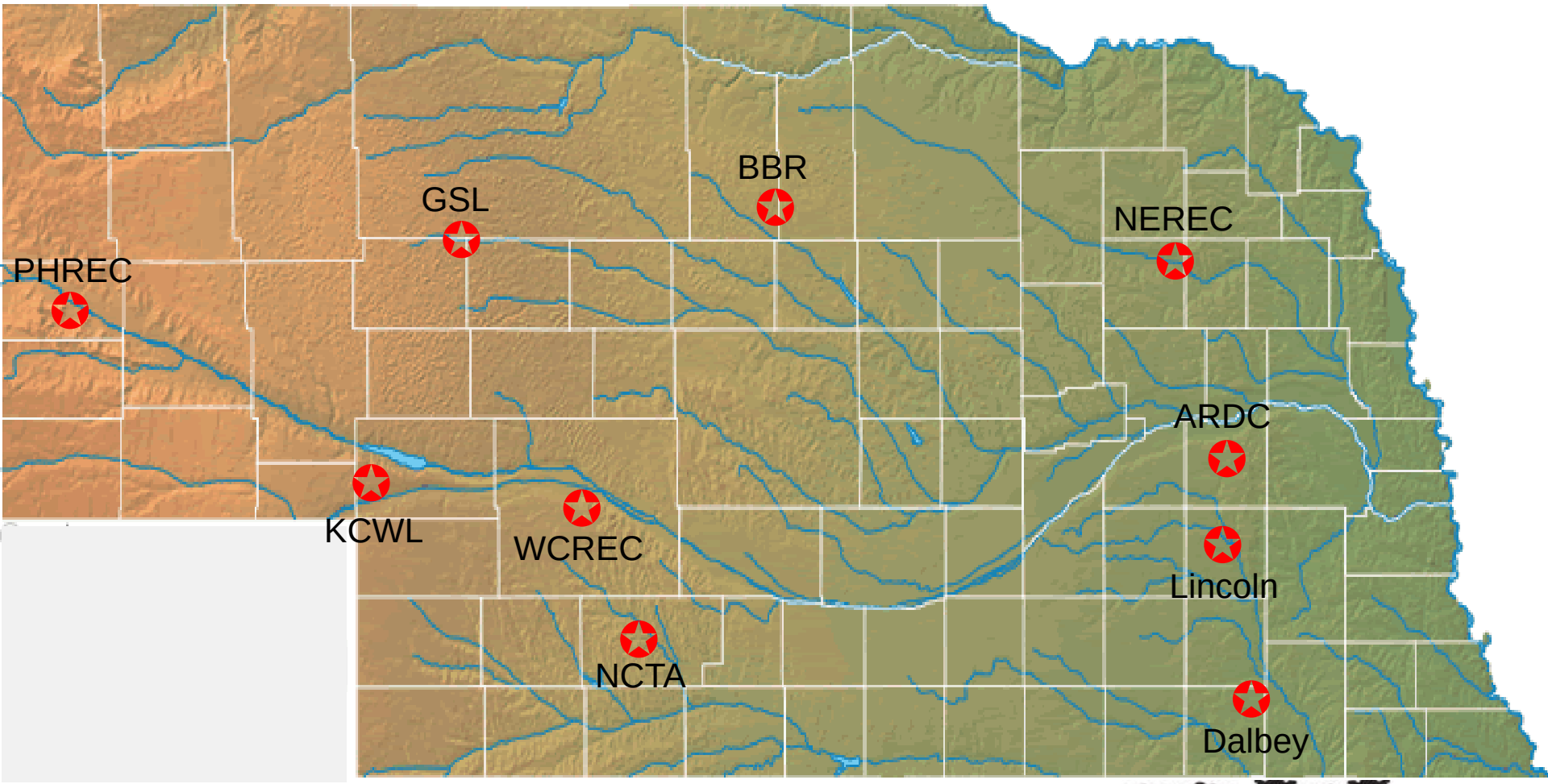
Heifer Development Systems

Rick Funston
Reproductive Physiologist

Feeding Quality Forum 2018


West Central
Research & Extension
Center
Est. 1903
IANR

UNL – Beef Research and Extension



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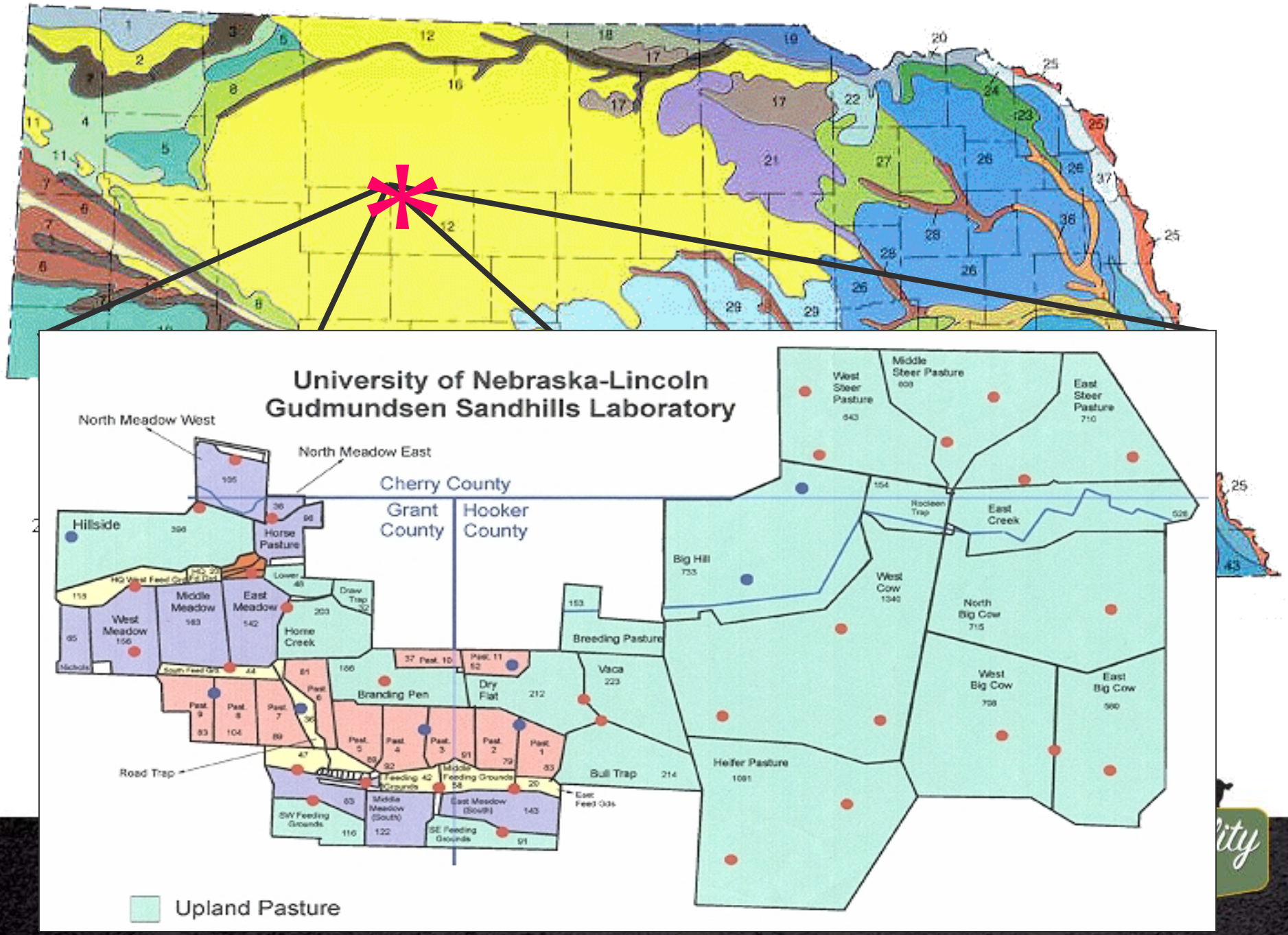
University of Nebraska-Lincoln
Gudmundsen Sandhills Laboratory
North Meadow West
North Meadow East
Cherry County
Grant County
Hooker County
Hillside
Horse Pasture
Middle Meadow
East Meadow
West Meadow
Home Creek
Branding Pen
Dry Flat
Vaca
Breeding Pasture
Bull Trap
Heifer Pasture
Big Hill
West Cow
North Big Cow
West Big Cow
East Big Cow
West Steer Pasture
Middle Steer Pasture
East Steer Pasture
East Creek
Road Trap
Upland Pasture

