

# Establishing an Estrous Synchronization Program

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**Vitor R. G. Mercadante**

**Department of Animal and  
Poultry Sciences**



**VirginiaTech**  
*Invent the Future*







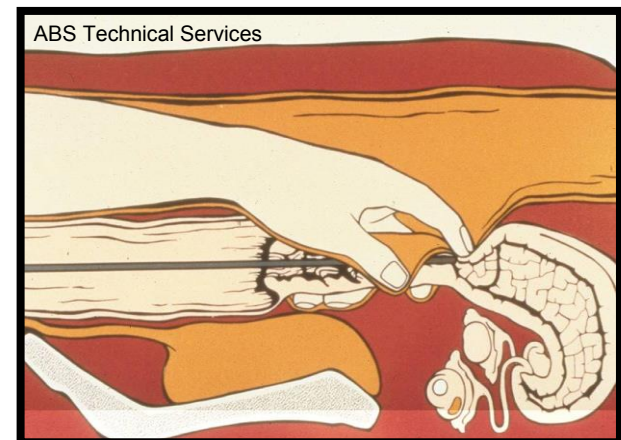
# Background

- **UNESP-Botucatu, Brazil**
  - **DVM - 2009**
- **University of Florida - NFREC**
  - **MS - 2012**
  - **PhD - 2015**
- **Virginia Tech - 2016**
  - **Assistant Professor**
  - **Beef Cattle Extension Specialist**



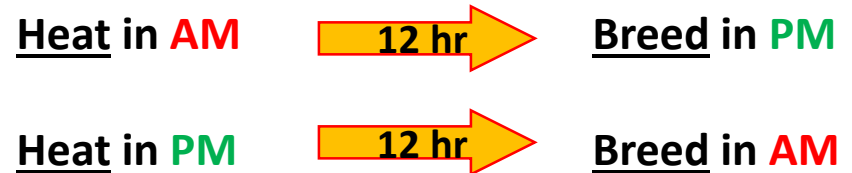
# Artificial Insemination

- Disease prevention
- Widespread selection of bulls
- Proven genetics
- Improves overall herd genetics
- Genetic selection of replacements heifers
- Crossbreeding



# Artificial Insemination

- Estrus/Heat Detection
  - AM-PM rule
- Stands to be mounted!
- Patience
- Do not distract cows
- At least two 45 minute sessions (AM-PM)
- Use secondary heat signs
- Use heat detection aids





# Artificial Insemination

- **Limitations of Estrus Detection**
  - **Accuracy**
  - **Time consuming**
  - **Estrus distribution**
  - **AI Technician**
  - **Anestrus**



# Estrous Synchronization

- **Pharmacological control of the Estrous Cycle**
- **Fixed-Timed Artificial Insemination – TAI**
- **Advantages**
  - No estrus detection
  - Optimization of labor
  - Induction of cyclicity
  - Calf crop uniformity
  - Shorten breeding and calving seasons
  - Go beyond genetic improvement





# Impact of TAI on Calving and Weaning

**Control**  
**n = 615**

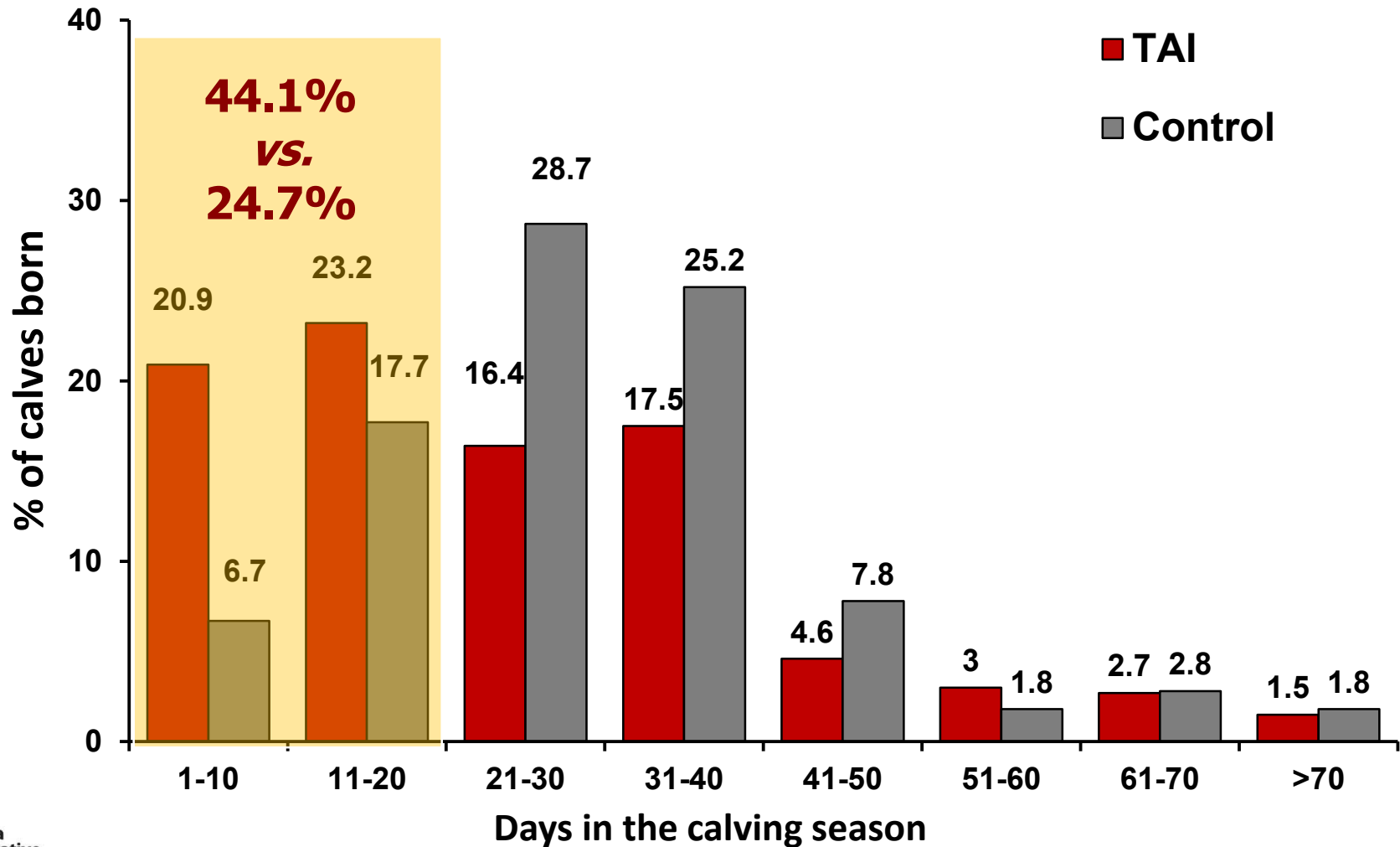


**TAI**  
**n = 582**





# Impact of TAI on Calving and Weaning



# Impact of TAI on Calving and Weaning

Item	Treatment	
	Control	TAI
No. of cows	615	582
Weaning rate, %	78 <sup>a</sup>	84 <sup>b</sup>
Weaning weight, lbs	387 ± 8 <sup>a</sup>	425 ± 8 <sup>b</sup>
<sup>ab</sup> Means within row differ ( $P < 0.01$ )		

