# Heifer Development
# Then and Now

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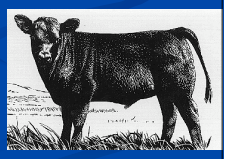
Reproductive Physiologist


## Welcome to Nebraska!

Huskers

## Beef Production Today

- Composites
- Clones
- Genome Mapped
- Marker assisted selection
- Whole Genome Selection
- EID
- Implanted Thermometer
- Retinal Scanning
- Sexed Semen
- Value Based Marketing
- Instrument Grading
- Predicted Eating Quality



## Resources

- Forage Base
- Genetic Base
- Management

Reproduction is the single most important factor for profitable beef production.

Can you cull a cow based on one year's progeny carcass data when you don't know who the sire is?

## Sire Selection

- Determines more than 85% of the total improvement made in a herd

## Trait Selection

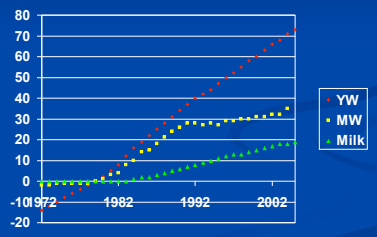
- Calving Ease (direct and Maternal)
- Birth Wt
- Gestation Length
- Heifer Pregnancy
- Stayability/Longevity
- Scrotal Circ
- Weaning Wt
- Milk
- TM (M&G)
- Yearling Wt
- Carcass Wt
- Marbling (%IMF)
- REA
- Fat
- Tenderness
- % Retail Product
- Grid Merit

## Reproductive Traits

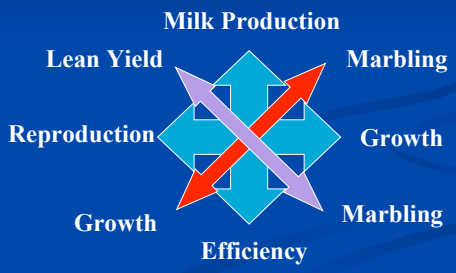
1. Puberty/ Resume cycling
2. Fertile ovulation
3. Conception (Cow and Bull)
4. Maintenance of Pregnancy
5. Give birth to live calf

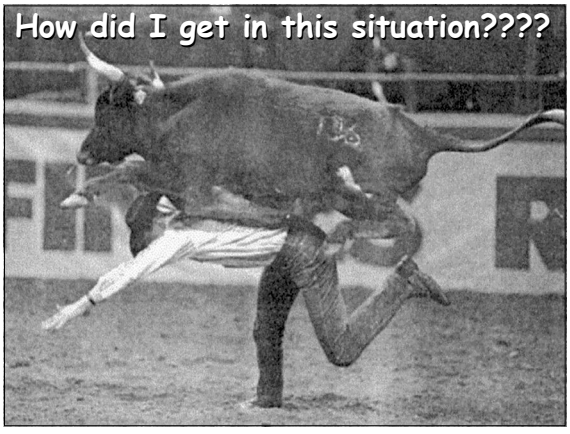
These interdependent traits culminate in a qualitative response, measured 1 time every year.

## Angus Genetic Trend for YW, MW, and Milk




## Which Direction to Go?





## Replacement Heifer Selection

1. Cull daughters of “bad mark” cows
2.
3.
4.
5.
6.

## What are“Bad Mark”Cows* ?

1. Cows that need help calving
2. Cows that calve late (+42 days)
3. Cows that fail to wean a calf
4. Cows that have big teats/need help
5. Cows that wean a light wt. calf
6. Cows that have “attitude” problems

* assume opens are culled

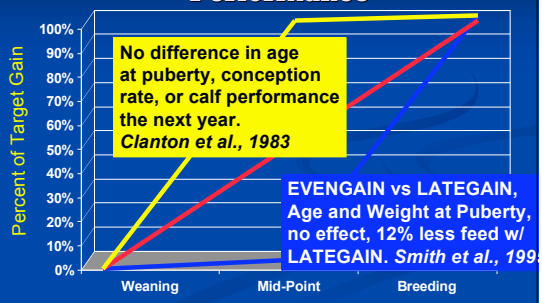
## Replacement Heifer Selection

1. Cull daughters of “bad mark” cows
2. Cull light wts., big birth wt & 6 frame
3. Cull youngest (born +45 d. calving )
4. Select daughters of oldest cows
5. Optimum (not maximum) preg. rate
6. Pigmented eyes & udder
7. Form = depth rib, chest width, guts

