



**Victor Cabrera**  
Assistant  
Professor  
Management



**Paul Fricke**  
Professor  
Reproductive  
Physiology



**Pam Ruegg**  
Professor  
Physiology and  
Management



**Randy Shaver**  
Professor  
Nutrition



**Milo Wiltbank**  
Professor  
Reproductive  
Physiology



**Kent Weigel**  
Professor and  
Chair  
Breeding and  
Genetics



United States Department of Agriculture  
National Institute of Food and Agriculture

Connie Cordoba, M.V, Ms, Outreach Specialist; Alexandre Souza, Post Doctoral fellow; Maria José Fuenzalida Valenzuela, Ph.D. Student; Saleh Shahinfar, Ph.D. Student; Afshin Kalantari, Ph.D. Student; Carol Hulland, Milk Quality Laboratory Technician

## OVERALL OBJECTIVE

To improve reproductive efficiency of lactating dairy cows using an interdisciplinary extension and research team that will identify and remove barriers to reproductive success and link outcomes of basic and applied research with an innovative extension delivery program

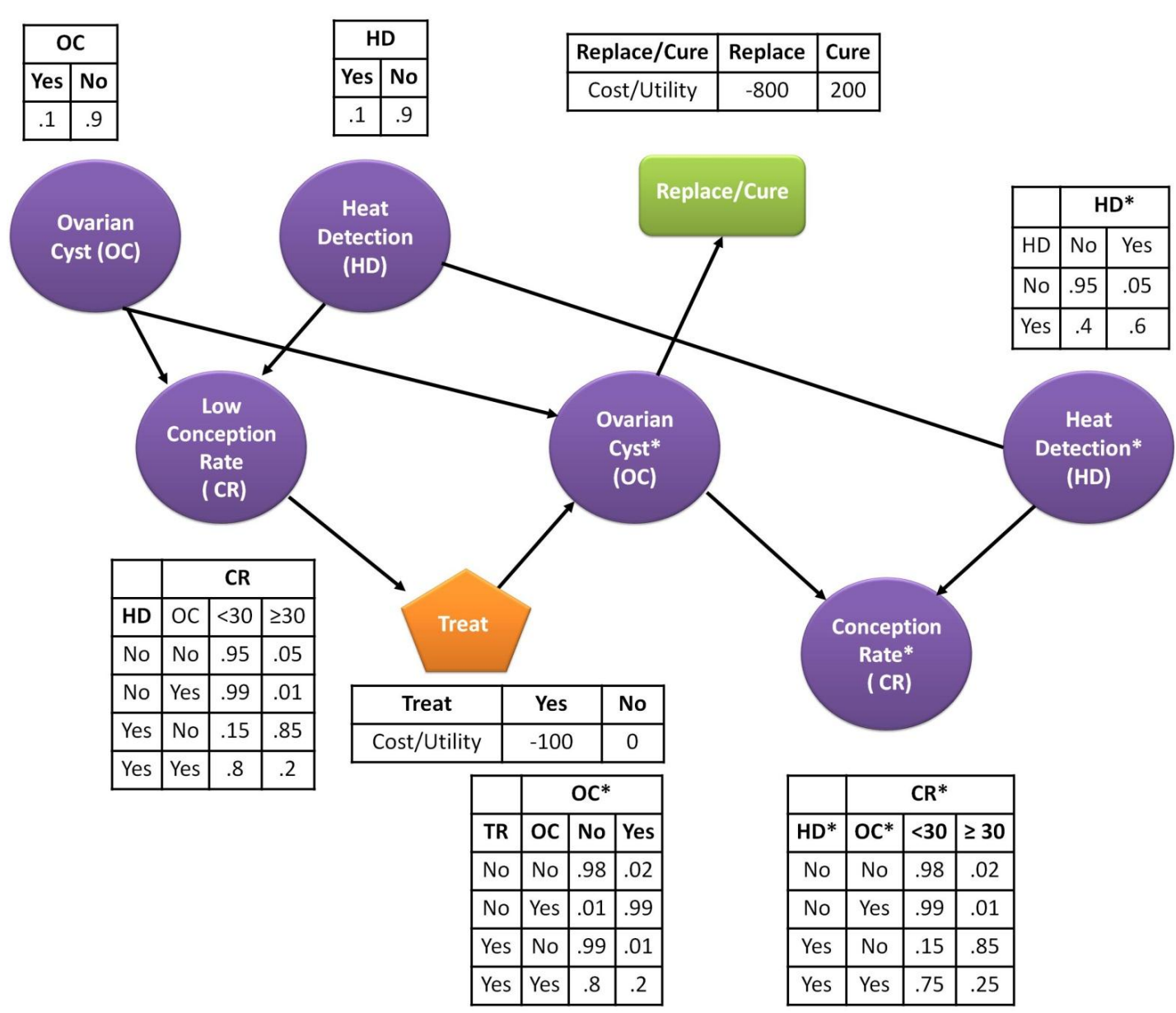
### Specific Aim 1

Characterize the contributions of specific management factors to the observed variation between commercial dairy farms in cow fertility.

Aim leaders: K.A Weigel and V.E Cabrera  
Ph.D. Students: Saleh Shahinfar and Afshin Kalantari

#### Facilitating Reproductive Decisions on Commercial Farms using Influence Diagrams:

Influence diagrams identify key elements of a reproductive program, including interrelationships between these factors and uncertainties regarding their effects on fertility. Decisions using these diagrams could include keep/cull a given cow, treat/don't treat a specific health disorder, breed/don't breed a particular cow that is in heat, etc. An example influence diagram is shown below:



The conditional probability distribution of conception rate is affected by **heat detection rate** and presence or absence of **ovarian cysts**. In the transition from one state space to the next, the conditional posterior probabilities are influenced directly by the conditional probabilities at the new state spaces (denoted with asterisks) and indirectly by the decision of whether or not to treat the animal for ovarian cysts. This leads to a final conditional probability table based on all prior and posterior conditional probabilities and decisions that were made. **In this aim, influence diagrams are being used to evaluate reproduction-related management decisions based on the benefits of alternative actions and the probability of various events.**