**38 lbs**

- Partial budget analysis

**\$49.00**





# AI Cowculator

**UF** | IFAS Extension  
UNIVERSITY of FLORIDA

**UF** | IFAS Research  
UNIVERSITY of FLORIDA



Carrier 4:04 PM

**Cowculator**

**Natural Service Sire Costs**

**Bull Maintenance Costs:**

\$ per year

**Average Purchase Cost of Bull:**

\$ per bull

**Useful Life:**

years

Carrier 4:06 PM

**Cowculator**

**Artificial Insemination Related Costs**

**Additional Labor:**

\$ per artificially inseminated cow

**Facilities & Equipment:**

\$ per artificially inseminated cow

**Estrous Synchronization Products:**

\$ per artificially inseminated cow

Carrier 4:05 PM

**Cowculator**

**Cowherd Related Costs**

**Number Of Cows In The Herd:**

# of cows

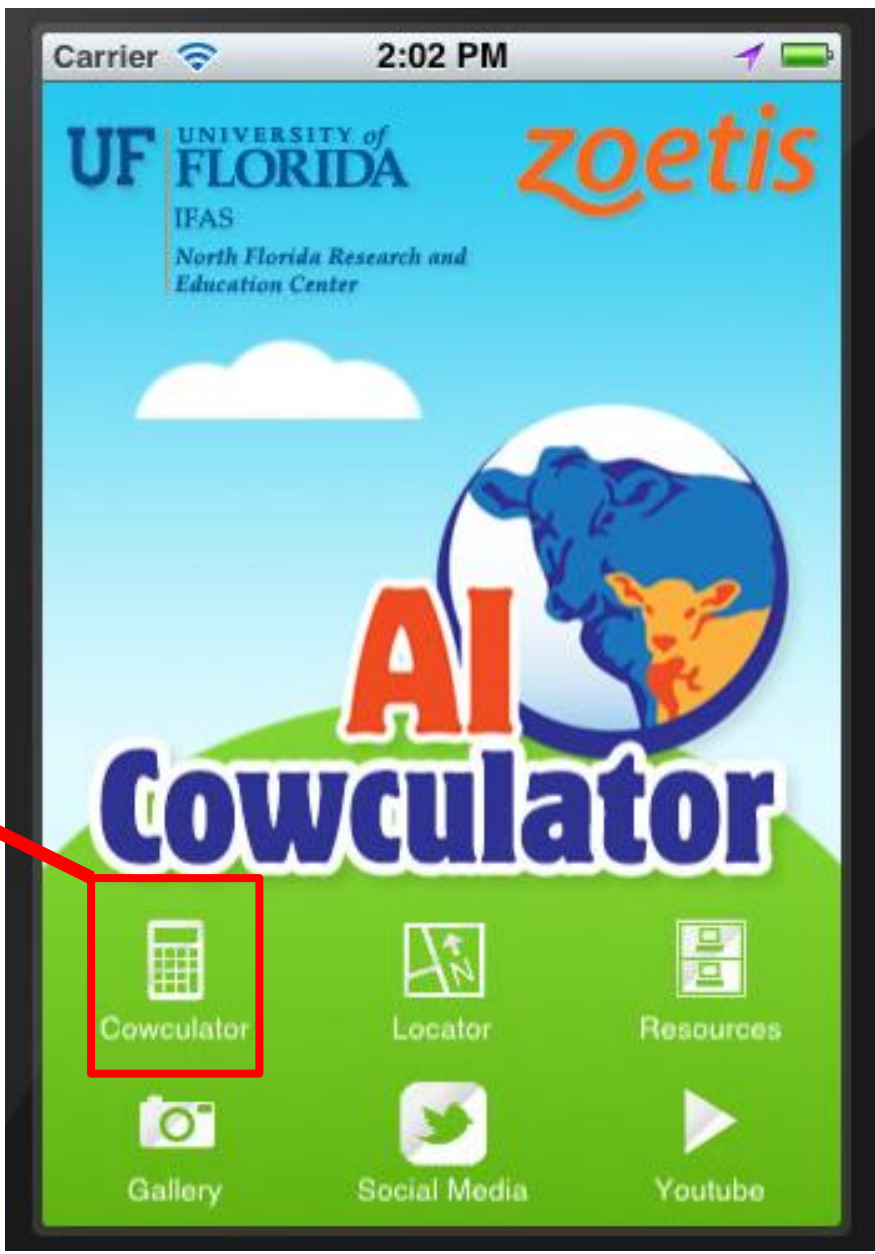
**Number Of Natural Service Bulls:**

# of bulls

**Expected Bulls For Clean-Up To AI:**

# of bulls

**Weaned Calf Crop:**





<http://nfrec.ifas.ufl.edu/programs/AICowculator.shtml>

## Bull Investment - Annual Bull and Per Cow Cost Calculator

### Natural Service Sire Costs

Bull Maintenance Costs	\$600.00
Average Purchase Cost of Bull	\$4,000.00
Useful Life	4
Salvage Value	\$105.00
Salvage Weight, Lb.	1,800
Interest Rate Used, %	6.0

### Cowherd Related Costs

Number Of Cows In The Herd	34
Number Of Natural Service Bulls	2
Expected Bulls For Clean-Up To AI	1
Weaned Calf Crop, %	87.5
Average Expected Weaning Weight, Lb.	500
Expected Price Of Weaned Calf, Per Cw	\$165.00

### Increased costs

Additional Labor	\$4.10
Facilities & Equipment	\$0.00
Estrous Synch Products	\$13.08
Semen	\$18.00
Artificial Insemination Technician	\$5.00

### Authors:

Dr. G. Cliff Lamb

Dr. Nicolas DiLorenzo

Darren D. Henry

Vitor R.G. Mercadante

Paula M. Mercadante

Francine Messias

## Partial Budget

### Decision Rule

Gain/Loss Per Exposed Cow	\$69.17
Gain/Loss Per Herd	\$2,351.78
<b>Derived Inputs</b>	
Increased Returns	\$64.17
Decreased Returns	\$0.00
Decreased Costs	\$45.18
Increased Costs	\$40.18



### Resources





# TAI Protocols for Beef Females

## BEEF COW PROTOCOLS - 2016

### HEAT DETECTION

**Select Synch**

**Select Synch + CIDR®**

**PG 6-day CIDR®**

Heat detect and AI days 0 to 3. Administer CIDR to non-responders and heat detect and AI days 9 to 12. Protocol may be used in heifers.

### HEAT DETECT & TIME AI (TAD)

**Select Synch & TAI**

Heat detect and AI day 6 to 10 and TAI all non-responders 72 - 84 hr after PG with GnRH at TAI

**Select Synch + CIDR® & TAI**

Heat detect and AI day 7 to 10 and TAI all non-responders 72 - 84 hr after PG with GnRH at TAI

**PG 6-day CIDR® & TAI**

Heat detect & AI days 0 to 3. Administer CIDR to non-responders & heat detect and AI days 9 to 12. TAI all non-responders 72 - 84 hr after PG with GnRH at TAI. Protocol may be used in heifers.

### FIXED-TIME AI (TAI)\*

**7-day CO-Synch + CIDR®**

Perform TAI at 60 ± 2 hr after PG with GnRH at TAI

**5-day CO-Synch + CIDR®**

Perform TAI at 72 ± 2 hr after CIDR removal with GnRH at TAI. Two injections of PG 8 ± 2 hr apart are required for this protocol.

### FIXED-TIME AI (TAI)\* for Bos Indicus cows only

**PG 5-day CO-Synch + CIDR®**

Perform TAI at 66 ± 2 hr after CIDR removal with GnRH at TAI. Two injections of PG 8 ± 2 hr apart are required for this protocol.

\* The time listed for "Fixed-time AI" should be considered as the approximate average time of insemination. This should be based on the number of cows to inseminate, labor, and facilities.