## Feeding to a "Target Weight"

| | % of Mature Wt @ breeding | |
|---|---|---|
| Item | 55% | 65% |
| Pre-breeding wt | 600 | 683 |
| Conception (21d) | 30 | 62 |
| Calving wt. | 834 | 897 |
| Calf birth wt. | 71 | 73 |
| Calving difficulty,% | 52 | 29 |
| Calf death loss,% | 6 | 5 |

## Effect of Time of Gain From Weaning to Breeding on Heifer Performance




## What is the appropriate Target Weight??

- 3-year study
- MARC II heifers – 80 each year
- Developed to either 53 or 58% of mature weight
- Placed with bulls May 20 – 45 d
- Data collected through 4th pregnancy diagnosis

## What is the appropriate Target Weight??

| % Mature Weight | 53 | 58 |
|---|---|---|
| Pregnancy Rate – 1st | 92 | 88 |
| -2nd | 91 | 91 |
| -3rd | 94 | 92 |
| -4th | 96 | 96 |

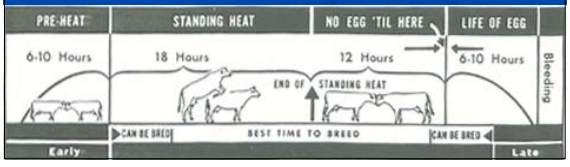
## What is the appropriate Target Weight??

| % Mature Weight | 50 | 55 |
|---|---|---|
| Breeding Season | 60 d | 45 d |
| Pregnancy Rate | 87 | 90 |
| Calve Date | 3/15 | 3/9 |
| Birth Weight | 75 | 75 |
| PG Wt. 2nd Calf | 903 | 926 |
| 2nd Preg. Rate | 91 | 92 |

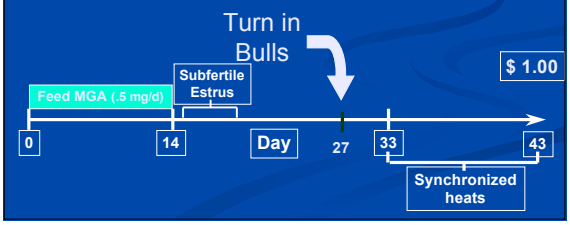
(3 years - 261 head Creighton, et al. 2005)

## Fertility at Puberty

| Pregnancy % | Estrus | |
|---|---|---|
| | 1st | 3rd |
| Following Natural Service | 57 | 78 |
| Following d 7 ET | 13 | 53 |



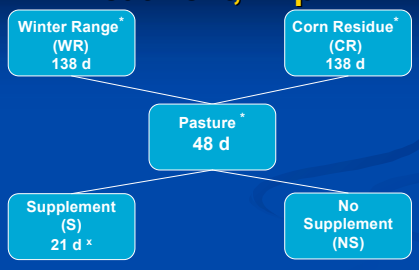
## Estrous Synchronization with Natural Service for Heifers




## Heifers developed to 50% mature weight

| | MGA | No MGA |
|---|---|---|
| April 24 | 577 | 577 |
| Cycling, % | 83 | 78 |
| 45 d preg, % | 90 | 90 |
| Wt. Preg check, lb | 795 | 785 |
| Calving Date | 3/8/05 | 3/6/05 |

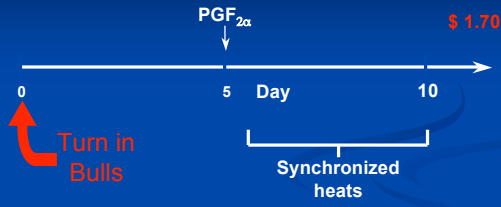
## Treatment, Exp. 1




* A daily supplement offered (28 % CP; 62 % DDG, 11 % wheat midds, 2 % urea, 25 % other, 80 mg/d monensin; 0.45 kg/hd/d)

