ADDING VALUE TO REPLACEMENT BEEF HEIFERS: A WORKING MODEL

THE SHOW-ME-SELECT™ REPLACEMENT HEIFER PROGRAM

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Challenges facing the beef industry…

- Reluctance to adopt new technology
- Aging producer population
- Rising input costs
- Declining markets
- Increasing global competition
- Perceived lack of incentives

Opportunities facing our industry…

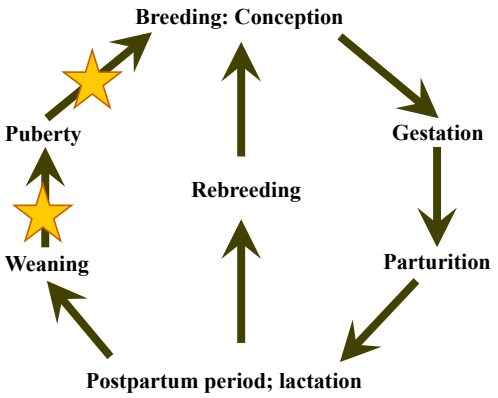
- **On-the-shelf technology** not being used *(that works)*
- **Increasing** domestic and global **demand for high-quality beef**
- Marketing incentives that will **add value**

As we consider expansion…

What practices or procedures are currently available and being used by the industry to support improvements in the way we manage and develop replacement females?

The U.S. Beef Herd

- 69% of cow-calf enterprises are secondary income sources
- 50% of producers report an established breeding season of specific duration
- 34% of beef herds are routinely pregnancy checked
- 10-15% of beef cattle enterprises utilize AI



Reproduction cycle of the beef female (Bellows, 1985)

THE TECHNOLOGY PROBLEM

Research

↓

More technology, complexity & sophistication ← **Limiting step**

↓

Fewer people understand it

↓

Fewer people trust it

↓

Progress is slowed

The Missouri SHOW-ME-SELECT™ Replacement Heifer Program

BEEF & MISSOURI'S ECONOMY

- ~ 1.9 million beef cows
  - 2nd/3rd in the U.S. in beef cow numbers
- Revenue from cattle production contributes > 1 billion dollars to Missouri's economy annually

DEVELOPING A PLAN

1. Create an understanding of the importance of heifer development based on reproductive outcomes.
2. Changes in heifer development spill over into the cow herd.
3. Importance of reproductive management becomes apparent.
4. Focus expands to genetic improvement.
5. Creation of a value-added product requires re-evaluation of marketing strategies.

PARTNERSHIPS & PROGRAM DELIVERY

- University of Missouri Extension
  - State Specialists
    - Animal Science
    - Agriculture Economics
    - Veterinary Extension
  - Regional Extension Livestock Specialists
- College of Agriculture, Food, and Natural Resources
- College of Veterinary Medicine
  - Veterinary Practitioners
- Missouri Cattlemen's Association
- Missouri Beef Cattle Improvement Association
- Missouri Department of Agriculture
- Missouri Livestock Marketing Association

SHOW-ME-SELECT ™ PROGRAM OBJECTIVES

- Improve existing development programs through a ***Total Quality Management*** approach
- Provide a reliable source of quality replacements ***(genetics and management)***
- Increase marketing opportunities for and ***add value to Missouri-raised heifers***

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SHOW-ME-SELECT™ ACCOMPLISHMENTS AND IMPACTS

SINCE 1996…	
Number of farms	833
Number of veterinarians	275
Number of heifers enrolled	129,545
Regional Extension Livestock Coordinators	10
Regional Extension Livestock Specialists	17
Contribution to Missouri's economy	> $120,000,000
First state-wide on-farm beef heifer development and marketing program in the nation.	

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SHOW-ME-SELECT™ ACCOMPLISHMENTS AND IMPACTS

MARKETING COMPONENT SINCE 1997…	
Sales and locations	147 sales @ 11 locations
Number of heifers sold	32,381 sold
Gross sales	$46,565,810
Number of states	19 states
Prospective buyers	9,919 (> 700 out of state)
Successful buyers	3,366 (> 200 out of state)

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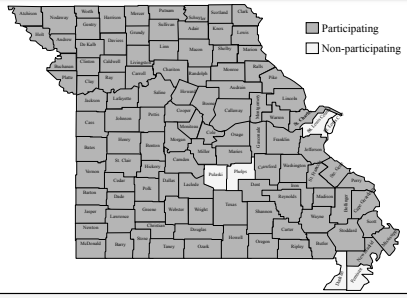
SHOW-ME-SELECT™ PRODUCER PARTICIPATION