GnRH: Cystorelin®, Factrel®, Fertagyl®, OvaCyst®, GONABreed®  
PG: estroPLAN®, Estrumate®, In-Synch®, Lutalyse®, ProstaMate®

Approved 8-16-2015      Beef Reproduction Task Force

## BEEF HEIFER PROTOCOLS - 2016

### HEAT DETECTION

**1 Shot PG**

**7-day CIDR®-PG**

**MGA®-PG**

### HEAT DETECT & TIME AI (TAD)

**Select Synch + CIDR® & TAI**

Heat detect and AI day 7 to 10 and TAI all non-responders 72 - 84 hr after PG with GnRH at TAI

**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®-PG & TAI**

Heat detect and AI day 30 to 33 and TAI all non-responders 72 hrs after PG with GnRH at TAI

### FIXED-TIME AI (TAI)\* Short-term Protocols

**7-day CO-Synch + CIDR®**

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

**5-day CO-Synch + CIDR®**

Perform TAI at 60 ± 4 hr after CIDR removal with GnRH at TAI. Two injections of PG 8 ± 2 hr apart are required for this protocol.

### FIXED-TIME AI (TAI)\* Long-term Protocols

**14-day CIDR®-PG**

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

**MGA®-PG**

Perform TAI at 72 ± 2 hr after PG with GnRH at TAI

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GnRH: Cystorelin®, Factrel®, Fertagyl®, OvaCyst®, GONABreed®  
PG: estroPLAN®, Estrumate®, In-Synch®, Lutalyse®, ProstaMate®

Approved 8-16-2015      Beef Reproduction Task Force

[www.beefrepro.unl.edu](http://www.beefrepro.unl.edu)



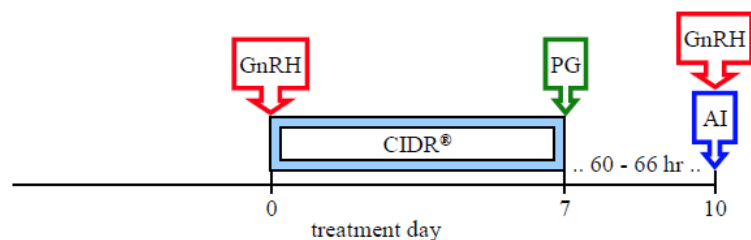


# TAI Protocols for Beef Cows

## FIXED-TIME AI (TAI)\*

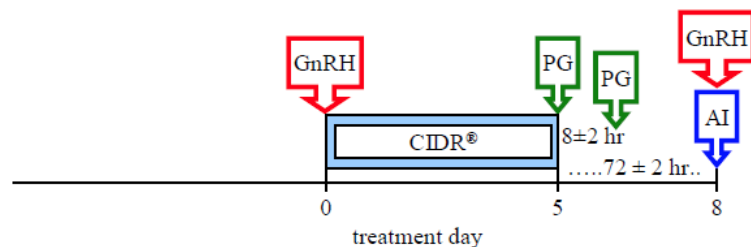
### 7-day CO-Synch + CIDR®

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



### 5-day CO-Synch + CIDR®

Perform TAI at 72 ± 2 hr after CIDR removal with GnRH at TAI. Two injections of PG 8 ± 2 hr apart are required for this protocol.



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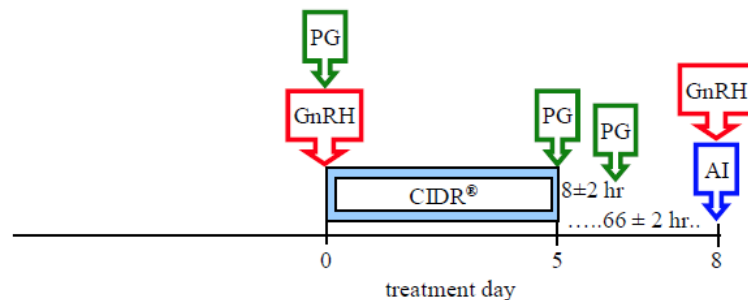
Beef Reproduction Task Force

## FIXED-TIME AI (TAI)\*

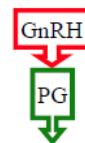
for *Bos Indicus* cows only

### PG 5-day CO-Synch + CIDR®

Perform TAI at 66 ± 2 hr after CIDR removal with GnRH at TAI. Two injections of PG 8 ± 2 hr apart are required for this protocol.



\* The time listed for "Fixed-time AI" should be considered as the approximate average time of insemination. This should be based on the number of cows to inseminate, labor, and facilities.



Cystorelin®, Factrel®, Fertagyl®, OvaCyst®,  
GONABreed®

estroPLAN®, Estrumate®, In-Synch®,  
Lutalyse®, ProstaMate®

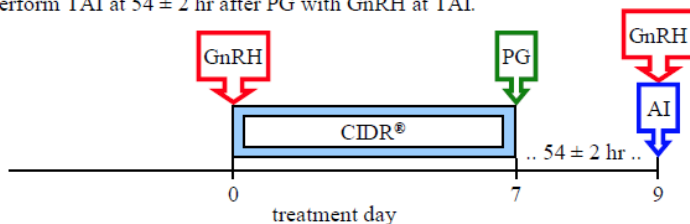
# TAI Protocols for Beef Heifers

## FIXED-TIME AI (TAI)\*

### Short-term Protocols

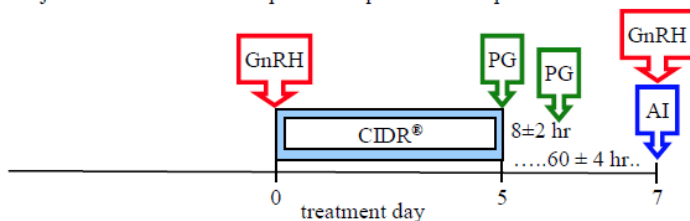
#### **7-day CO-Synch + CIDR®**

Perform TAI at  $54 \pm 2$  hr after PG with GnRH at TAI.



#### **5-day CO-Synch + CIDR®**

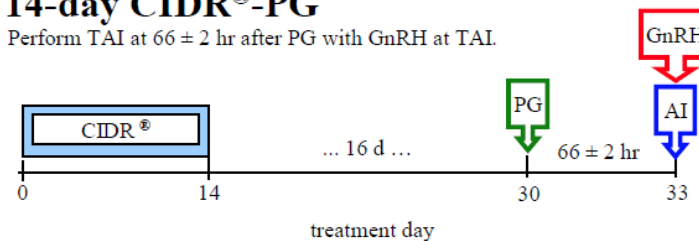
Perform TAI at  $60 \pm 4$  hr after CIDR removal with GnRH at TAI. Two injections of PG  $8 \pm 2$  hr apart are required for this protocol.



### Long-term Protocols

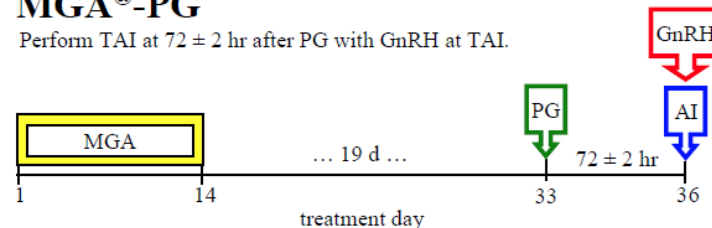
#### **14-day CIDR®-PG**

Perform TAI at  $66 \pm 2$  hr after PG with GnRH at TAI.

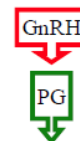


#### **MGA®-PG**

Perform TAI at  $72 \pm 2$  hr after PG with GnRH at TAI.



\* The times listed for “Fixed-time AI” should be considered as the approximate average time of insemination. This should be based on the number of heifers to inseminate, labor, and facilities.