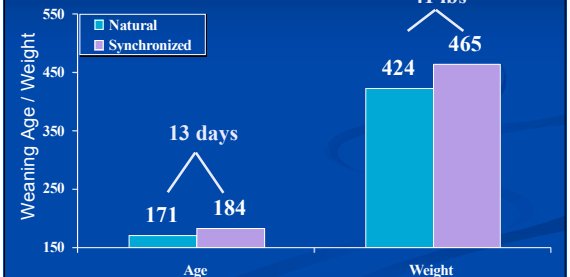
× Supplement offered (28 % CP; 62 % DDG, 11 % wheat midds, 2 % urea, 25 % other, 240 mg/d monensin; 1.4 kg/hd/d)

## Synchronization of Estrus in Cyclic Cows/heifers



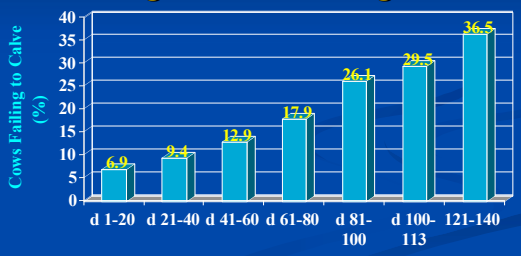

✓ Used with 32-day breeding season at Fort Keogh with the Season of Calving herds over the past 3 years and has consistently yielded pregnancy rates > 85%.

## Increased Calf Weaning Age and Weight with Estrous Synchronization



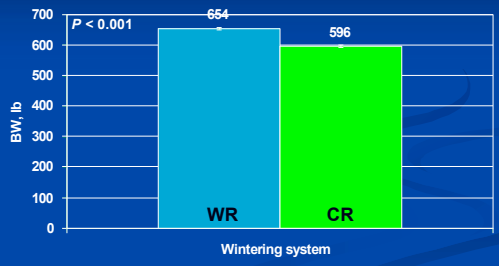

Schafer et al., 1990 CSU Beef Report. p. 115

## Effect of Calving Date on the Number of Cows Calving the Following Year

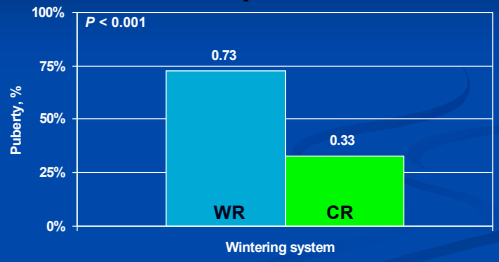



(Patterson et al., 1992)

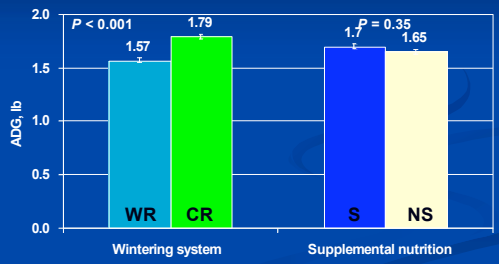
## Effect of Wintering System on BW before Breeding, Exp. 1