Producers from 108 (95%) of 114 counties enrolled heifers in the Show-Me-Select Replacement Heifer Program from 1997-2016

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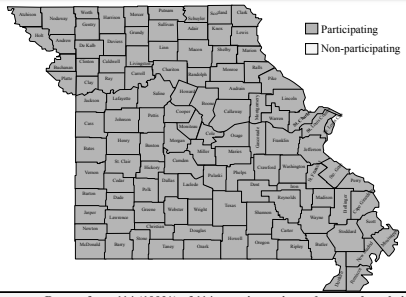
SHOW-ME-SELECT™ REGISTERED BUYERS



Buyers from 114 (100%) of 114 counties registered to purchase heifers from 1997-2016 sales

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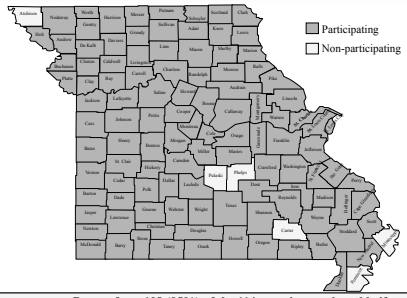
SHOW-ME-SELECT™ ACTUAL BUYERS



Buyers from 108 (95%) of the 114 counties purchased heifers from 1997-2016 sales

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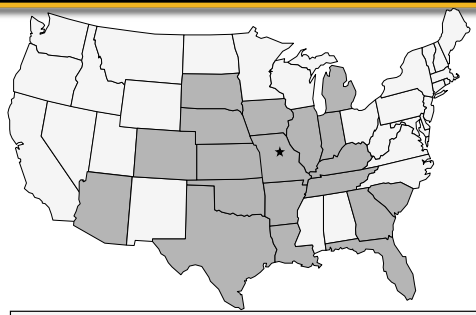
SHOW-ME-SELECT™ WHERE THEY'VE GONE …..



Since 1997, buyers from 19 states purchased heifers from the Show-Me-Select Replacement Heifer Program

Show-Me-Select ™

Average Sale Price by Year

Fall sales (spring-calving heifers)

Year	Average
1997	$826
1998	**$767**
1999	$824
2000	$1047
2001	$966
2002	$951
2003	$1122
2004	$1322
2005	$1349
2006	$1210
2007	$1323
2008	$1168
2009	$1177
2010	$1413
2011	$1706
2012	$2043
2013	$2121
2014	**$2944**
2015	$2388
2016	$1796

Show-Me-Select ™

Average Sale Price by Year

Spring sales (fall-calving heifers)

Year	Average
2000	$1052
2001	$1110
2002	$1125
2003	**$981**
2004	$1403
2005	$1392
2006	$1378
2007	$1209
2008	$1294
2009	$1295
2010	$1332
2011	$1711
2012	$1948
2013	$1655
2014	$2519
2015	**$2820**
2016	$2242

Show-Me-Select ™ Program…

- Centralized data base allows us to track data generated from the program.
- Allowed us to compete effectively for USDA-NIFA funded integrated project awards.

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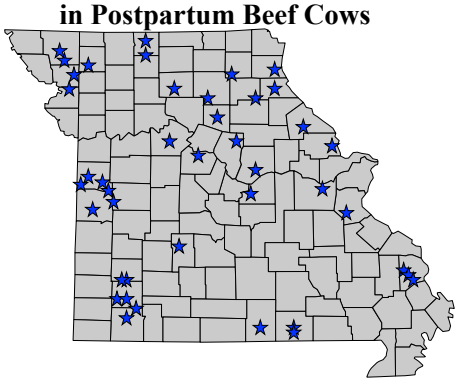
Project Outcomes

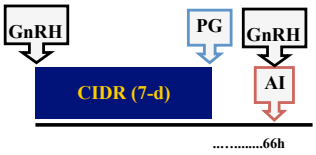
Integrating extension and research projects ……

- Draws on the fundamentals upon which Extension and the Land Grant System were founded: the use and application of what we know to create knowledge.
- Transfers science-based knowledge that enables participants to make practical production and management decisions based on economics.