Cystorelin®, Factrel®, Fertagyl®, OvaCyst®, GONABreed®

estroPLAN®, Estrumate®, In-Synch®, Lutalyse®, ProstaMate®

Approved 8-16-2015

Beef Reproduction Task Force

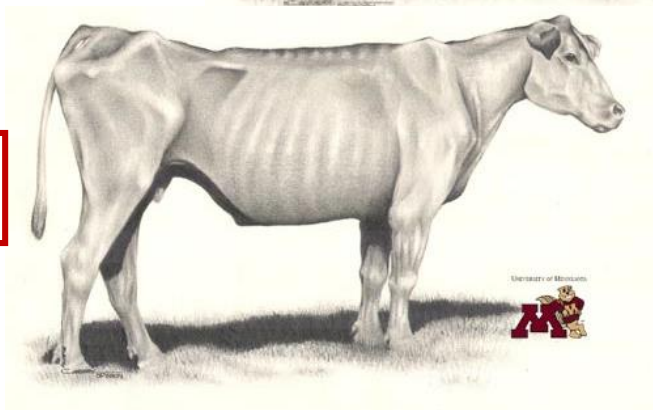
# Establishing a TAI Program

## Nutrition, Nutrition, Nutrition!!

**BCS 5**



**BCS 1**



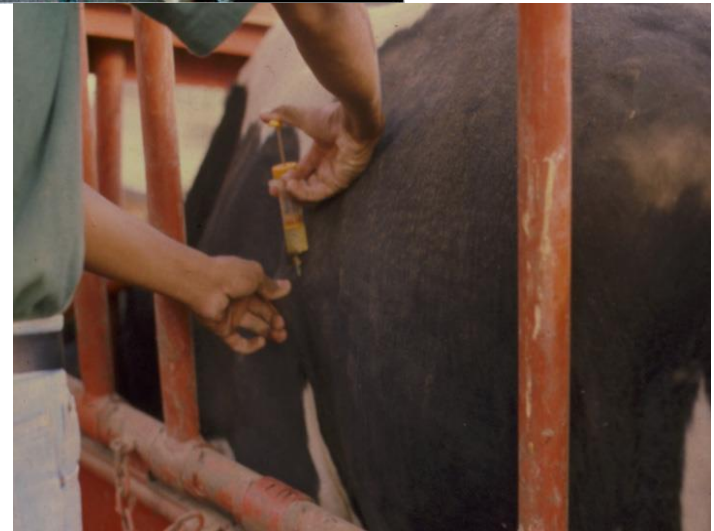
**BCS 9**



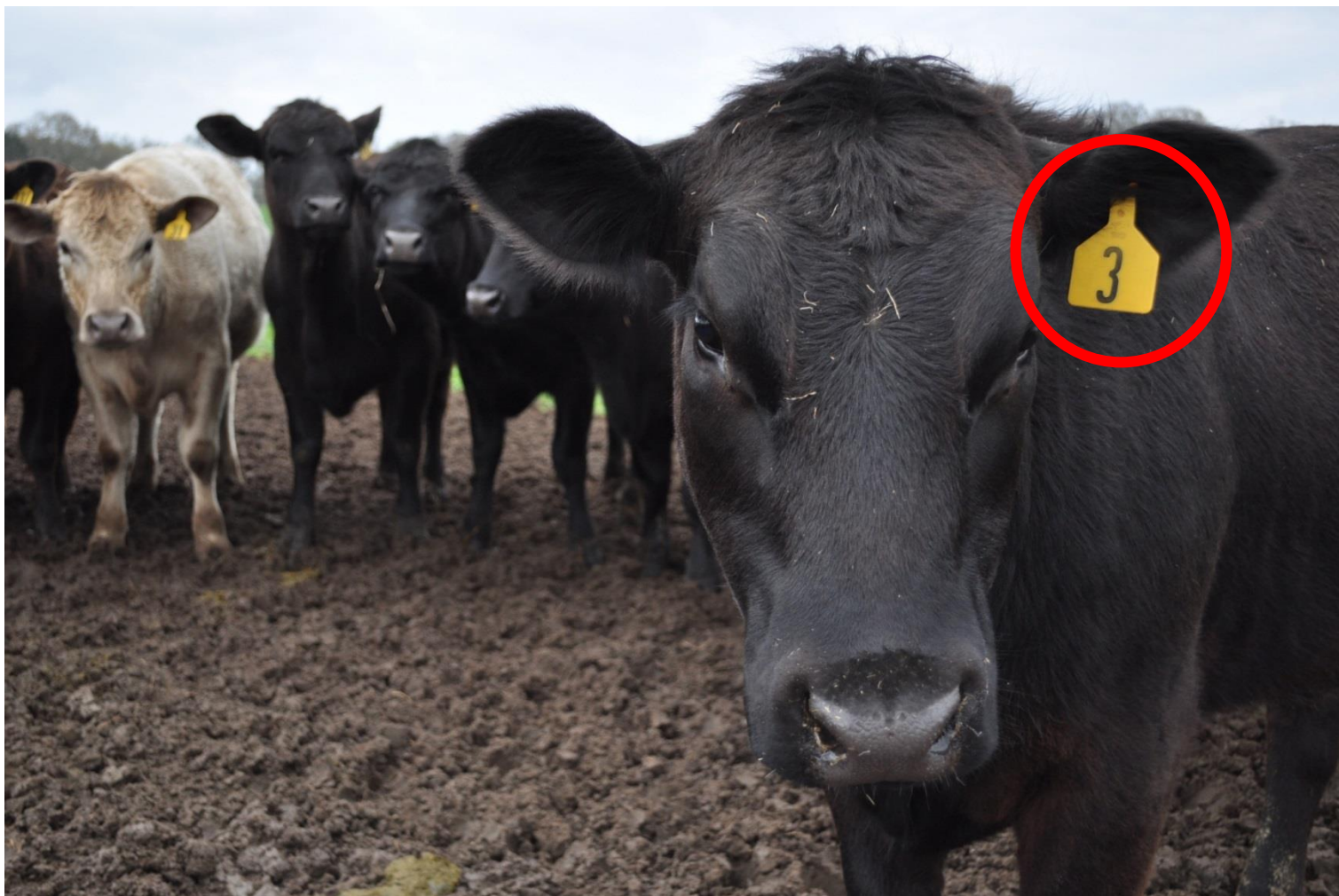


# Establishing a TAI Program

## A Sound Herd Health Program



## Individual Identification





# Establishing a TAI Program

## Accurate Records





# Establishing a TAI Program

## Reliable Facilities



# Establishing a TAI Program

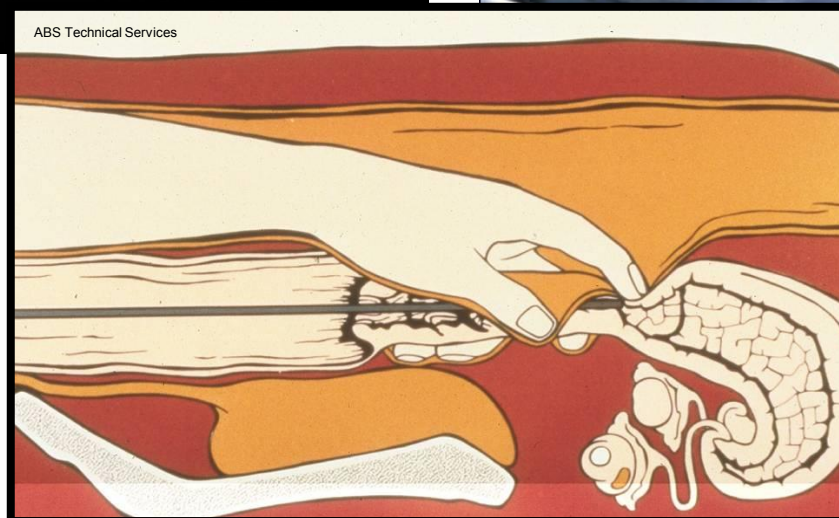