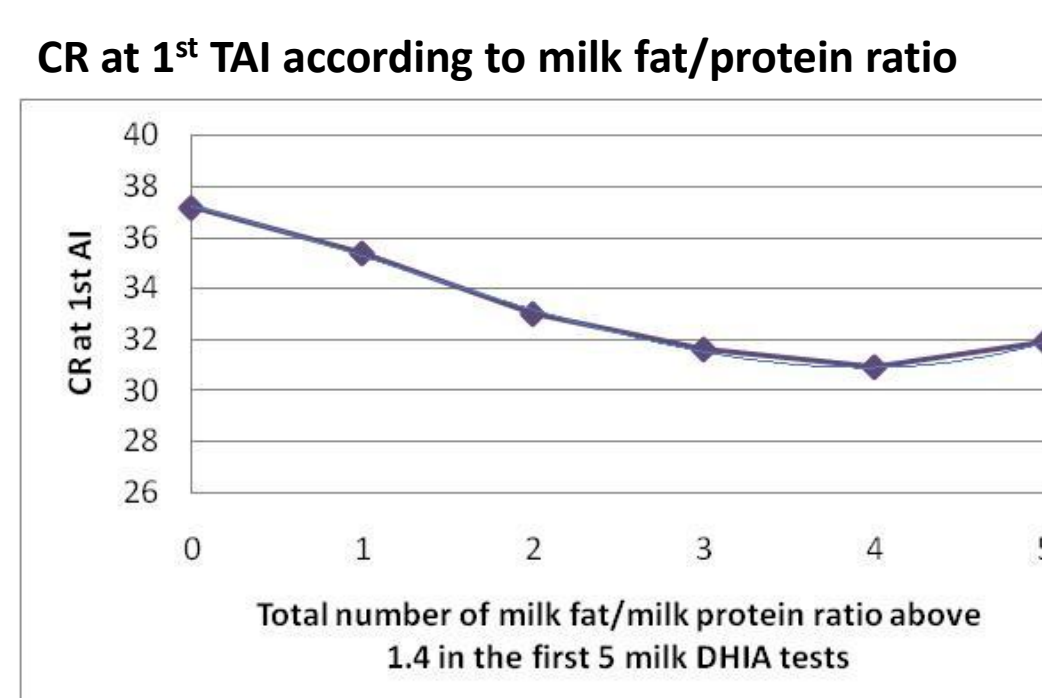
These analyses are being conducted using USDA-AIPL data from ±4,400 herds in the Midwest being provided by AgSource Cooperative Services, Verona, WI.

### Specific Aim 2

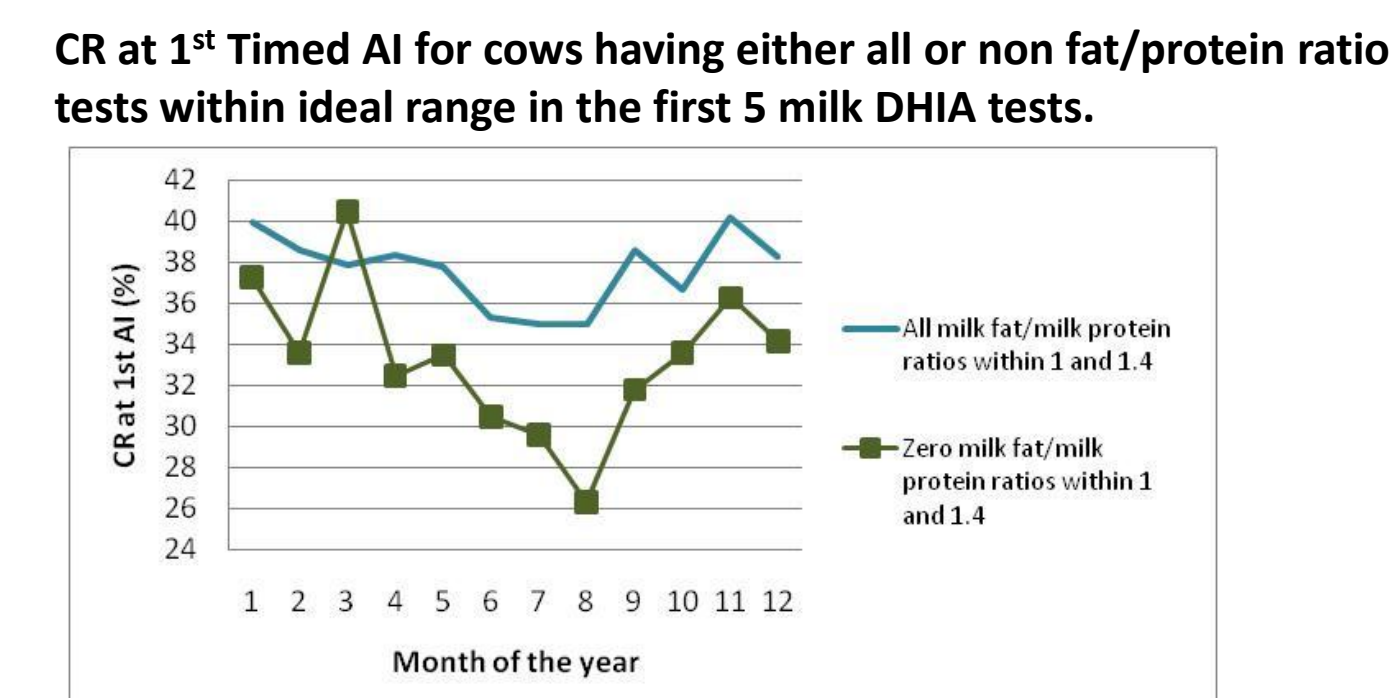
Determine the impact of specific nutritional components on reproductive performance of lactating dairy cows.