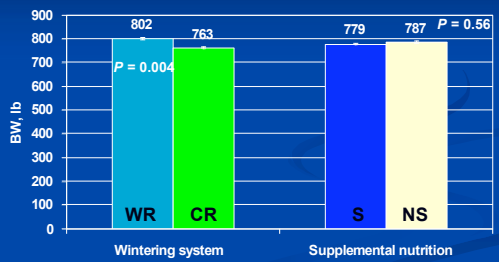

## Effect of Wintering System on Puberty Status before Breeding, Exp. 1



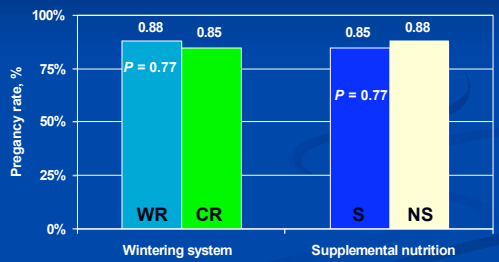

## Effect of Treatment on ADG after Breeding, Exp. 1



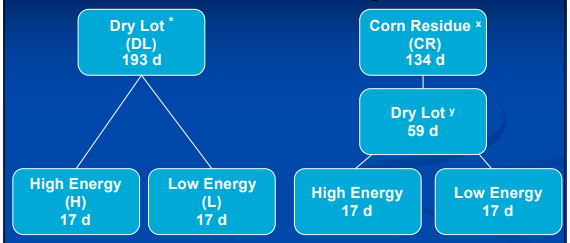

## Effect of Treatment on BW at Pregnancy Diagnosis, Exp. 1




## Effect of Treatment on Pregnancy Rate, Exp. 1



## Treatment, Exp. 2

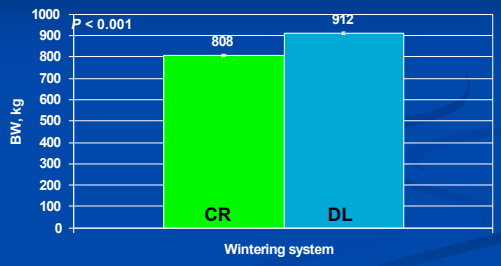



* DM%; Brome hay (62%), corn silage (20%), DDG (13%), supplement (5%, 200 mg/d monensin)

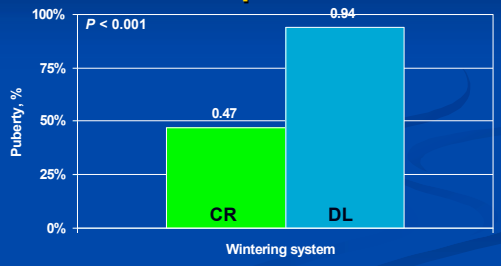
x A daily supplement offered (28 % CP; 62 % DDG, 11 % wheat midds, 2 % urea, 25 % other, 80 mg/d monensin; 0.45 kg/hd/d)

y DM%; brome hay (58%), corn silage (25%), DDG (12%), supplement (5%, 200 mg/d monensin)

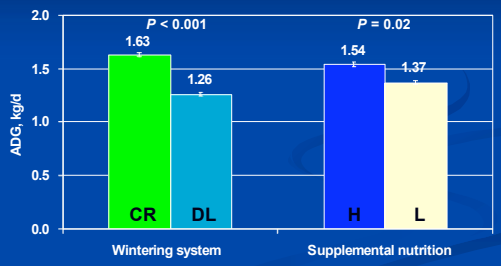
## Effect of Wintering System on BW before Breeding, Exp. 2