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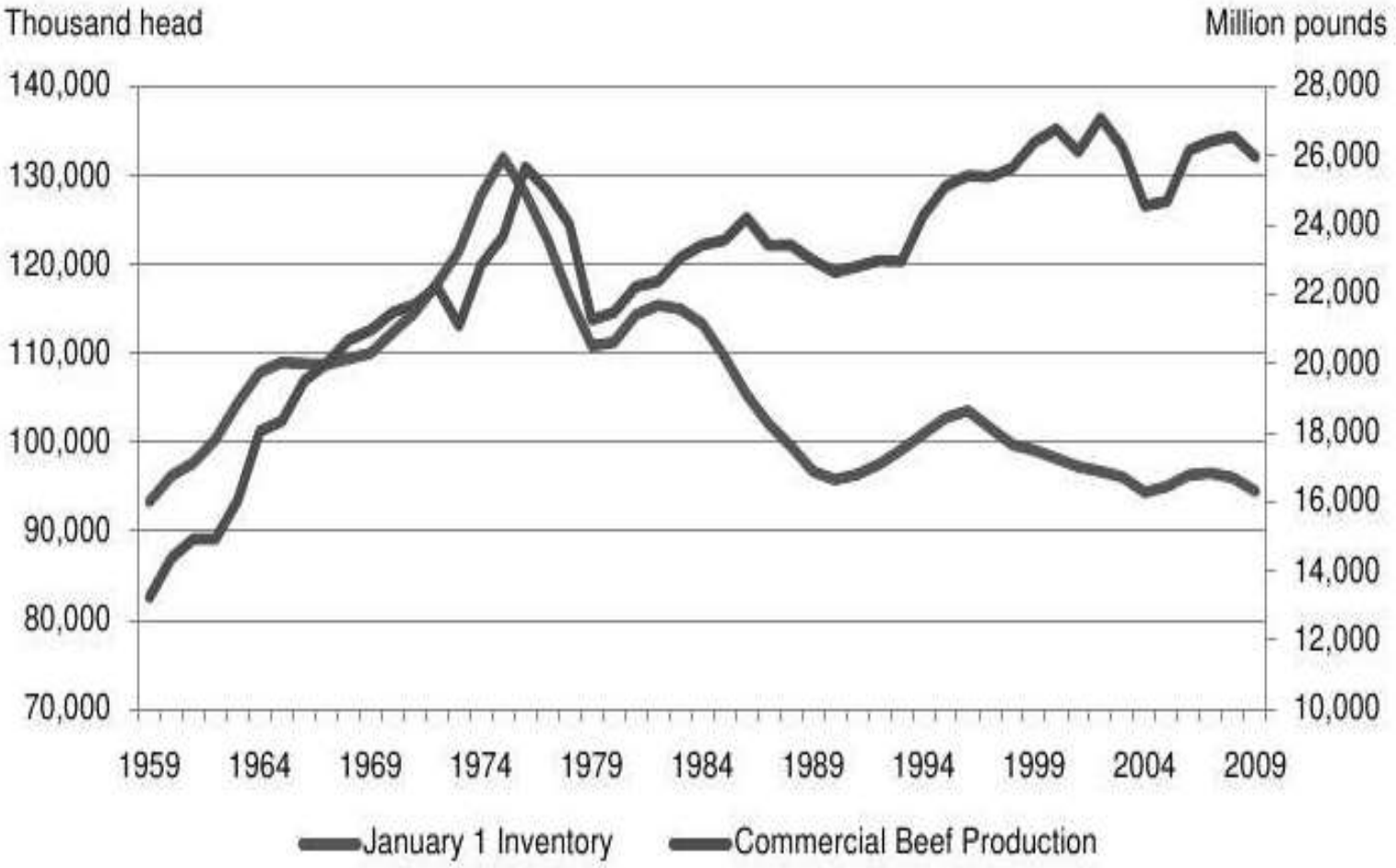
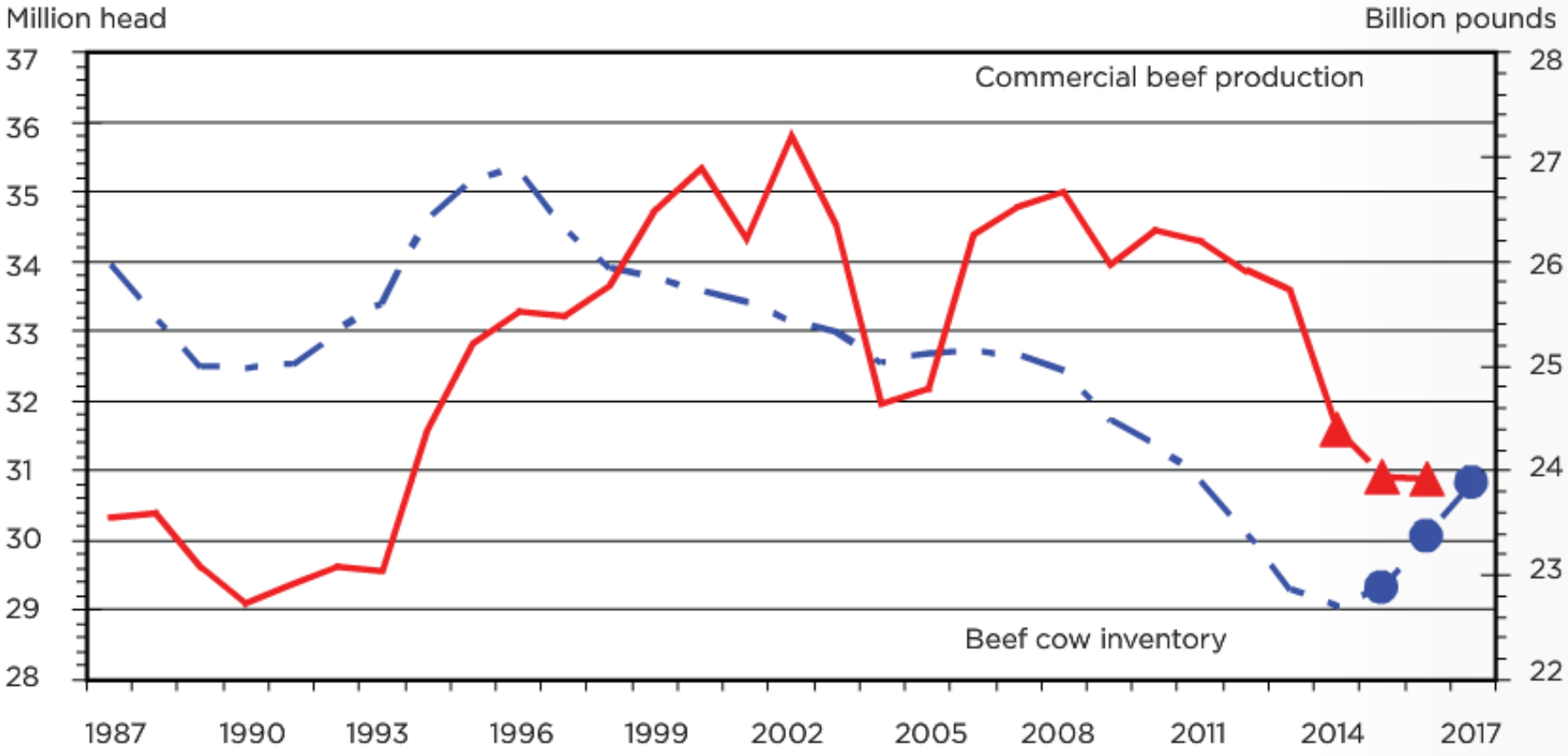
Graph 13. January 1 Cattle Inventory and Commercial Beef Production - United States