Aim leaders: R.D. Shaver and M.C. Wiltbank  
Post Doctoral fellow: Alexandre Souza

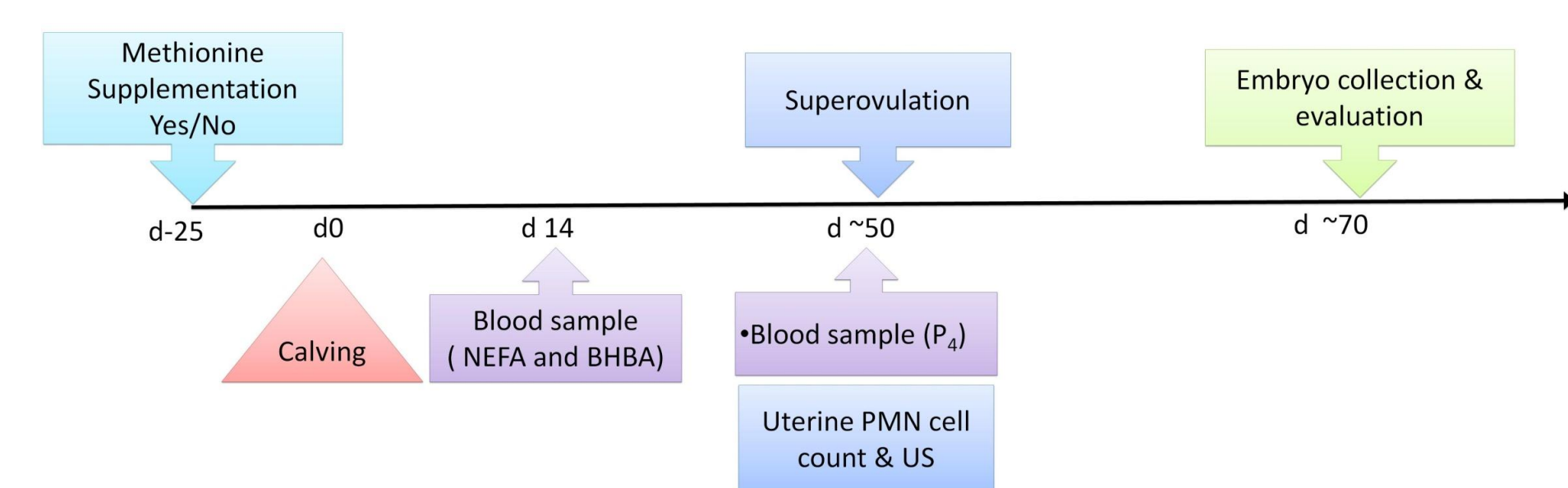
**Experiment 1:** To test whether if milk fat/milk protein ratios indicative of metabolic disorders or nutritional origin such as ketosis (ratio >1.4) and/or subclinical acidosis (ratio <1.0) have an impact in conception rate (CR) at 1<sup>st</sup> postpartum artificial insemination AI.



N=300,000 1<sup>st</sup> postpartum services from first 5 milk tests provided by AgSource Cooperative Services, Verona, WI



**Experiment 2:** Protocol to evaluate the effects of supplementing Methionine near calving on uterine health and embryo quality in high producing cows.