On-farm Demonstrations with Fixed-time AI in Postpartum Beef Cows



CO-Synch + CIDR in Cows with FTAI @ 66 hours



- **73 herds**
- **FTAI pregnancy rate = 4327/7028 (62%)**
  - **Range = 38-86%**
  - **7 of 73 herds FTAI pregnancy rate < 50%**

What we learned …

- The concept of fixed-time AI made sense
- Selection of sires to use in AI programs for many commercial producers was overwhelming
  - How do I begin to choose?

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SHOW-ME-SELECT™ TIER TWO

Minimum Accuracies for Sires of Tier Two Heifers

Trait	Accuracy
Calving ease (direct)	.65
Calving ease (maternal)	.30
Weaning weight	.75
Carcass Weight	.20
Marbling	.20

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EXPANDED USE OF FTAI

Large's Portable AI Barns
- MU Extension funding placed 10 barns across Missouri

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EXPANDED USE OF ULTRASOUND

- Differentiate AI from bull breeding
  - Early diagnosis
  - Fetal sexing

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Can producers make more money? (2010 through 2016)

Tier 1 NS bred (*n=3,831*) ……BASELINE AVG. = $2,018

Tier 1 AI bred (*n=4,956*)……...added $184 = $2,202

Tier 2 NS bred (*n=341*)…….....added $68 = $2,086

Tier 2 AI bred (*n=686*) …….....added $244 = $2,262

57% AI bred; 43% NS bred

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Can producers make more money? (Spring "16")

Tier 1 NS bred …BASELINE AVG. $2,112

Tier 2 AI bred …added **$422 = $2,534**

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Can producers make more money?
(Fall "16")

Tier 1 NS bred …BASELINE AVG. $1,700

Tier 2 AI bred …added $377 = $2,077

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SHOW-ME-SELECT®
SHOW-ME-PLUS

- Tested with a genomic prediction panel
  - Breed association GE-EPD
  - GeneMax Advantage
  - Maternal Edge
  - Herd Navigator
  - Igenity Gold
  - Igenity Silver
  - Method Choice

Show-Me-Plus

Premiums for heifers with various classifications*

Classification	Premium	ROI
AI pregnancy	$130	
Show-Me-Plus (Genomic Prediction)	$204	326% to 700%

*Predicted premiums for heifers with various classifications, based on mixed model analysis of 2014 and 2015 sale reports.

Genomic ROI: Early Returns Suggest Premium for Show-Me-Plus Heifers
http://blog.steakgenomics.org/2016/02/genomic-roi-early-returns-suggest.html
See http://agebb.missouri.edu/select/prgmreq.htm for more information.

Adding value with HIGH ACCURACY
MU Thompson Research Center

Sire Group	No. of steers	Choice or higher (%)	CAB® (%)	Prime (%)	CAB® Prime (%)
High Accuracy	252	100	59	29	88
Low Accuracy	101	96	50	13	63

Adding value with HIGH ACCURACY
MU Thompson Research Center

High Accuracy Sire Group	Carcass Value ($)	Difference ($)	
Prime	2285	---	---
CAB®	2116	169	---
Choice	1999	286	117

Heifers Enrolled by Service Type and Year

Year	AI %	Natural Service %
2010	68	32
2011	77	23
2012	85	15
2013	83	17
2014	91	9
2015	90	10
2016	91	9

Reproductive Management …

Prior to & after the first breeding season

- Create a platform for long-term reproductive health
- Nutritional development
- Prebreeding reproductive exam
  - Weight, Reproductive tract score, and pelvic area
- Estrous synchronization
- Sire selection
  - BW or CE EPD
- Early pregnancy diagnosis
  - Fetal age

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SHOW-ME-SELECT™

Intervention points for veterinarians

- **HEALTH**
  - WEANING
  - PREBREEDING
  - PRE-SALE
- **REPRODUCTIVE EVALUATION**
  - PREBREEDING
    - Reproductive tract scores
    - Pelvic measurements
  - BREEDING
    - Estrous synchronization
    - AI
  - PREGNANCY EVALUATION
    - Early pregnancy diagnosis/fetal aging
    - Fetal sexing
    - Pre-sale pregnancy confirmation

Reproductive Tract Scores

RTS	Cycling status	Uterine horns	Ovaries
1	infantile	no tone	no palpable follicles
2	non-cycling > 30 d to puberty	no tone	8 mm follicles
3	non-cycling < 30 d to puberty	slight tone	8-10 mm follicles
4	Estrous cycling Follicular phase	coiled	> 10 mm follicles
5	Estrous cycling Luteal phase	distended	corpus luteum present