Beef production vs beef cow inventory

Inventory on Jan. 1, 2014, U.S.



LIVESTOCK MARKETING INFORMATION CENTER

Data Source: USDA-AMS, Compiled & Analysis by LMIC and Derrell Peel

10 Good Reasons to Expose More Heifers During the Next Few Years

…and two notes of caution.

By Tom Brink

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GREAT time to own cows, ***IF*** you have a competitive cost structure ***AND*** the right genetics and management to compete in today's marketplace.

BEEF SYSTEMS RESEARCH


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

Improving Efficiency

- [Dam Weight*Lean Value of Dam + **No. Progeny***Progeny Weight*Lean Value of Progeny] - [Dam Feed*Value of Feed for Dam + **No. Progeny***Progeny Feed*Value of Feed for Progeny].

- By simply increasing number of progeny per dam through either selection, heterosis from crossing, or better management, we will increase efficiency of production.

Cow Depreciation

Frequently the second largest expense to the cow-calf enterprise after feed!

Photo Courtesy USDA NRCS

How is Depreciation Calculated?

Depreciation is equal to

$$\frac{\text{Purchase Price or Replacement Cost} - \text{Salvage Value}}{\text{Productive Years in the Herd}}$$

Depreciation Example

Bred Two-Year-Old Heifer = $2,750

Average Cull Cow Value = $1,500

Depreciation without death loss = $1,250/ head

If a 2% death loss is added in assuming an average cow value of $2000.