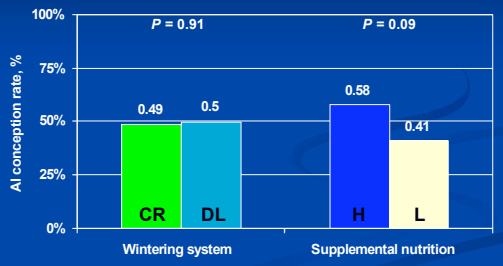

## Effect of Wintering System on Puberty Status before Breeding, Exp. 2



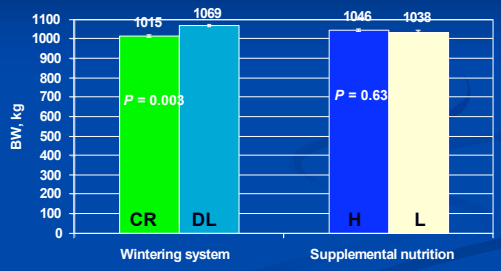

## Effect of Treatment on ADG after Breeding, Exp. 2



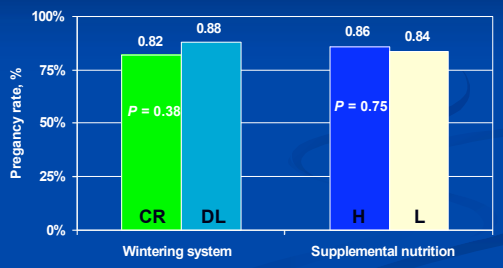

## Effect of Treatment on AI Conception Rate, Exp. 2



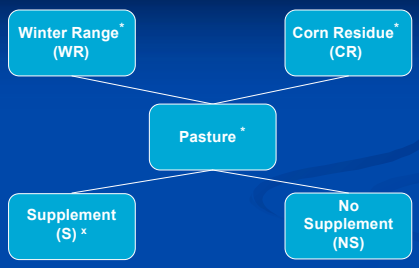

## Effect of Treatment on BW at Pregnancy Diagnosis, Exp. 2




## Effect of Treatment on Pregnancy Rate, Exp. 2




## Current Research

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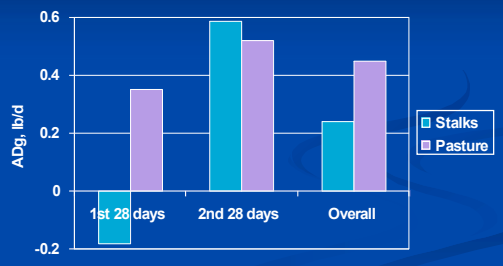
x Supplement offered (28 % CP; 62 % DDG, 11 % wheat midds, 2 % urea, 25 % other, 240 mg/d monensin; 1.4 kg/hd/d)

## Results - ADG



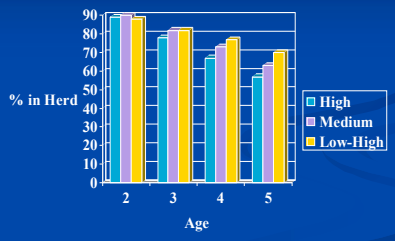

## Summary

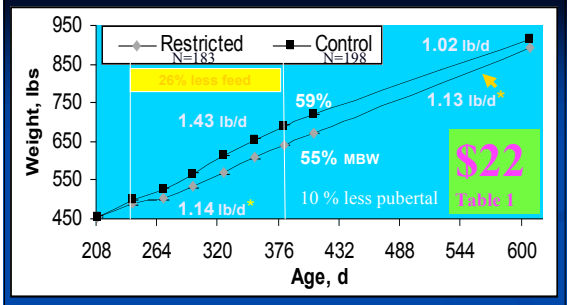
- Development on CR reduced
  - ADG before breeding
  - Percent of heifers pubertal before breeding
- Did not affect pregnancy rate
- Supplementation around time of breeding
  - Improved AI conception rate
  - Did not affect pregnancy rate

## Lighter Target Weights

- Lower Development Costs $20-$30
- Selling open heifers was profitable
- Determine adaptability early?
  - Short breeding season
  - Lighter breeding weights
  - Lighter mature weights?
- Must continue to grow through calving

## Longevity and Heifer Development System




**Pregnancy Rate in Controls = 90%**
**Pregnancy Rate in Restricted = 86%**

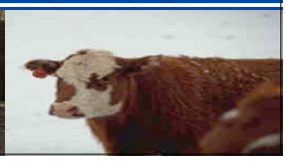
Fort Keogh data on CGC heifers born 2003 - 2005


"If you are looking for additional fertility and production from your cowherd, Sim x Angus or Sim x Red Angus females are the way to go. In over 48,000 comparisons from our heifer development program, we routinely observe an 8 to 10% increase in fertility from these hybrid-line females when compared to straightbreds. This combined with superior milk and maternal traits, make these females hard to beat in any production system."

*Dr. Patsy Houghton, General Manager, Heartland Cattle Company, McCook, NE*

## Advantage of Crossbred Cows

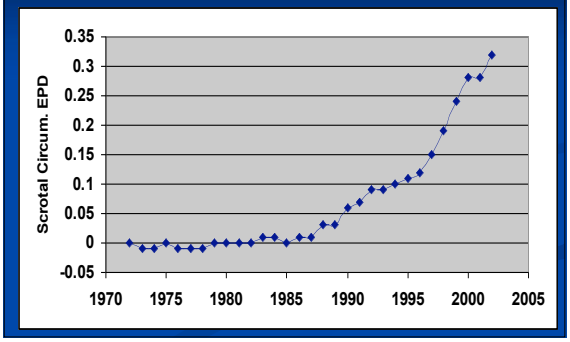
| Trait | Maternal Heterosis |
|---|---|
| Longevity | 1.2 yrs (44%) |
| Calf Weight/Cow Exposed | 74 lb (25%) |
| Net Profit/Cow Exposed | $70 |



## Scrotal Circumference

- 21 day reduced age at first estrus; 1.6cm increase in scrotal circumference in progeny from 141 sires selected for scrotal circumference (Morris, 1993)
- Daughters of bulls with a high SC EPD reached puberty 62 days earlier than a low SC EPD line (Hough, 1991)

## Has Age of Puberty Changed?



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