## Reliable Facilities





# Establishing a TAI Program

## Sound AI Technician





# UF-NFREC CASE STUDY



# UF-NFREC CASE STUDY

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**2006**

Start breeding  
season

Remove  
bulls



1

120

**2007**

Start breeding  
season

Remove  
bulls



1

120

**2008**

TAI heifers

TAI cows

TAI late  
calving cows

TAI late, late  
calving cows

Remove  
bulls



1

8

49

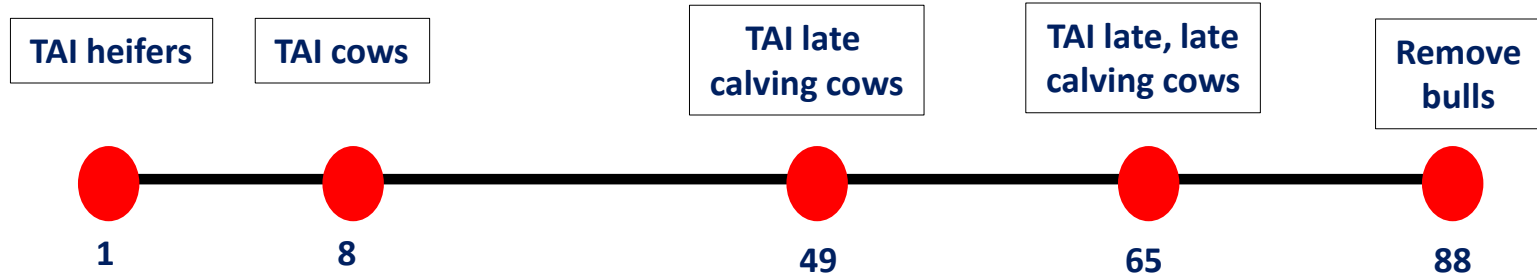
70

110

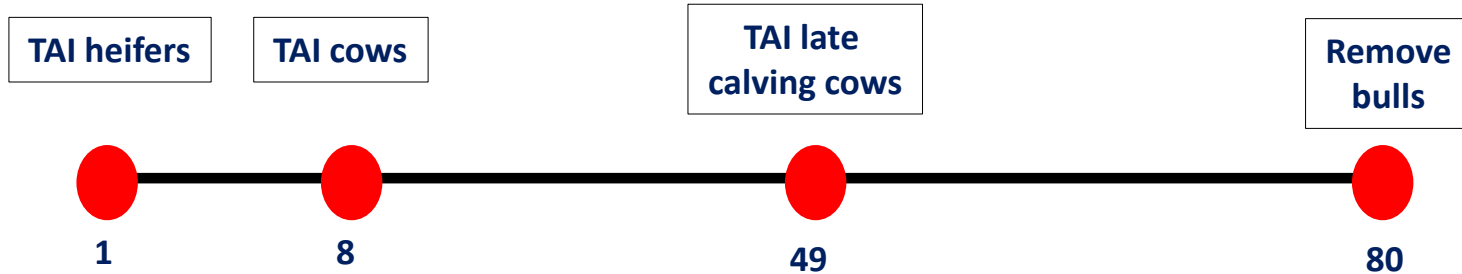
# UF-NFREC CASE STUDY

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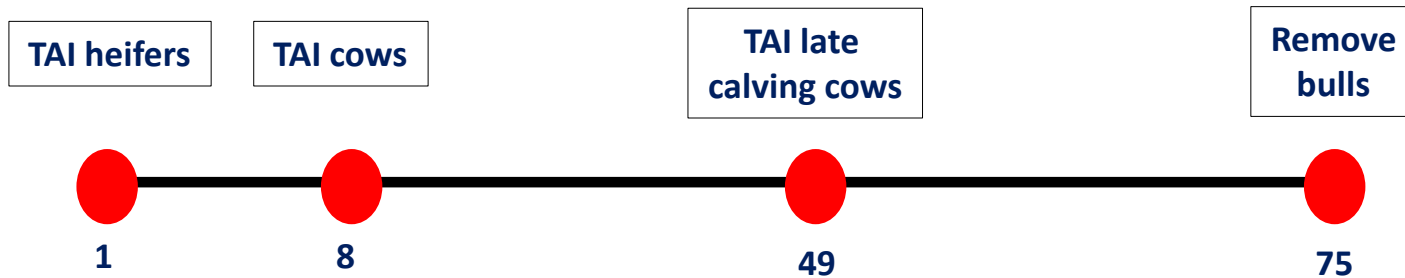
**2009**



**2010**



**2011**





# UF-NFREC CASE STUDY

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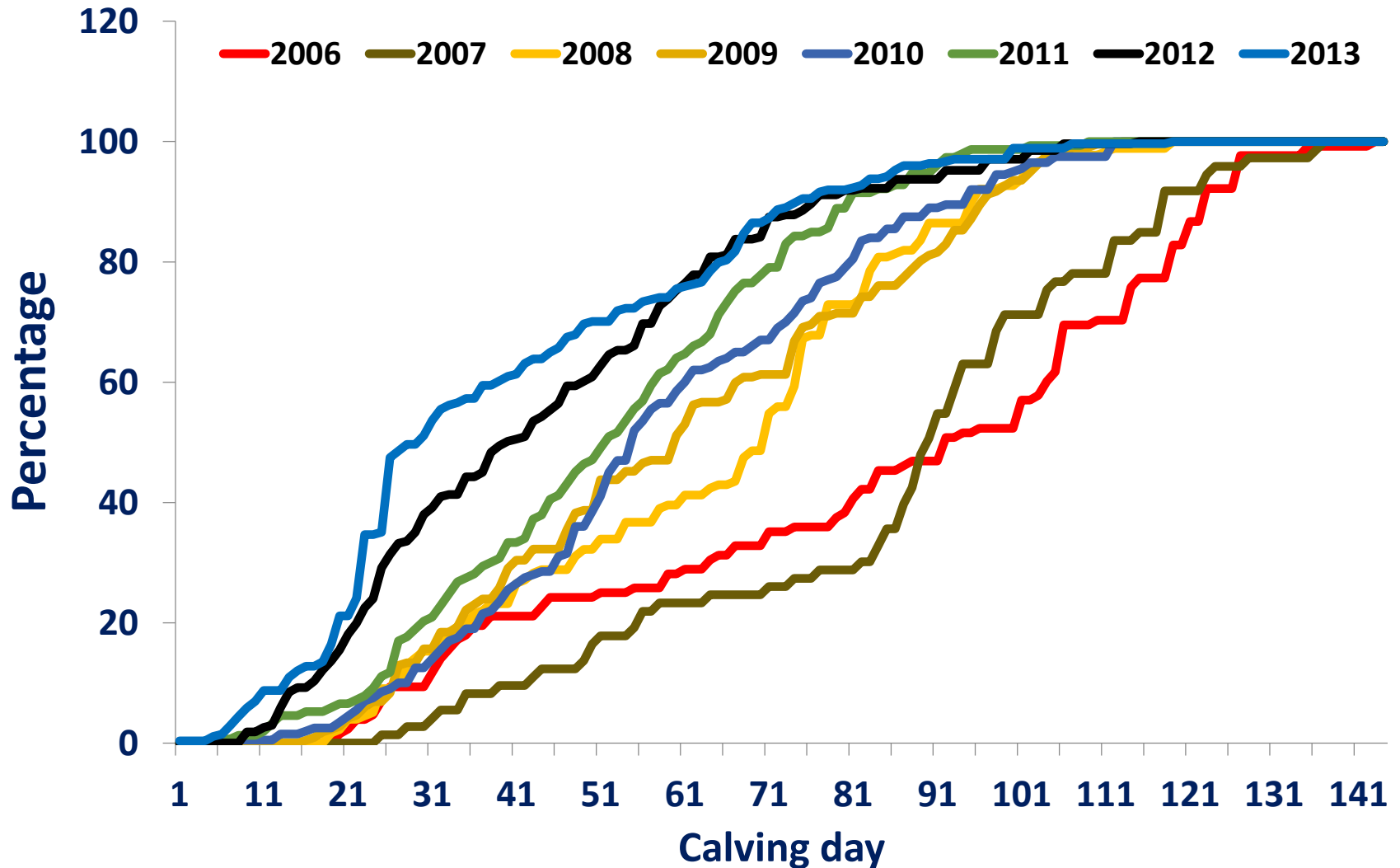
**2012**