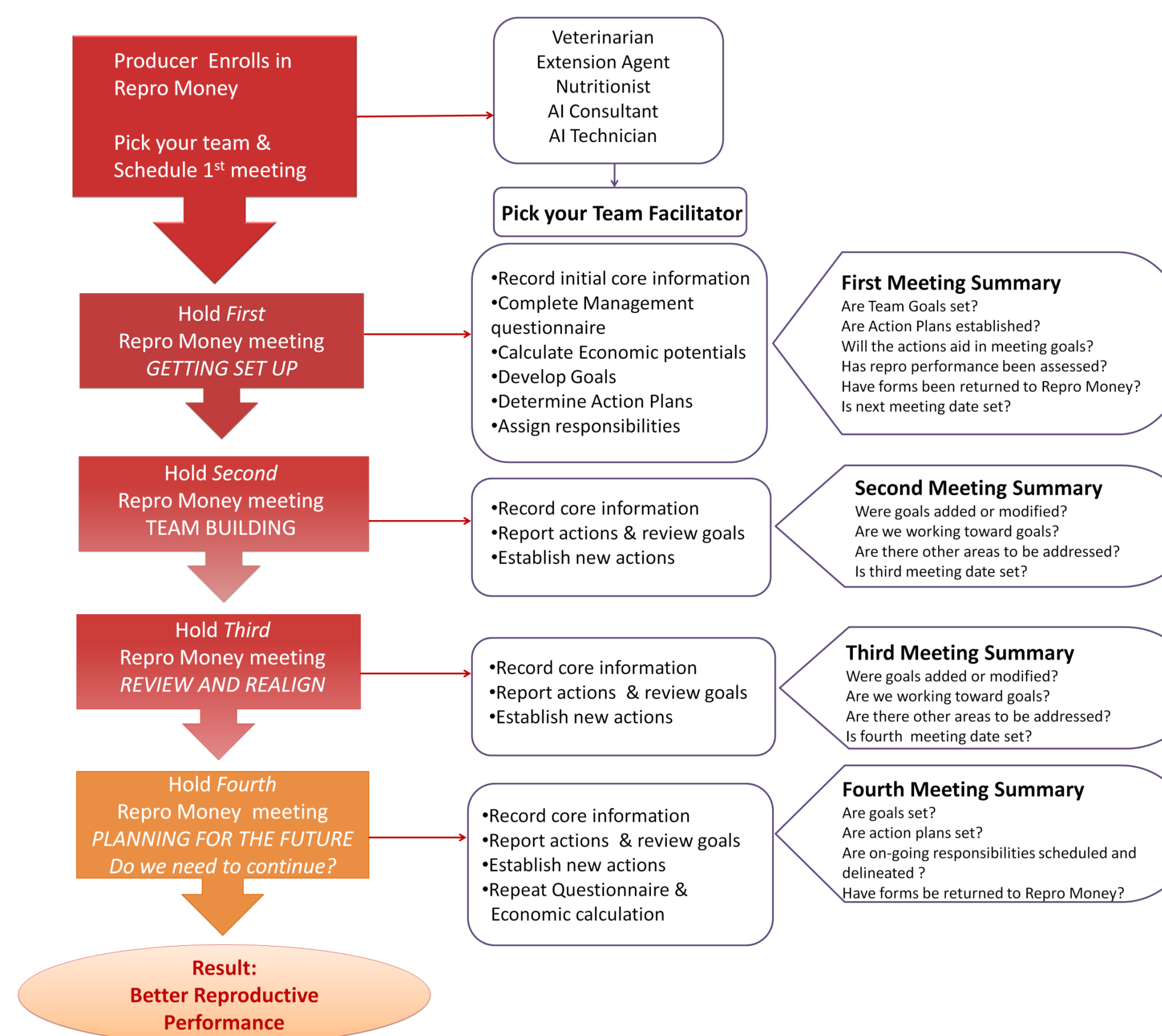


### Specific Aim 5- REPRO MONEY

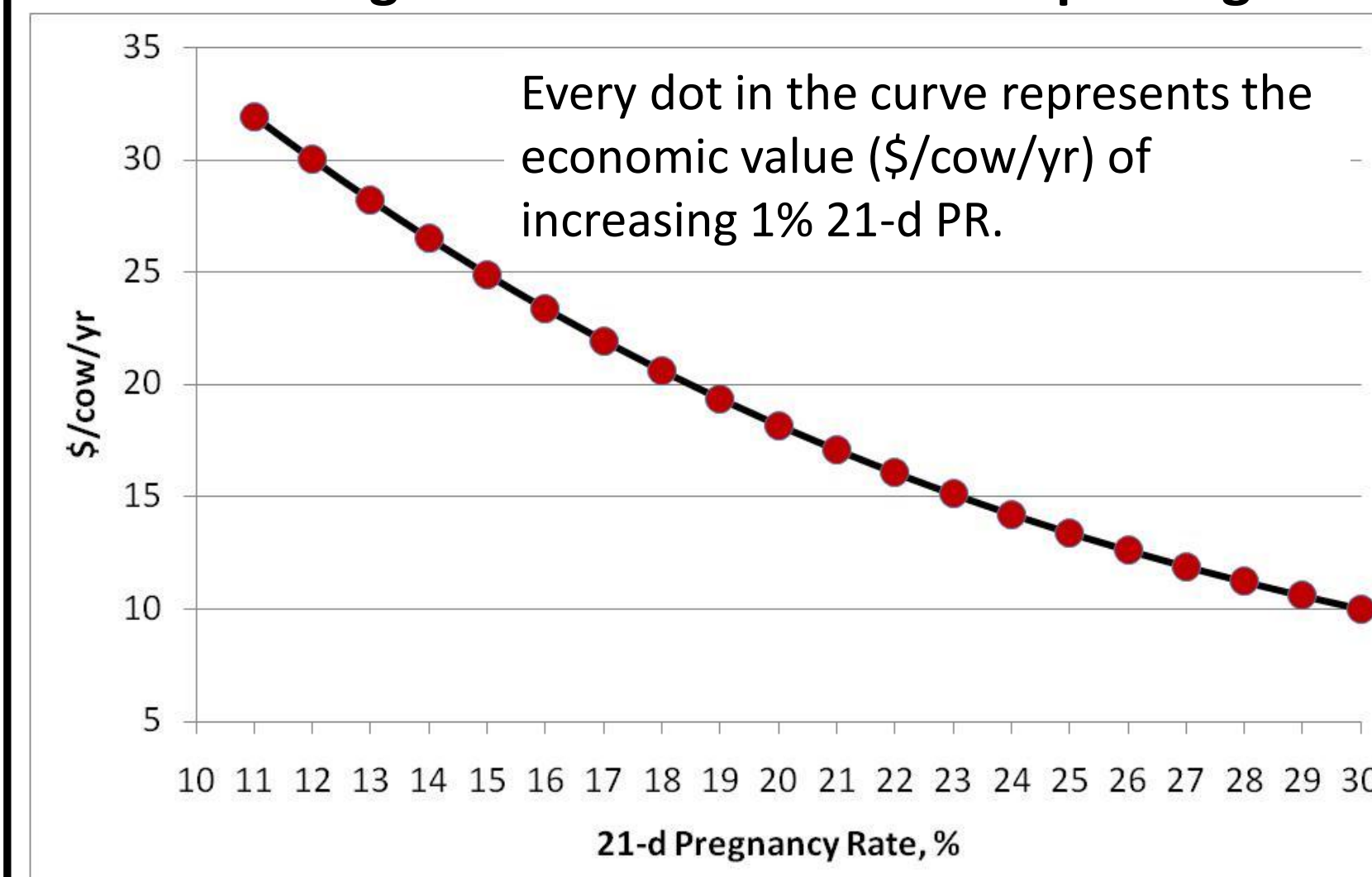
A team based Program to Improve the Reproductive Performance of Dairy Herds

Aim leaders: V.E. Cabrera, P.M. Fricke, P.L. Ruegg, R.D. Shaver and K.A. Weigel.  
Extension Outreach Specialist: Connie Cordoba

#### Repro Money Road Map:



#### Marginal Economic Value of Improving 21-d Pregnancy Rate (PR)



For example the economic value of improving the 21-d PR from 15 to 18% is the cumulative value between 16 and 18% in the curve:

$$\$23 + \$22 + \$21 = \$66/\text{cow per year}$$

#### Materials Developed

- Web page: <http://fyi.uwex.edu/repromoney/>
- Binder with program forms & resources
- Official program brochure
- Management Questionnaire (core data collection tool)
- Dairy Comp 305 basis file to retrieve information from farms' backup records complete to Management Questionnaire
- Curricula and Power Point Presentations for Team Leader training