5 Years in the Herd = $290/year

4 Years in the Herd = $353/year

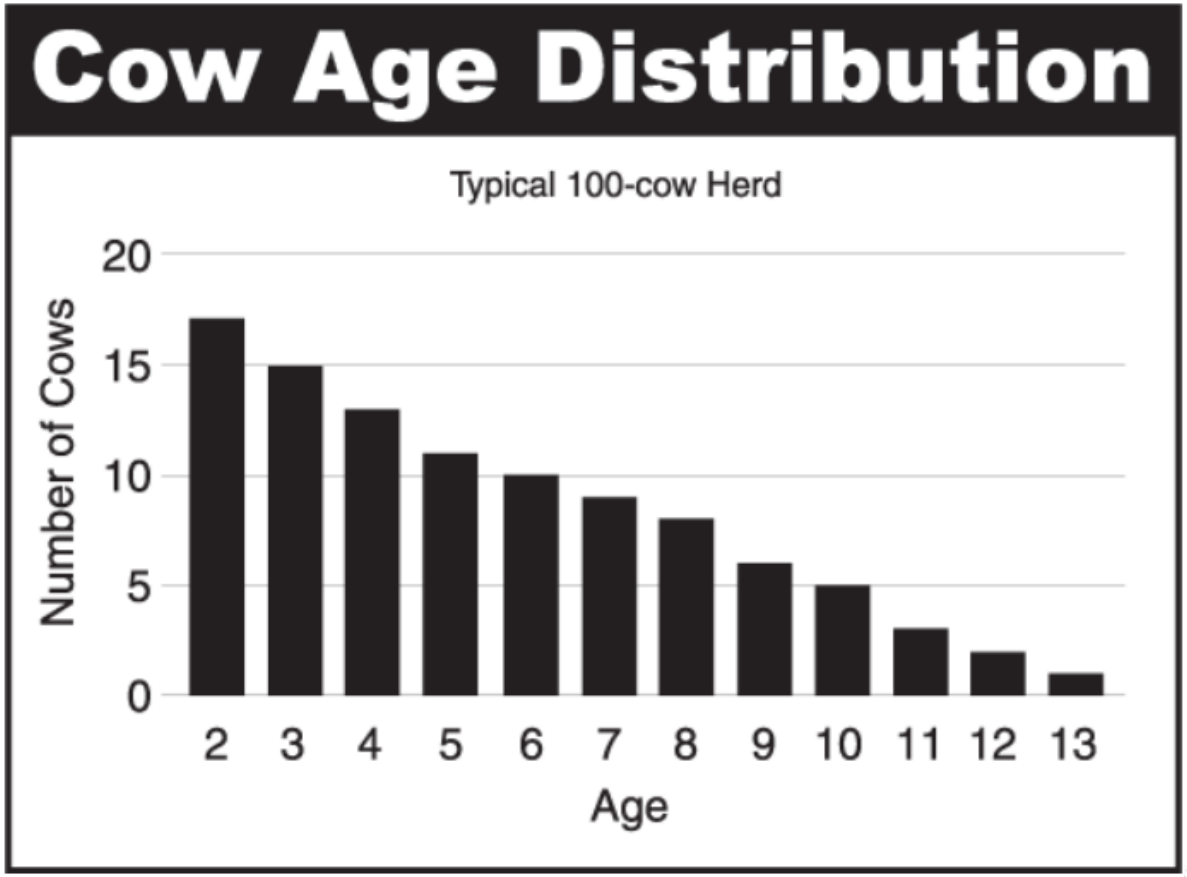
3 Years in the Herd = $457/year

Average cow age is 5 ½ years

At a 16% replacement rate, a cow will on average wean 4.5 to 5 calves before she leaves the herd.

How long is cow in a herd?

Assuming a 16% bred heifer replacement rate.



Dr. Kris Ringwall NDSU

Change from 20 to 15% replacement

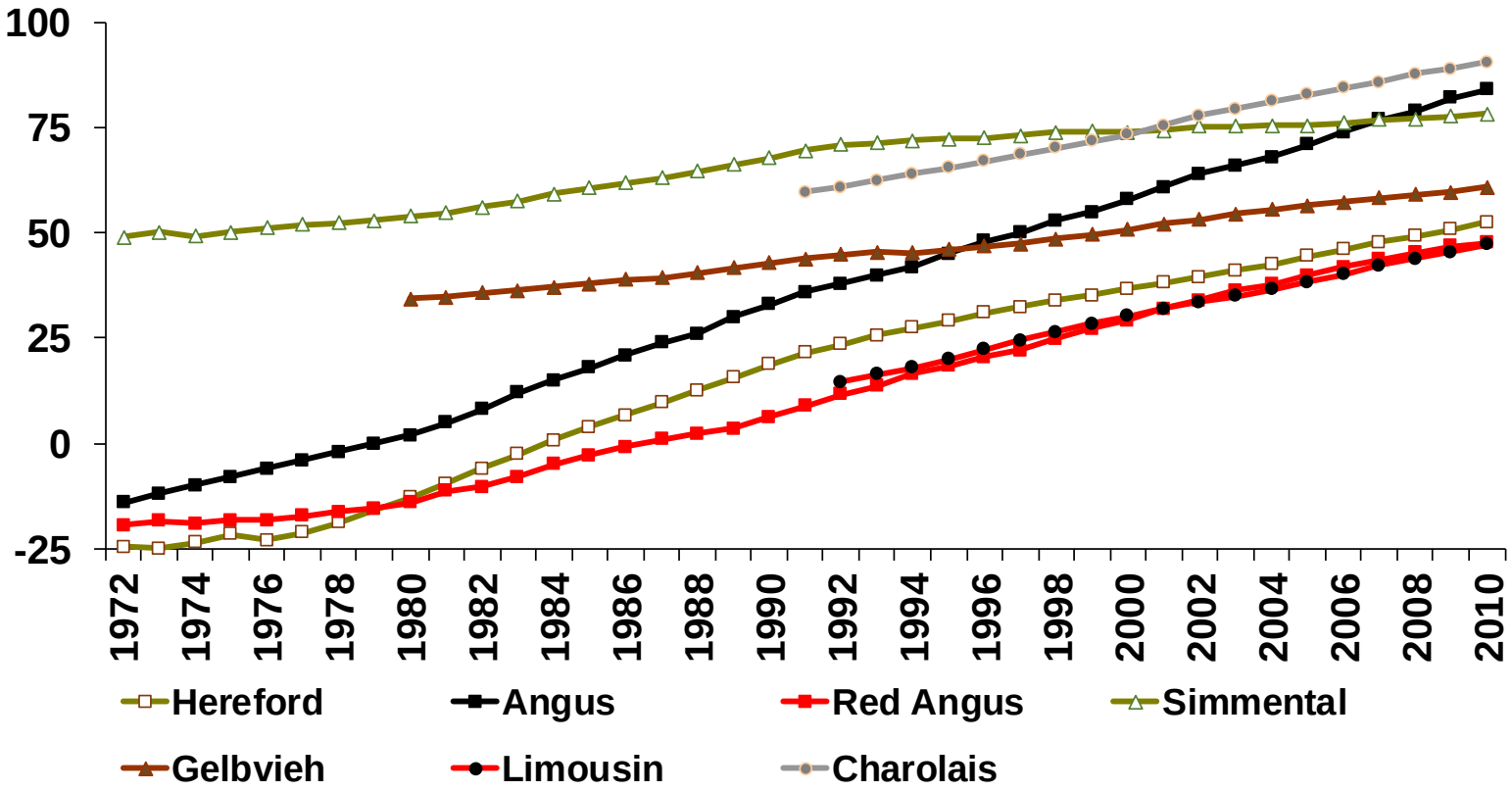
- **8 % increase in cows 5 and older**
- **6.2 % increase in weaning wt**
  (cows 5 and older wean heavier calves = 31 lbs)
- **16 % increase in lb calf to sell**
  (6.2 % ww and less retained)
- **Older cows easier to breed back**

Buying vs. Raising Heifers

- “The Stochastic Partial Budgeting for Beef Cow Replacement”
  - https://westcentral.unl.edu/agecon3

- Major considerations
  - Price to buy bred cows/heifers or pairs
  - Feed costs

Genetic Trends for YW, lb



Adapted from Spring 2012 Genetic Trends from Breed Associations and 2012 AB-EPD factors (Keuhn et al., 2012)

Genetics

If a producer was using Angus bulls with average EPD for milk, WW and YW in 1998-2000, the same bulls would be ranked in the bottom 5 % for these traits today

"The reproduction rate of the cow herd has not increased the past 20 years and has tended to decline the past 10 years."