**2013**



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# UF-NFREC CASE STUDY

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**Breeding season pregnancy rates:**

<b>Year</b>	<b>2006</b>	<b>2007</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>
<b>Breeding season length</b>	<b>120</b>	<b>120</b>	<b>110</b>	<b>88</b>	<b>80</b>	<b>75</b>	<b>70</b>	<b>72</b>
<b>Pregnancy rates</b>	<b>81%</b>	<b>86%</b>	<b>84%</b>	<b>86%</b>	<b>82%</b>	<b>94%</b>	<b>92%</b>	<b>93%</b>
<b>Mean calving day</b>	<b>79.2</b>	<b>80.9</b>	<b>59.2</b>	<b>56.2</b>	<b>53.7</b>	<b>47.2</b>	<b>39.5</b>	<b>38.7</b>

# UF-NFREC CASE STUDY

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## Change in calf value:

Year	2006	2007	2008	2009	2010	2011	2012	2013
Mean calving day	79.2	80.9	59.2	56.2	53.7	47.2	39.5	38.7
Difference from 2006/2007	0	0	21.7	24.7	27.2	33.7	41.4	42.2
Per calf increase in value	0	0	\$65	\$74	\$82	\$101	\$124	\$127
Herd increase in value	0	0	\$19,530	\$22,230	\$24,480	\$30,330	\$37,260	\$37,980