#### Impact

- The Repro Money program has formally been presented and demonstrated in at least 13 extension and industry meetings
- Four pilot farms are enrolled and being followed through all the Repro Program steps
- A core group of facilitators are ready to deploy and facilitate the program
- This program is already changing knowledge, actions, and conditions in dairy farming reproductive efficiency

### Specific Aim 3

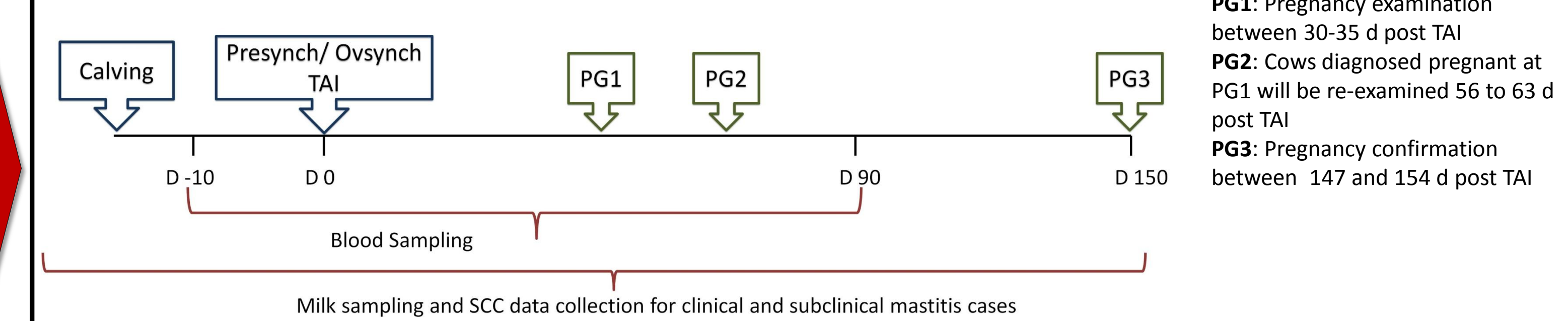
Identify the impact of mastitis on fertility and pregnancy loss in lactating dairy cows.

Aim leaders: P.M. Fricke and P.L Ruegg; Milk Quality laboratory technician: C. Hulland  
Ph.D. Student: Maria Jose Fuenzalida Valenzuela

#### Materials and Methods

- 2,800 cows from four large commercial dairy herds are being enrolled from calving until confirmed pregnant at 150 days post-AI
- Blood samples will be collected weekly to determine pregnancy status based on Pregnancy-Specific Protein B which will allow estimating the timing of pregnancy loss.
- Milk samples will be collected for all of the enrolled cows that present a clinical mastitis case during the enrollment period.

#### Experimental Design



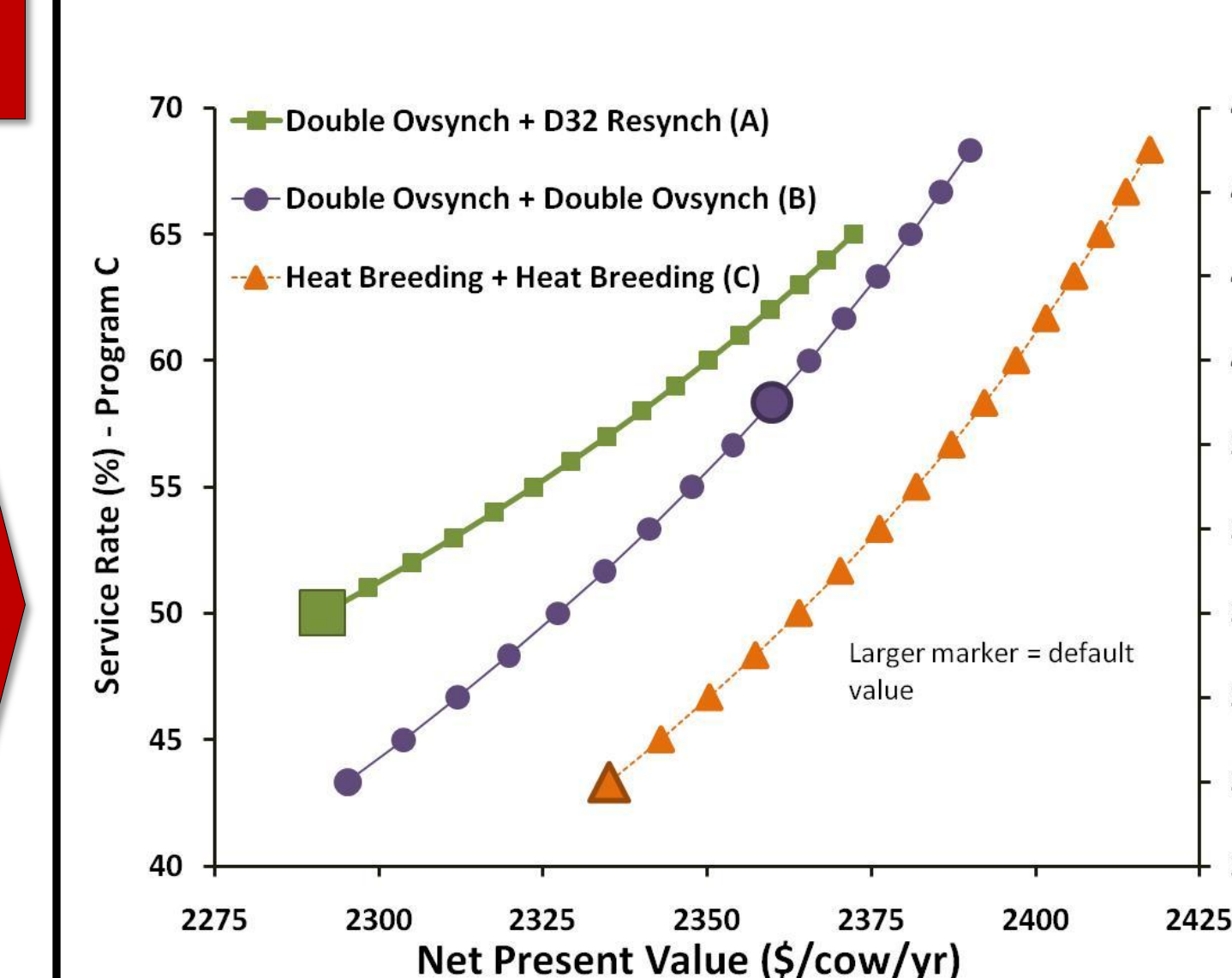
**Expected Results** The occurrence of pregnancy loss will be greater in cows that experience mastitis. In addition, this study will help to elucidate associations between mastitis case severity, pathogen type, and pregnancy loss.