-Dr. Jim McGrann
Ranch Economist Prof. Emeritus – Texas A&M

McGrann. Personal Communication. 2016

Heifer Selection and Development

Replacement Heifer Selection

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

Jim Gosey, 2005

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

Jim Gosey, 2005

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

Jim Gosey, 2005

Sire Selection

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

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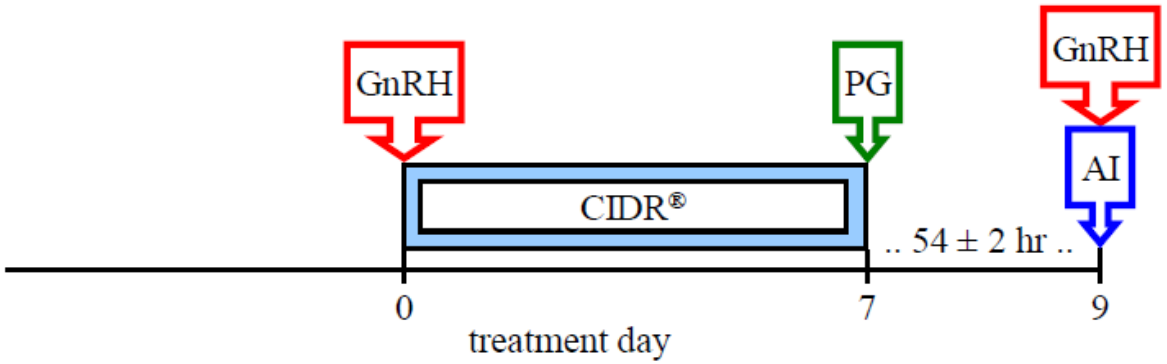
Time of Calving Affects Heifer Progeny

	21 d calving periods		
Heifer calves (n = 1,019)	**1st**	**2nd**	**3rd**
Preweaning ADG, lb	**1.83**	**1.83**	**1.90**
Weaning weight, lb	**483**	**470**	**434**
Prebreeding ADG, lb	**.86**	**.90**	**.90**
Prebreeding weight, lb	**653**	**644**	**609**
Cycling, %	**70**	**58**	**39**
Breeding ADG, lb	**1.59**	**1.63**	**1.70**
Pregnancy rate, %	**90**	**86**	**78**
Calved in 1st 21 d	**81**	**69**	**65**