# Stablishing a TAI Program

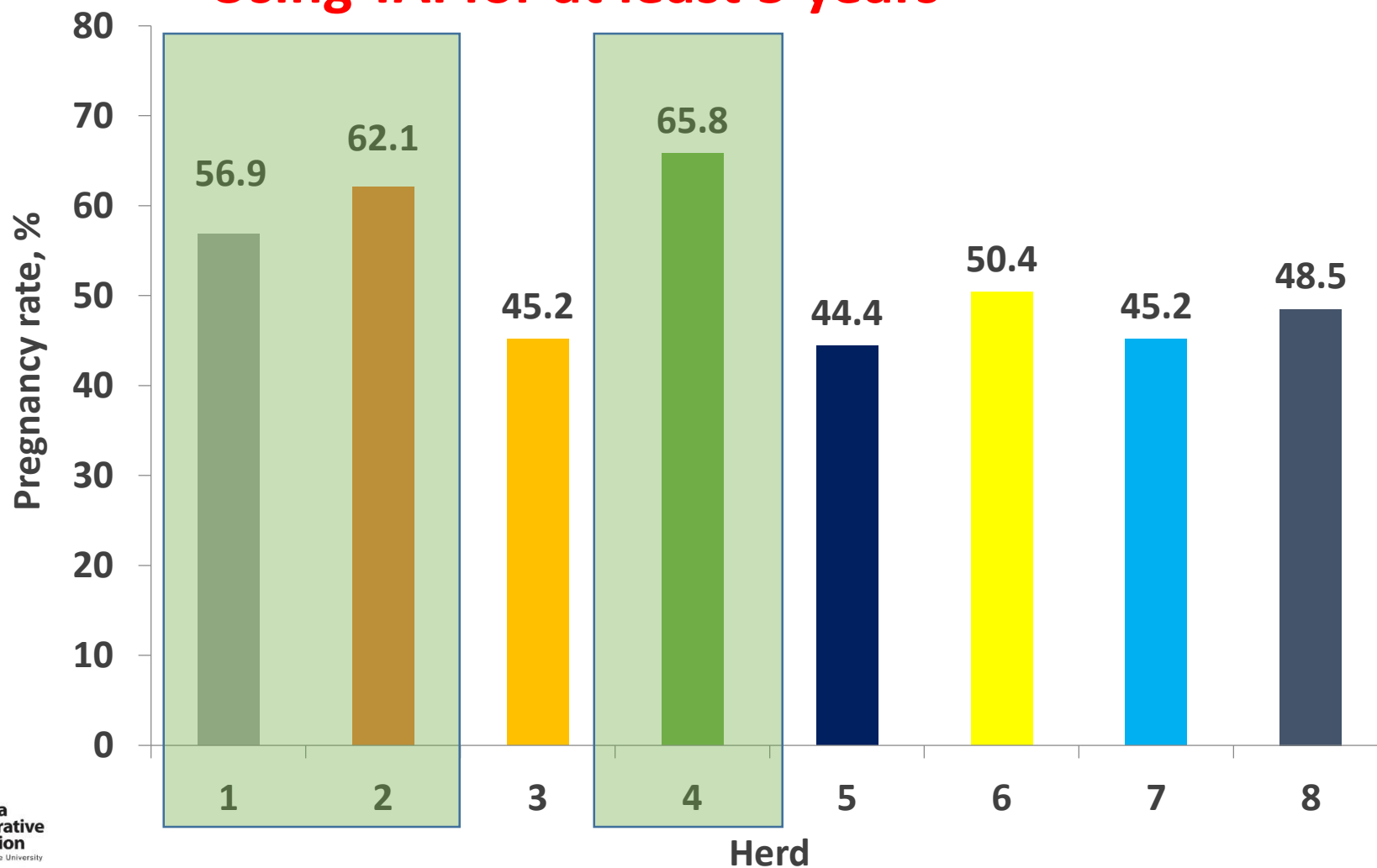


- South Dakota
- 1,700 cows in 8 operations

# Stablishing a TAI Program

## TAI PREGNANCY RATES BY HERD

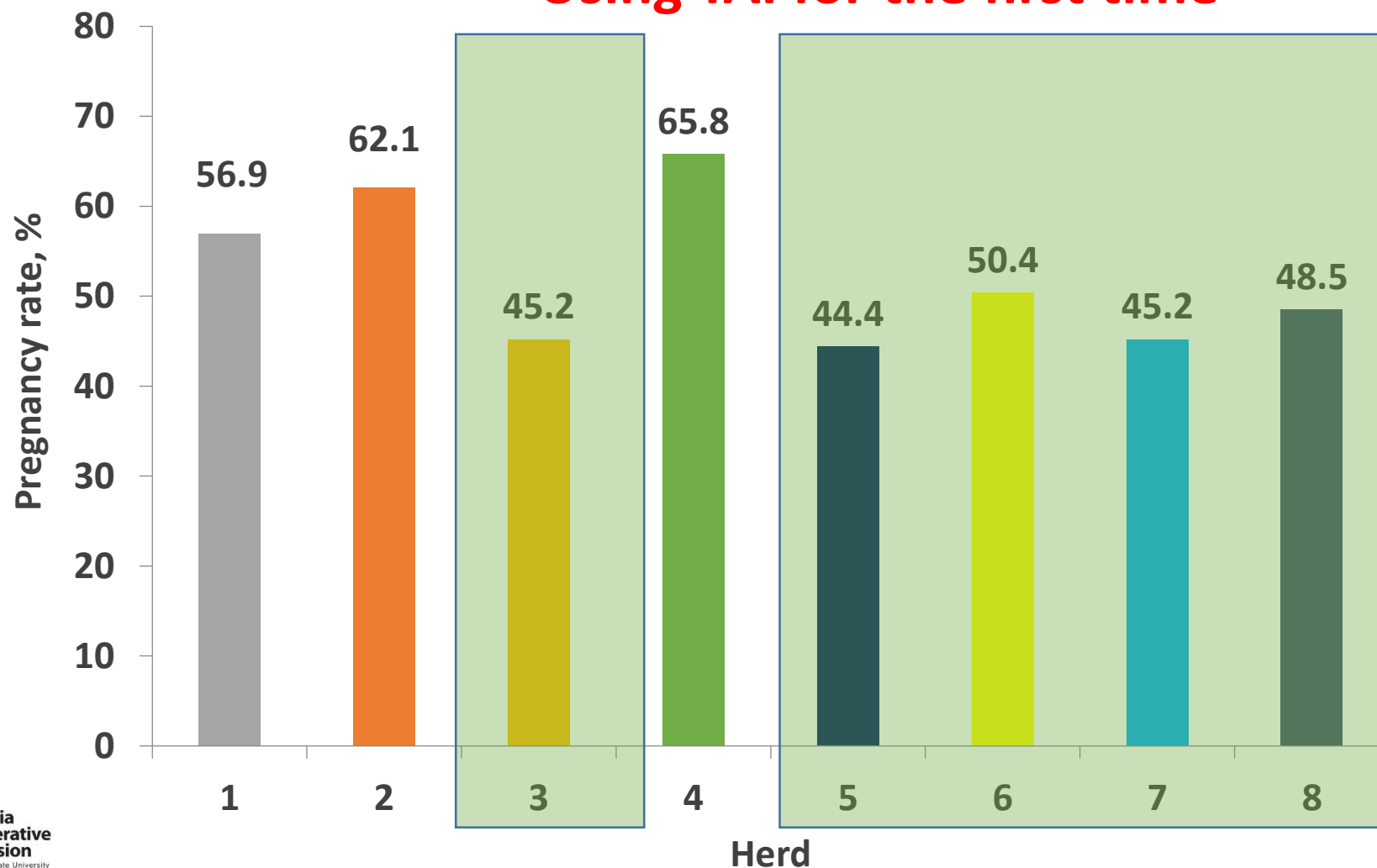
Using TAI for at least 5 years



# Stablishing a TAI Program

## TAI PREGNANCY RATES BY HERD

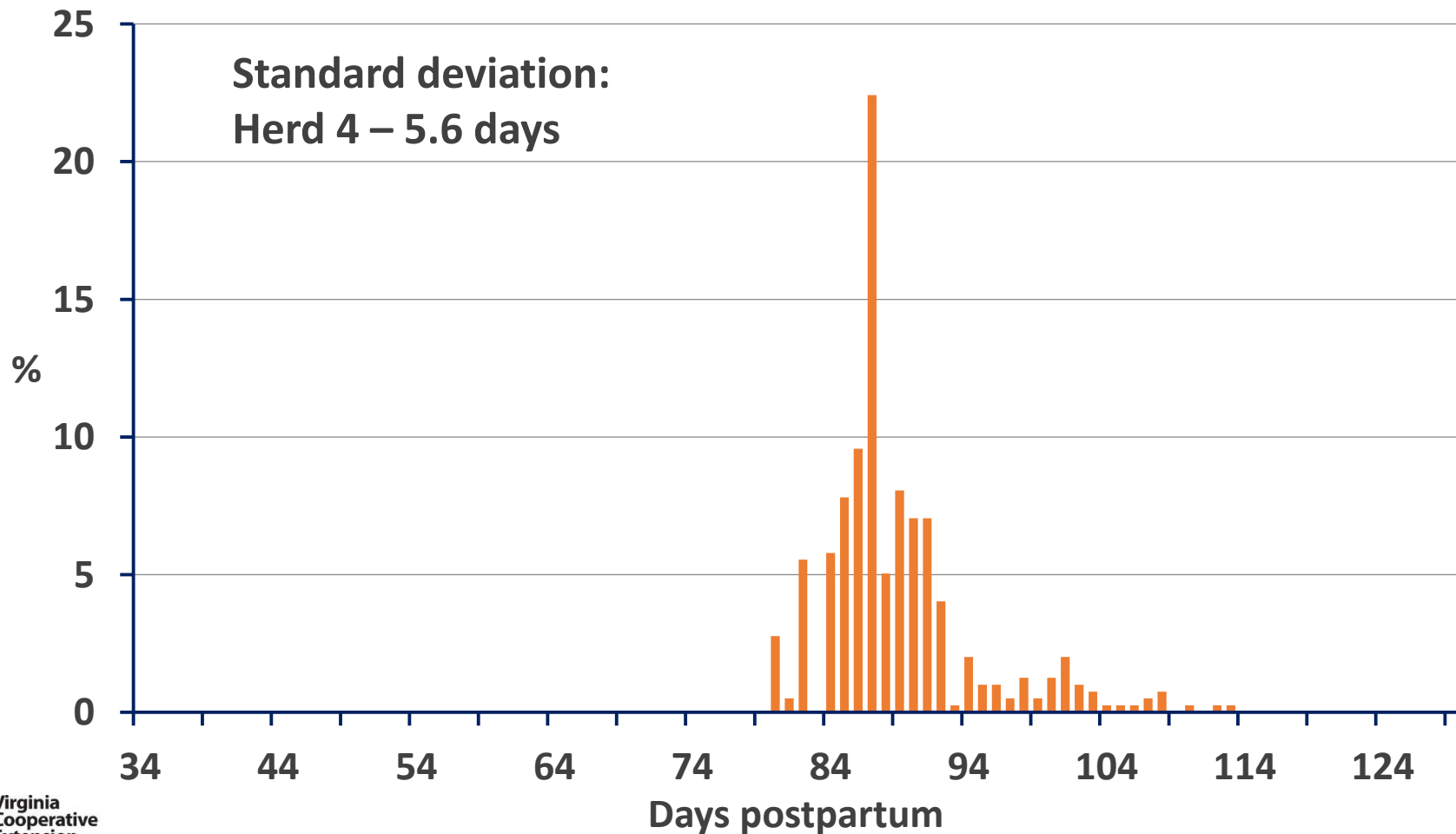
Using TAI for the first time





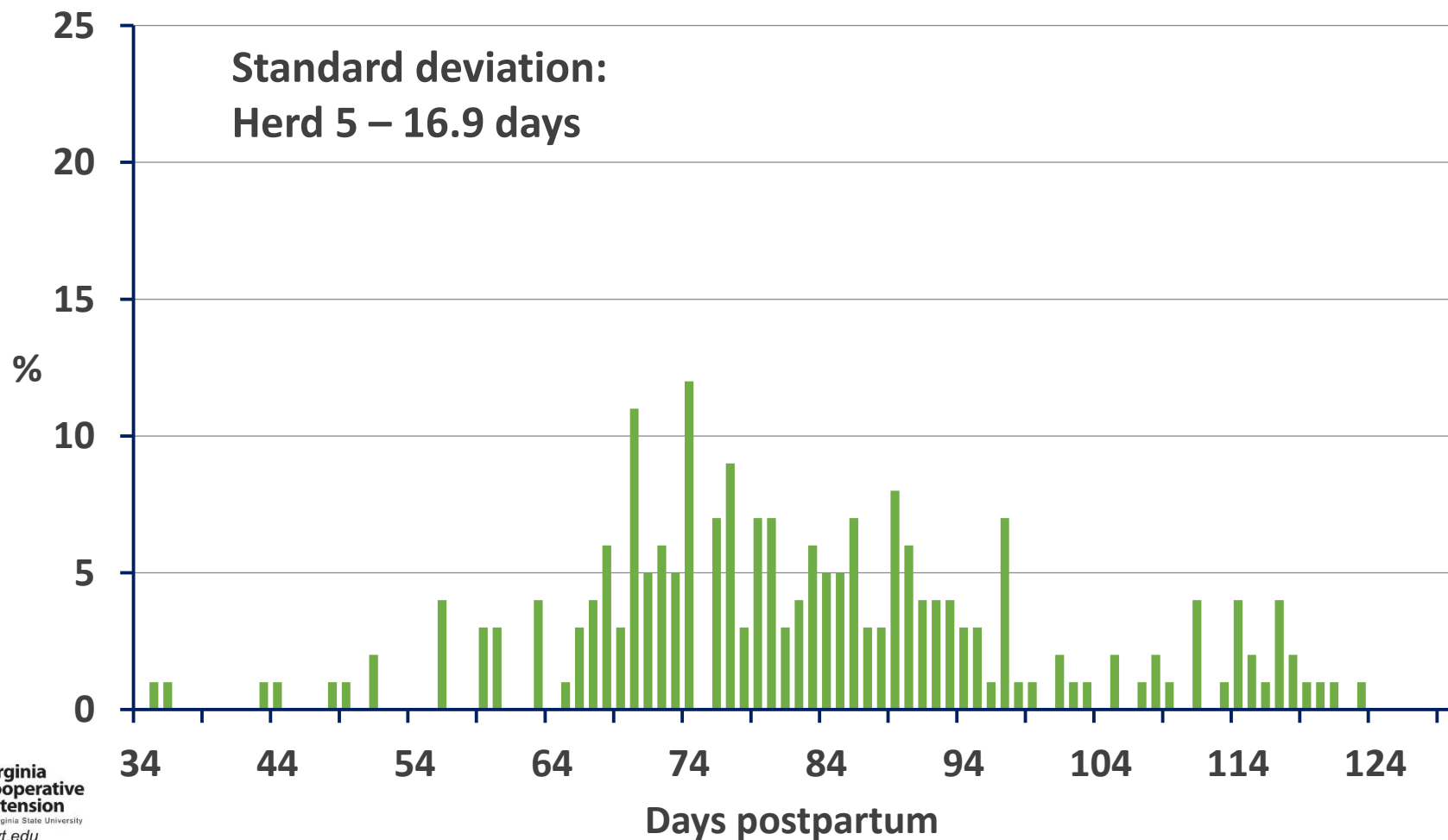
## DISTRIBUTION OF DAYS POSTPARTUM

- **HERD 4 – 65.8% PR, TAI FOR 7 YEARS**



## DISTRIBUTION OF DAYS POSTPARTUM

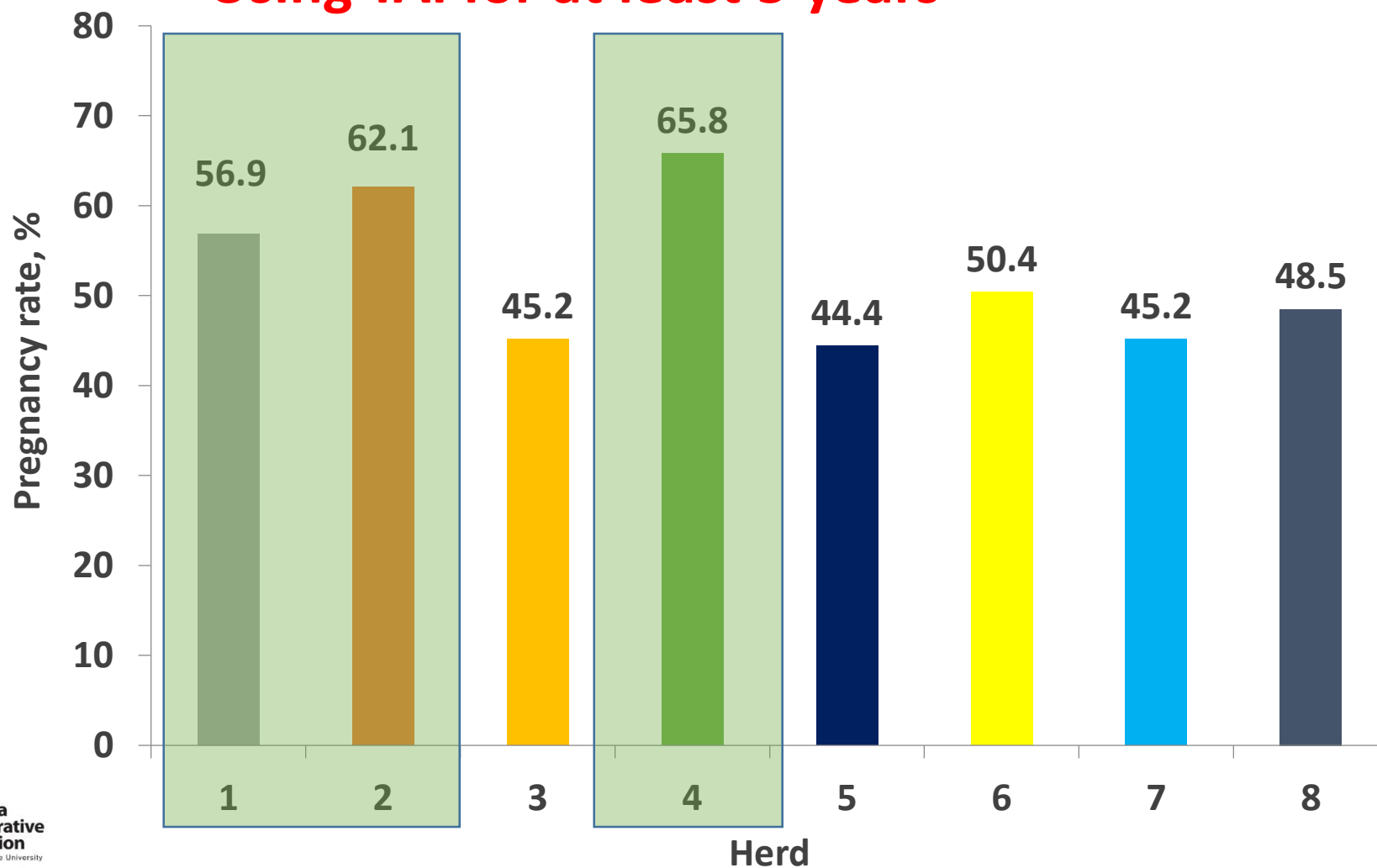
- HERD 5 – 44.4% PR, TAI FOR THE FIRST TIME



# Stablishing a TAI Program

## TAI PREGNANCY RATES BY HERD

Using TAI for at least 5 years





# Estrous Synchronization and TAI

- **Powerful tool**
- **Advantages go beyond genetic improvement**
- **Shorten breeding and calving seasons**
  - **Uniformity**
  - **More lbs of calf per cow exposed**
- **Nutrition**
- **Herd health**
- **Process**



## Beef Reproduction Task Force

[www.beefrepro.unl.edu](http://www.beefrepro.unl.edu)

## South East Cattle Advisor

[www.secattleadvisor.com](http://www.secattleadvisor.com)

# Contact Information

**Vitor R.G. Mercadante**  
**mercadante@vt.edu**  
**(540) 231-9153**