### Specific Aim 4

Evaluate the economic impact of reproductive management strategies on overall farm sustainability under a variety of management scenarios.

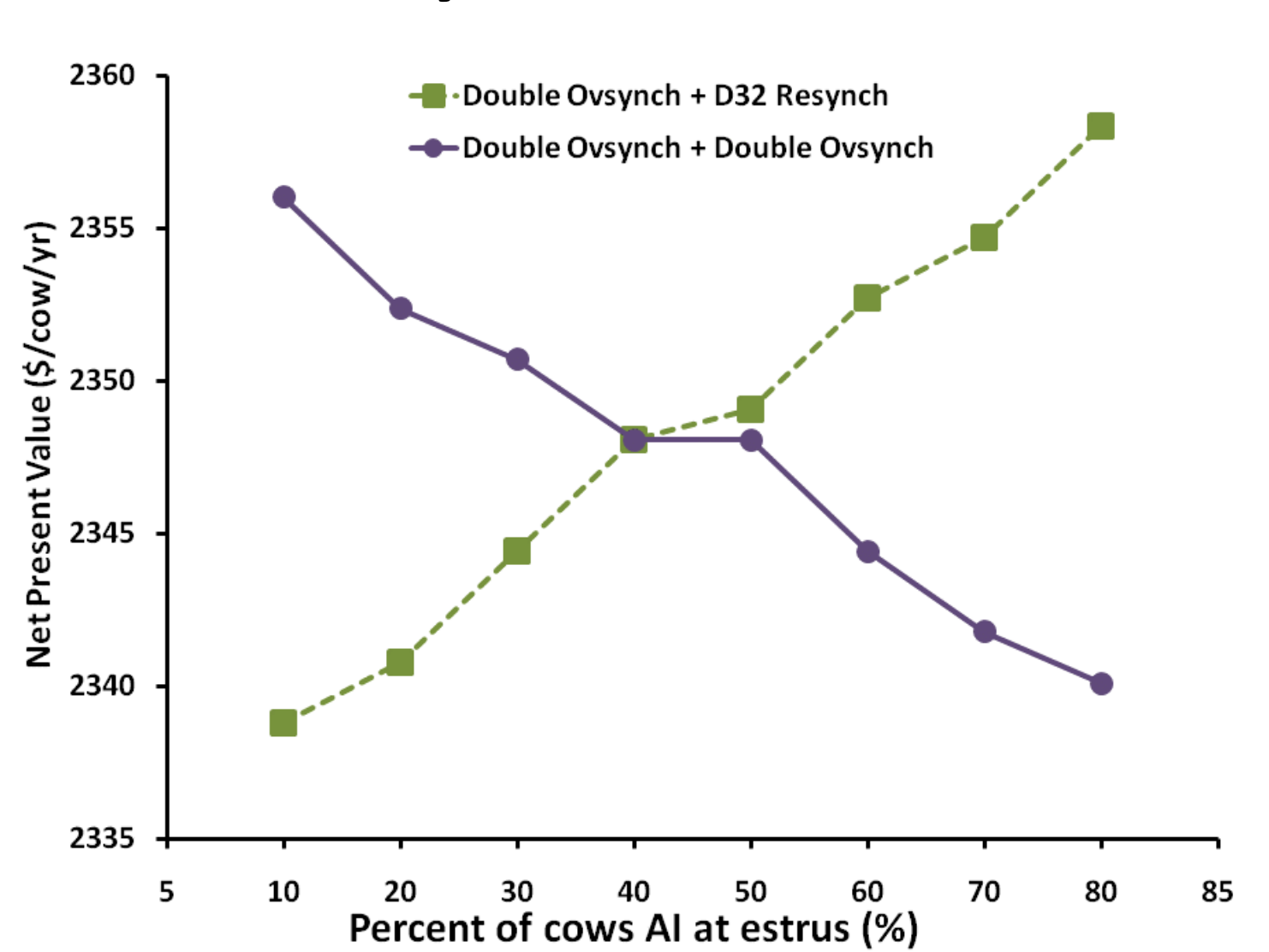
Aim leaders: V.E. Cabrera and K.A. Weigel  
Ph.D. Students: Saleh Shahinfar and Afshin Kalantari