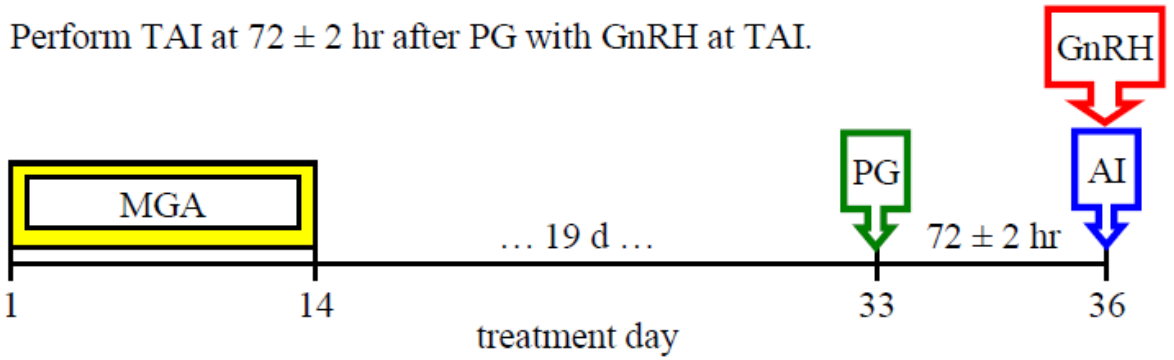
7-day CO-Synch + CIDR®

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



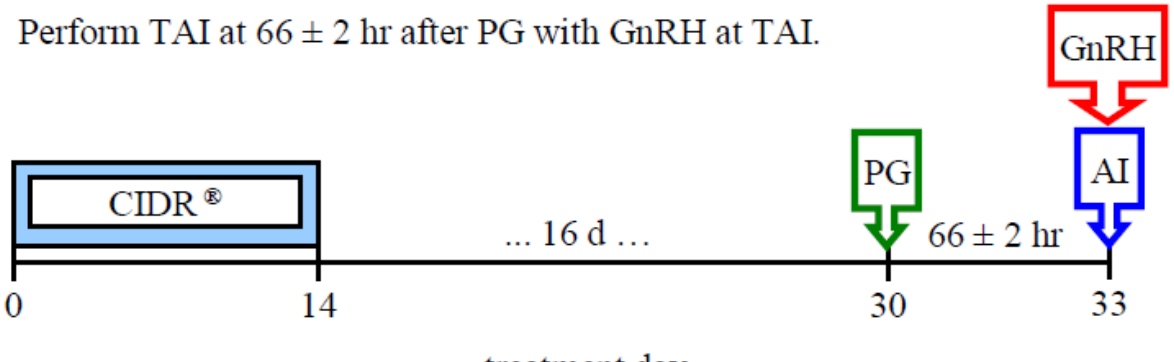
MGA®-PG

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



14-day CIDR®-PG

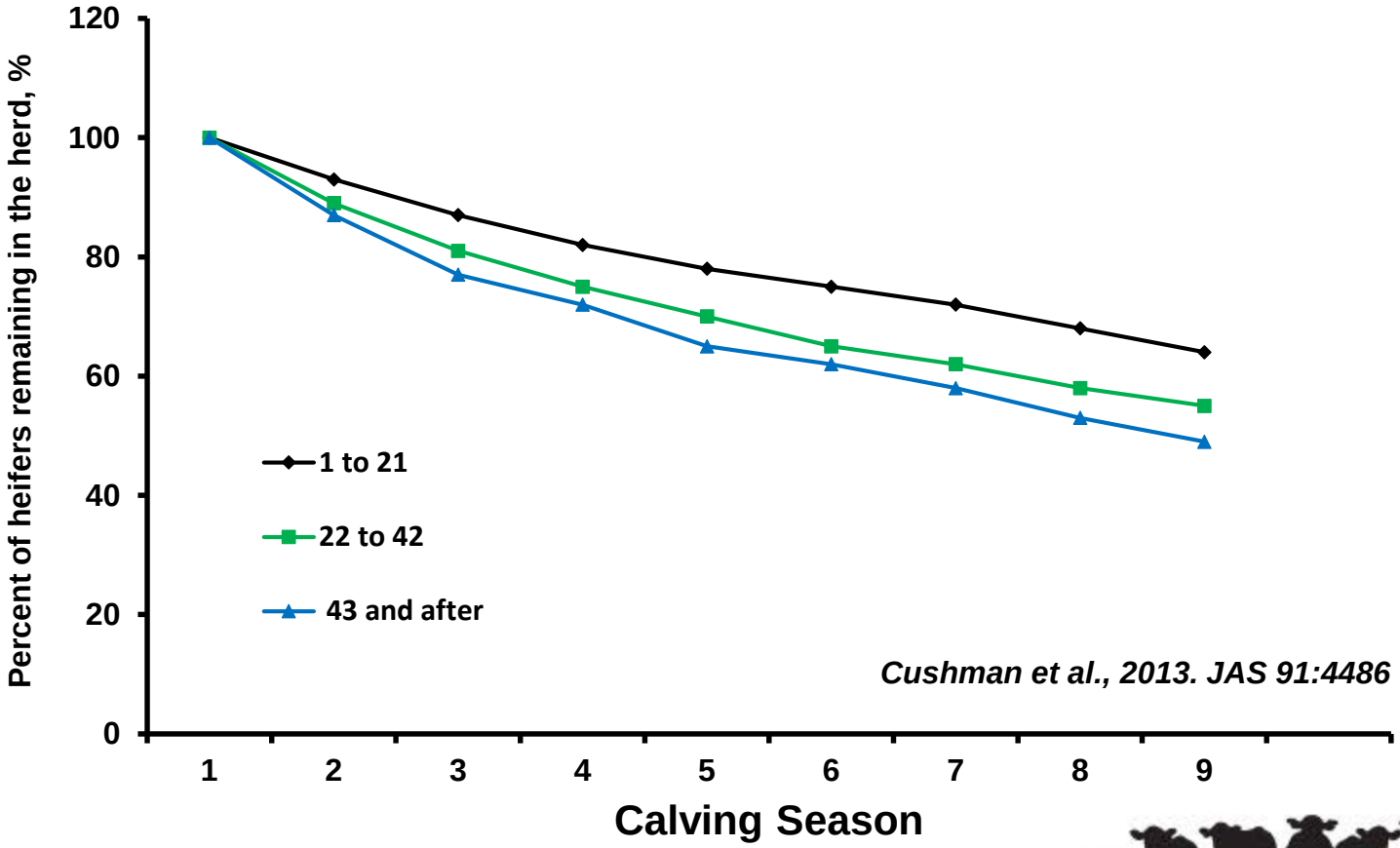
Perform TAI at 66 ± 2 hr after PG with GnRH at TAI.



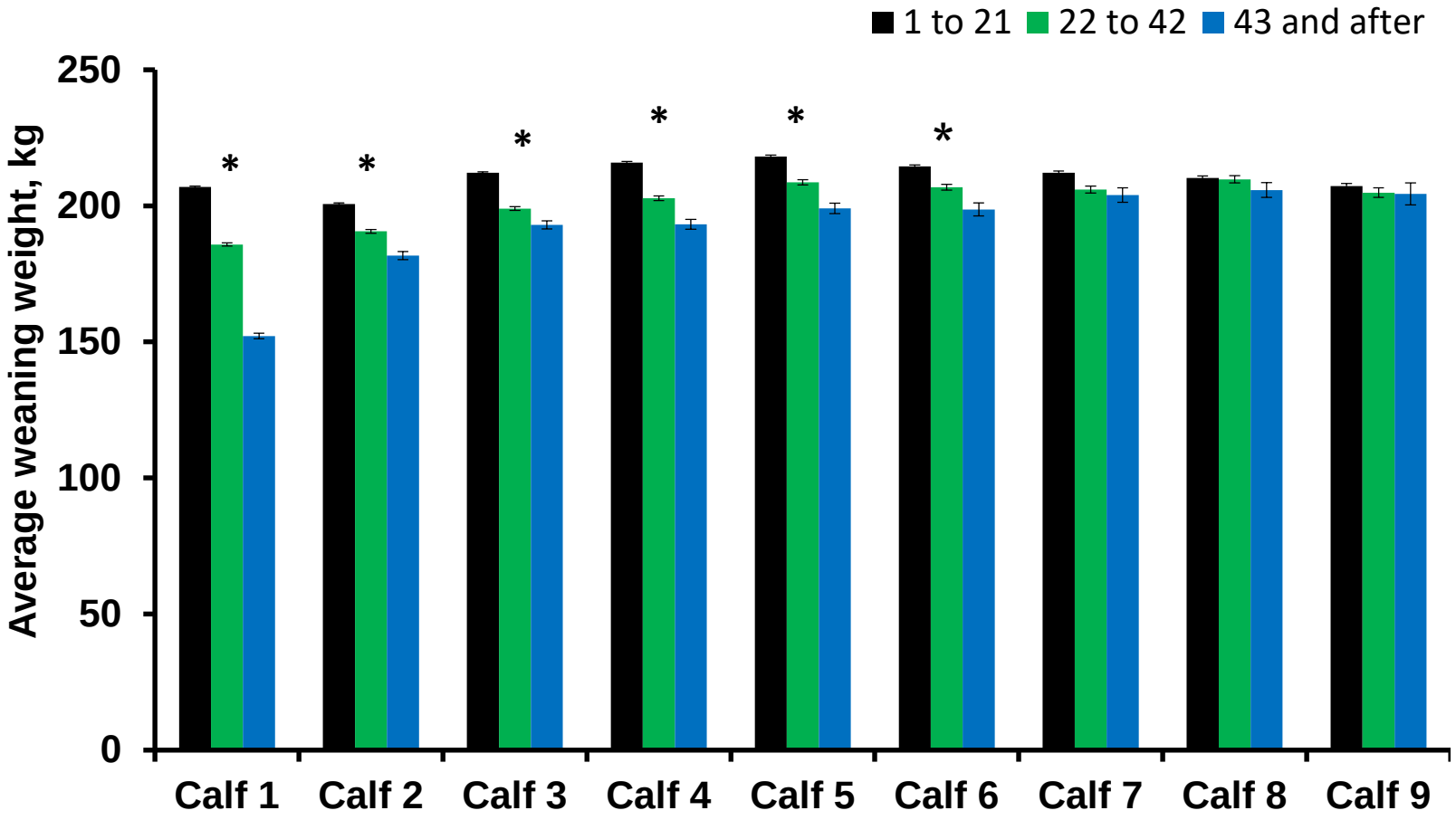
2018 Heifer Protocols-Fixed Time AI (TAI)