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Heifer management…

- RTS: 4 to 6 weeks before breeding or 2 weeks before estrous synchronization
- Begin synchronization when ≥ 50% of the heifers have RTS of 4 or 5

Reproductive Tract Scores and FTAI

- Show-Me-Select database allows for analysis of FTAI pregnancy rates based upon reproductive tract score (n=29,343)

	1	2	3	4	5
n pregnant	9	255	4,091	5,138	5,088
n exposed	163	893	8,422	10,092	9,773
FTAI PR	**6%**	**29%**	**48%**	**51%**	**52%**

Reproductive Tract Scores and FTAI
n = 9,315 heifers

	RTS and FTAI Pregnancy Rate	
FTAI Protocol	Non-Cycling	Cycling
7-Day CO-Synch + CIDR	166/438 38%[a,x]	369/861 43%[b,x]
MGA - PG	81/230 35%[a,x]	265/564 47%[b,x]
14-Day CIDR - PG	4,027/8,647 47%[a,y]	9,588/18,434 52%[b,y]

[a,b]Percentages within rows with different superscripts differ P < 0.01.
[x,y]Percentages within columns with different superscripts differ P < 0.01.

Reproductive Tract Scores and FTAI
n = 19,859 heifers

	RTS and FTAI Pregnancy Rate	
FTAI Protocol	Non-Cycling	Cycling
7-Day CO-Synch + CIDR	166/438 38%[a,x]	369/861 43%[b,x]
MGA - PG	81/230 35%[a,x]	265/564 47%[b,x]
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Reproductive Tract Scores and FTAI
n = 29,174 heifers

	RTS and FTAI Pregnancy Rate		
FTAI Protocol	Non-Cycling	Cycling	Totals
7-Day CO-Synch + CIDR	166/438 38%[a,x]	369/861 43%[b,x]	535/1,299 41%[x]
MGA - PG	81/230 35%[a,x]	265/564 47%[b,x]	346/794 44%[x]
14-Day CIDR - PG	4,027/8,647 47%[a,y]	9,588/18,434 52%[b,y]	13,615/27,081 50%[y]

[a,b]Percentages within rows with different superscripts differ P < 0.01.
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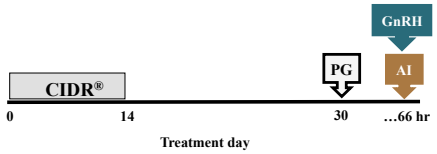
14-DAY CIDR-PG PROTOCOL FOR HEIFERS



Combining health & reproduction in a single management step…….

SHOW-ME-SELECT™ REPLACEMENT HEIFER PROGRAM

- Development of heifers during the postweaning to prebreeding period sets the stage for future reproductive success/failure
- Reproductive evaluation of heifers prior to the first breeding season is useful in determining success of the development period
- The program database provides the opportunity to collect reproductive data on large numbers of heifers across the state

SHOW-ME-SELECT™ Accomplishments and Impacts

- First statewide, on-farm beef heifer development and marketing program in the nation
- Producers are utilizing available technologies for on-farm heifer development that are now spilling over into the cowherd
- Increased interest & adoption of estrus synchronization and AI
  - Successful application
  - Differential in sale prices
- A growing interest in expanded use of AI to the entire herd
  - Reproductive management
  - Genetic improvement
  - *"Use and application of what we know to create knowledge"*

LOOKING AHEAD…

- *Animal scientists (reproductive physiologists & geneticists) need to work more closely with veterinarians and the AI industry.*
- The industry needs more and better reproductive data.
- It all begins with heifers.

The SHOW-ME-SELECT™ Program Educational conduit….

- "We" (academia, producers, veterinarians, and allied industry) learn from data generated from the program.
- Web-based expansion of our data base will afford other states or organizations to provide similar opportunities to their clientele.

LOOKING AHEAD…

- As we consider herd expansion and heifer retention, development and breeding…
  - *Isn't it time the industry begin considering standardization of development practices and procedures as they relate to reproductive outcomes?*
  - *Is it feasible to consider connecting these data to the national cattle evaluation to improve the quality of reproductive data collection, reporting and analysis?*

The SHOW-ME-SELECT™ Program *for more information*

- Google "Show-Me-Select Replacement Heifers"
- PBS Affiliates
  - Friday, June 6, 2014
  - www.MarketToMarket.org

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The Missouri SHOW-ME-SELECT™ Replacement Heifer Program