#### Economic Sensitivity Analysis of Three Reproductive Programs



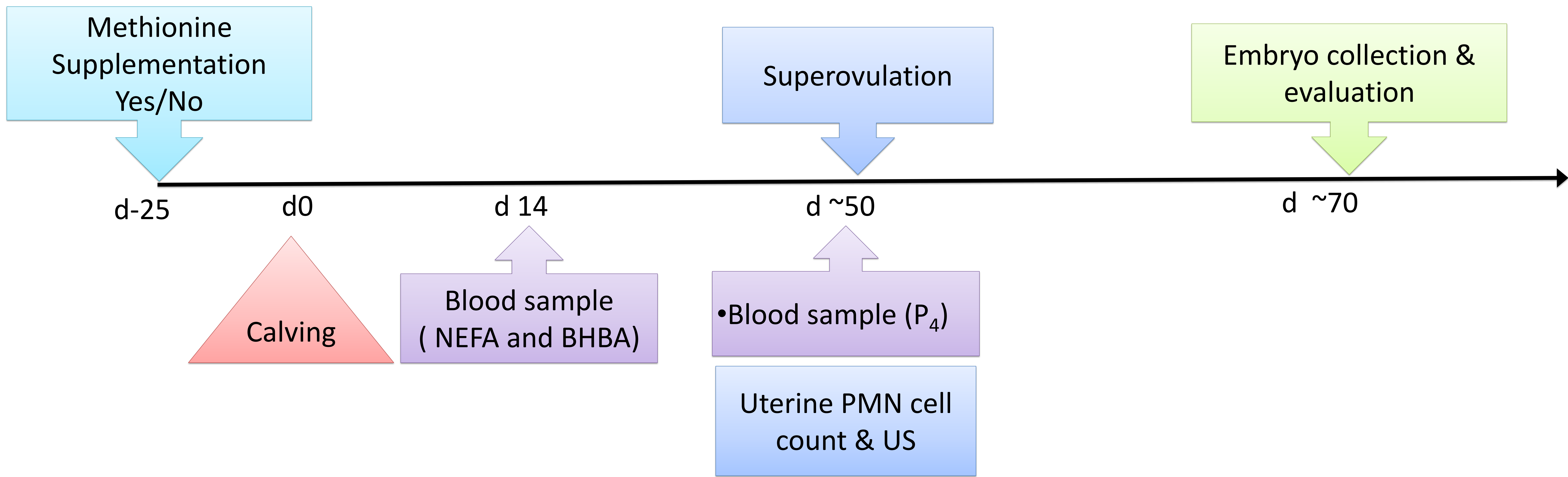
Program B had the greatest net present value (NPV). In order to reach the same NPV as Program B, Program A would have to increase its conception rate by 5% and Program C would need to increase its service rate by 13%.

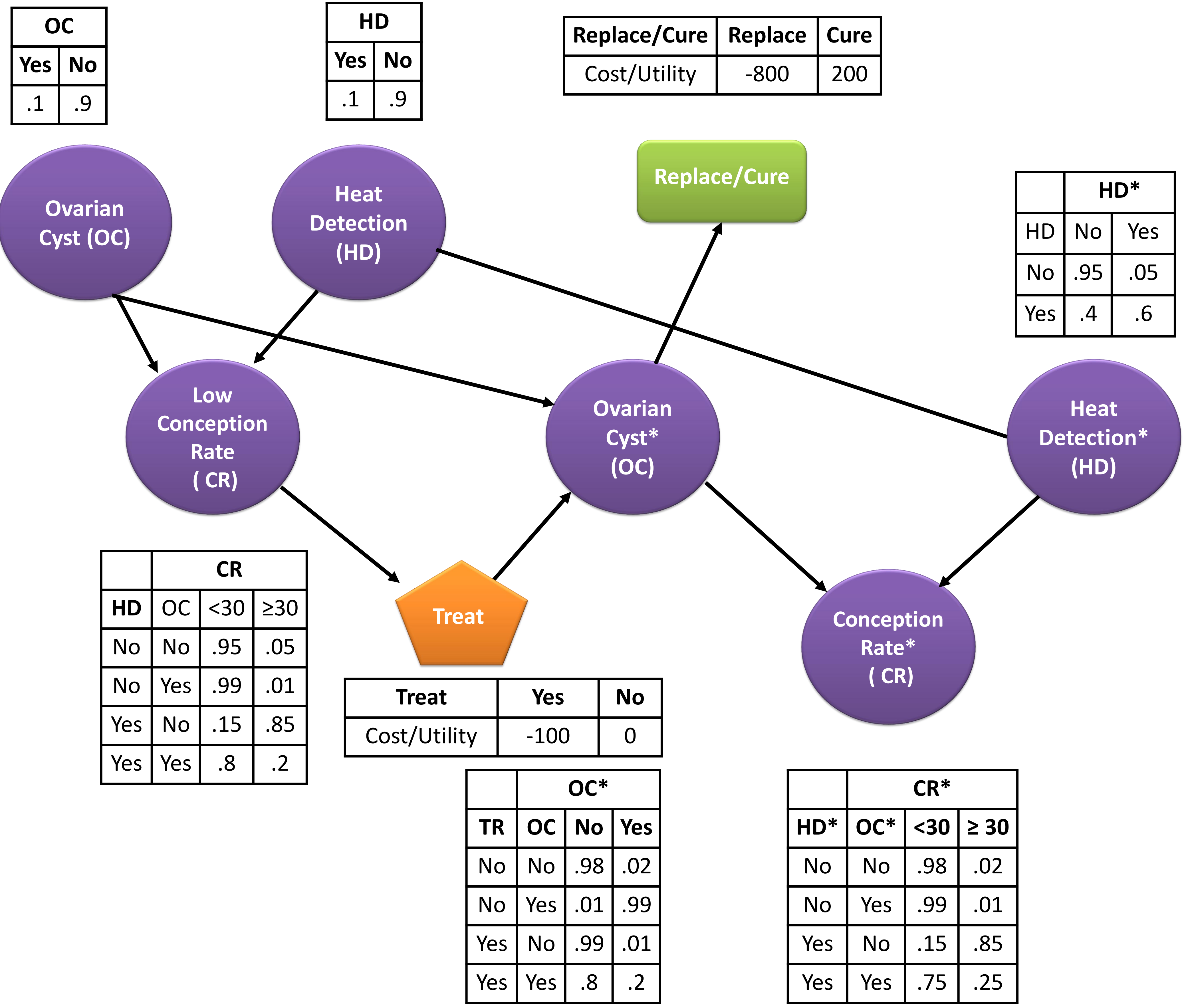
#### Economic Effect of Including Heat Breeding (HB) Between Timed AI resynchronizations

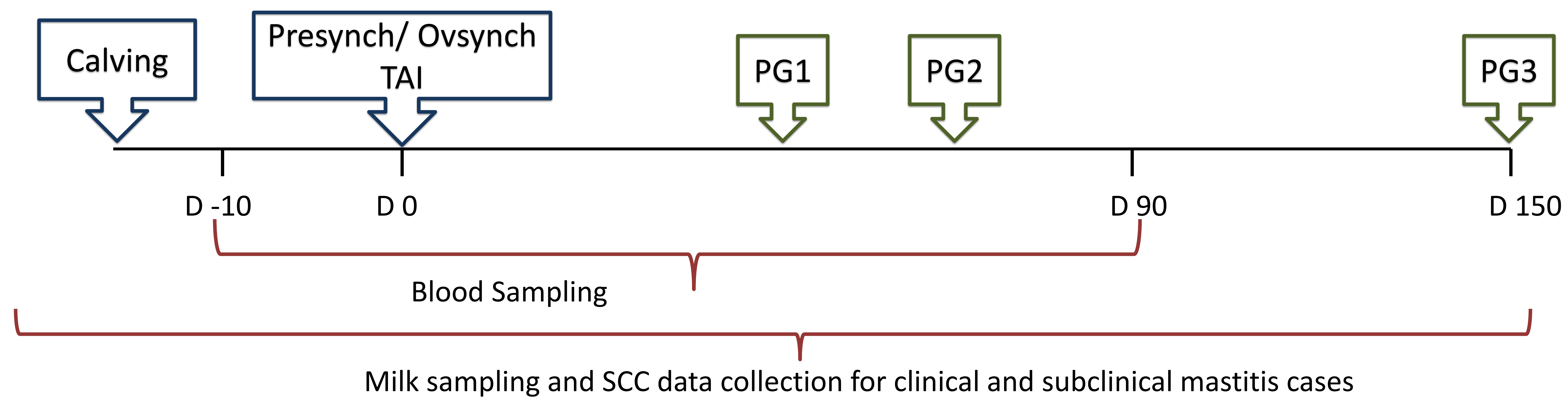


The net present value of timed AI (TAI) reproductive programs could increase or decrease when including heat breeding (HB) in between TAI services depending on the relationship between TAI and HB conception rates.









**PG1:** Pregnancy examination between 30-35 d post TAI

**PG2:** Cows diagnosed pregnant at PG1 will be re-examined 56 to 63 d post TAI

**PG3:** Pregnancy confirmation between 147 and 154 d post TAI



Producer Enrolls in  
Repro Money

Pick your team &  
Schedule 1<sup>st</sup> meeting

Veterinarian  
Extension Agent  
Nutritionist  
AI Consultant  
AI Technician

**Pick your Team Facilitator**

Hold *First*  
Repro Money meeting  
*GETTING SET UP*

- Record initial core information
- Complete Management questionnaire
- Calculate Economic potentials
- Develop Goals
- Determine Action Plans
- Assign responsibilities

**First Meeting Summary**  
Are Team Goals set?  
Are Action Plans established?  
Will the actions aid in meeting goals?  
Has repro performance been assessed?  
Have forms been returned to Repro Money?  
Is next meeting date set?

Hold *Second*  
Repro Money meeting  
TEAM BUILDING

- Record core information
- Report actions & review goals
- Establish new actions

**Second Meeting Summary**  
Were goals added or modified?  
Are we working toward goals?  
Are there other areas to be addressed?  
Is third meeting date set?

Hold *Third*  
Repro Money meeting  
*REVIEW AND REALIGN*

- Record core information
- Report actions & review goals
- Establish new actions

**Third Meeting Summary**  
Were goals added or modified?  
Are we working toward goals?  
Are there other areas to be addressed?  
Is fourth meeting date set?

Hold *Fourth*  
Repro Money meeting  
*PLANNING FOR THE FUTURE*  
*Do we need to continue?*

- Record core information
- Report actions & review goals
- Establish new actions
- Repeat Questionnaire & Economic calculation

**Fourth Meeting Summary**  
Are goals set?  
Are action plans set?  
Are on-going responsibilities scheduled and delineated ?  
Have forms be returned to Repro Money?

**Result:**  
**Better Reproductive  
Performance**



**Producer Enrolls in  
Repro Money**

Veterinarian  
Extension Agent  
Nutritionist  
AI Consultant  
AI Technician

**Pick your team &  
Schedule 1<sup>st</sup> meeting**

**Pick your Team Facilitator**

- Record initial core information
- Complete Management questionnaire
- Calculate Economic potentials
- Develop Goals
- Determine Action Plans
- Assign responsibilities

**Hold 1<sup>st</sup>  
Repro Money meeting  
*GETTING SET UP***

**First Meeting Summary**  
Are team Goals set?  
Are Action Plans established?  
Will the actions aid in meeting goals?  
Has repro performance been assessed?  
Have forms been returned to Repro Money?  
Is next meeting date set?

**Hold 2<sup>nd</sup>  
Repro Money meeting  
*TEAM BUILDING***

**Second Meeting Summary**  
Were goals added or modified?  
Are we working toward goals?  
Are there areas of need not under consideration?  
Is third meeting date set?

- Record core information
- Report actions & review goals set
- Establish new actions

**Hold 3<sup>rd</sup>  
Repro Money meeting  
*REVIEW AND REALIGN***

**Third Meeting Summary**  
Were goals added or modified?  
Are we working toward goals?  
Are there areas of need not under consideration?  
Is fourth meeting date set?

- Record core information
- Report actions & review goals set
- Establish new actions

**Hold 4<sup>th</sup>  
Repro Money meeting  
*PLANNING FOR THE FUTURE  
Do we need to continue?***

**Fourth Meeting Summary**  
Are goals set?  
Are action plans set?  
Are on-going responsibilities scheduled and delineated ?  
Have forms be returned to Repro Money?

- Record core information
- Report actions & review goals set
- Establish new actions
- Repeat Questionnaire & Economic calculation

**Result:  
Better Reproductive  
Performance**



**EXCELLENCE IN  
EDUCATION AND DISCOVERY**