beefrepro.unl.edu

Advantages of calving early as a heifer

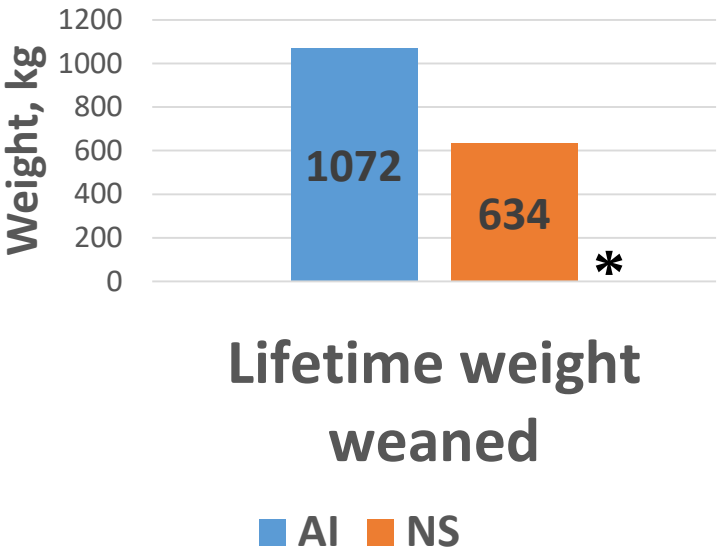


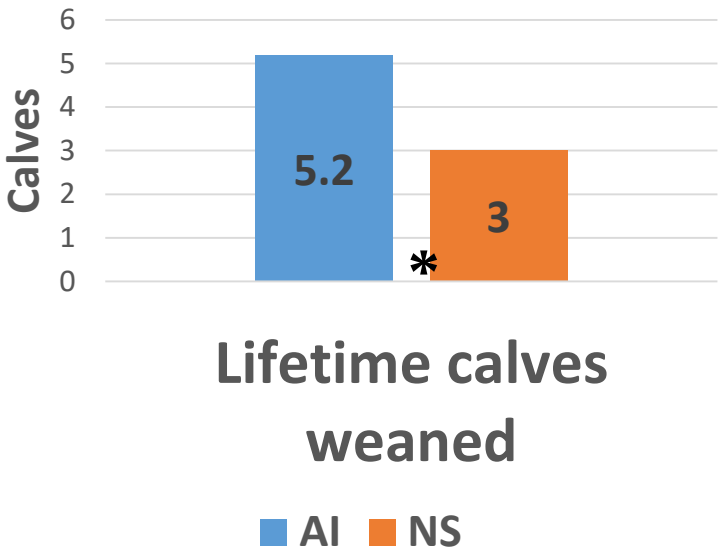
Advantages of calving early as a heifer



Cushman et al., 2013. JAS 91:4486

Lifetime production by heifers' first conception

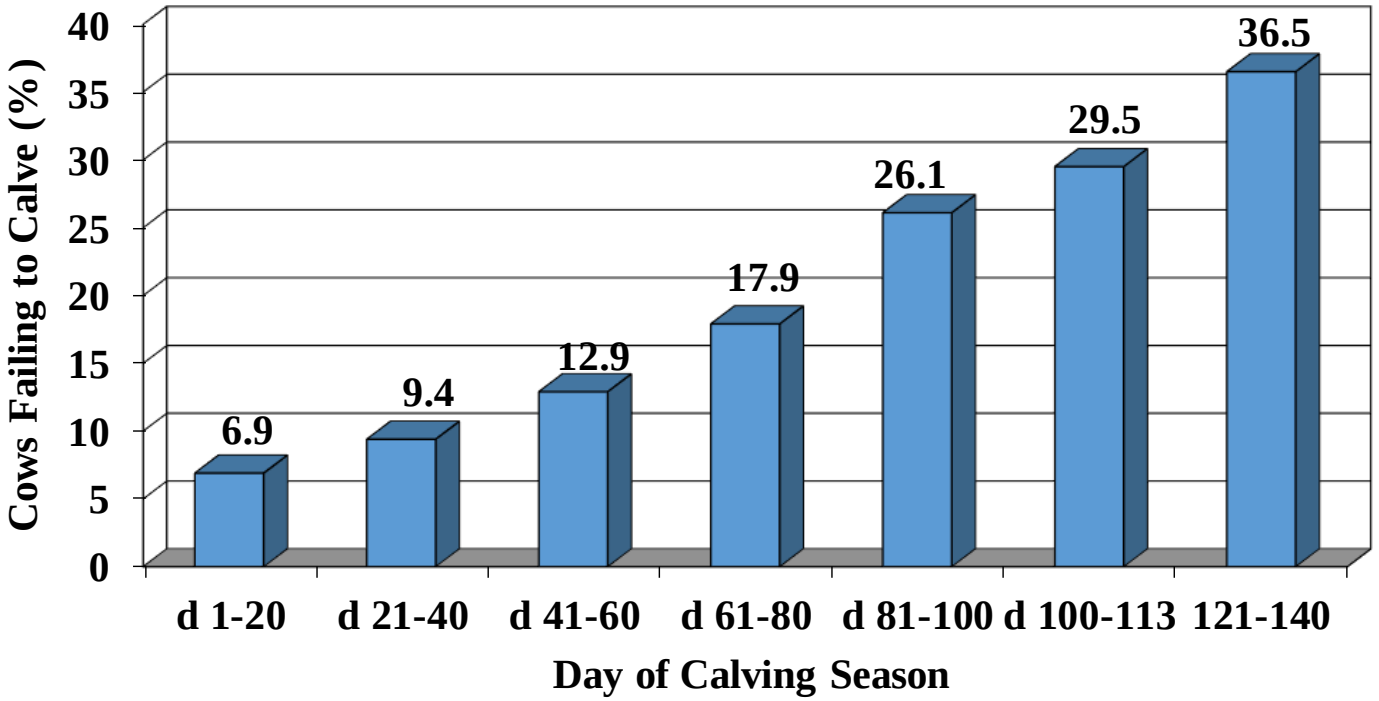




* $P < .0001$

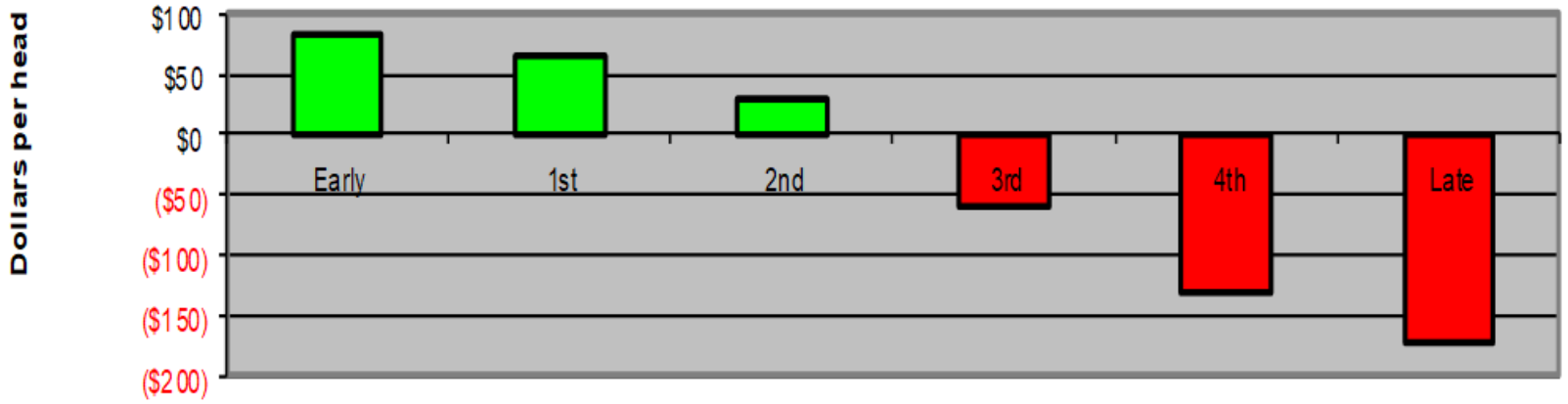
(French et al., 2012)

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

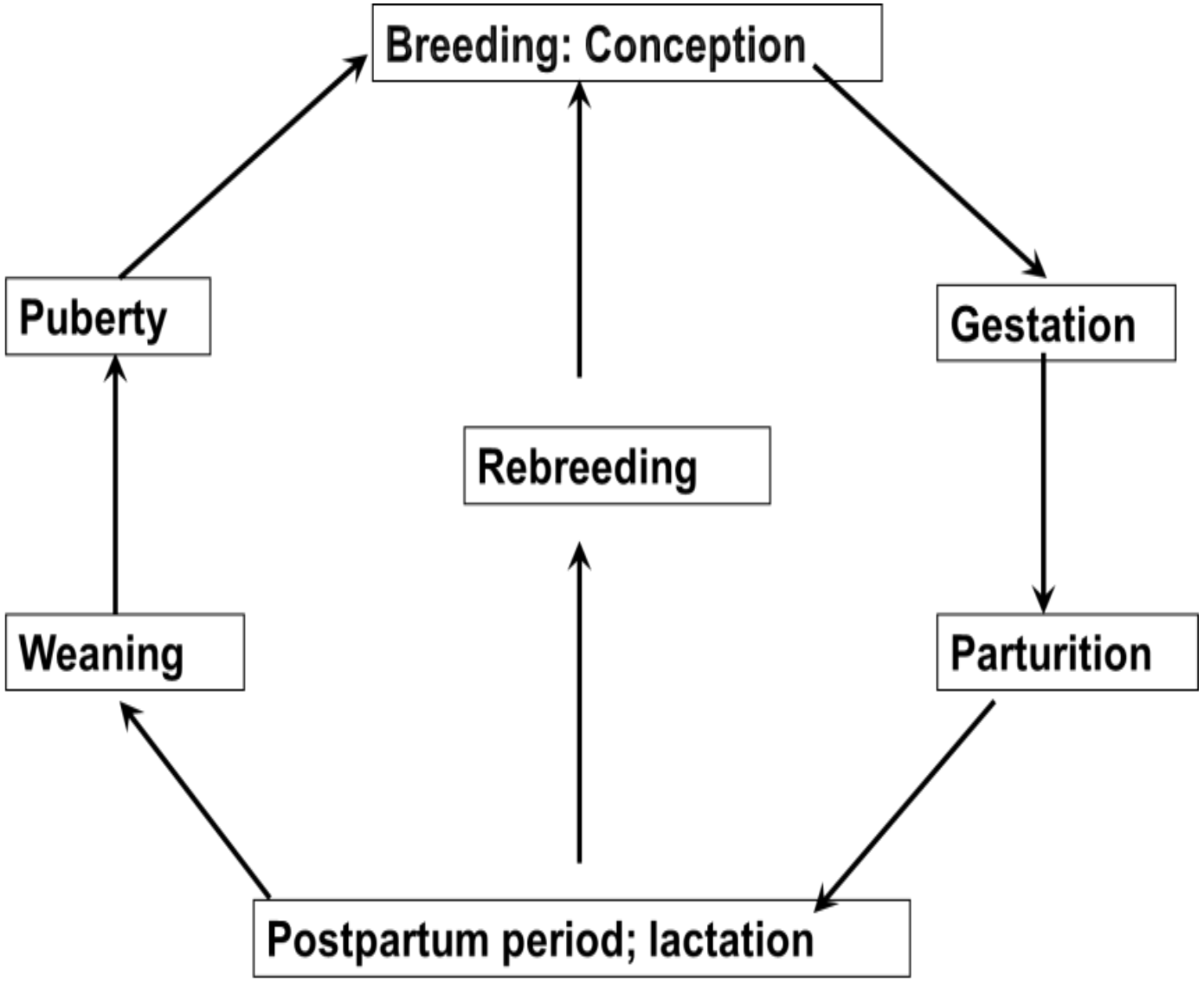


(Patterson et al., 1992)

Probability Differences Affected by Calving Date



- **It takes profit from 2 early-calving cows to cover loss from 1 late-calver.**
- **A cow calving in the first 21 days her entire 8 or 9-year life, produces the weaning weight equivalent of 1½ to 2 ADDITIONAL calves in her lifetime compared with one that starts late and stays late.**



Reproduction cycle of the beef female (Bellows, 1985)

Feeding to a “Target Weight

% Mature BW @ Breeding	55%	60%
Pre-breeding WT	600	683
Conception (21 d)	30	62
August pregnancy	63	90
October pregnancy	50	87
Calving WT	834	897
Calf BW	71	73
Calving difficulty, %	46	36
Calf death loss, %	6	5

What is the appropriate Target Weight??

% Mature WT		53	58
Pregnancy Rate	1st	92	88
	2nd	91	91
	3rd	94	92
	4th	96	96

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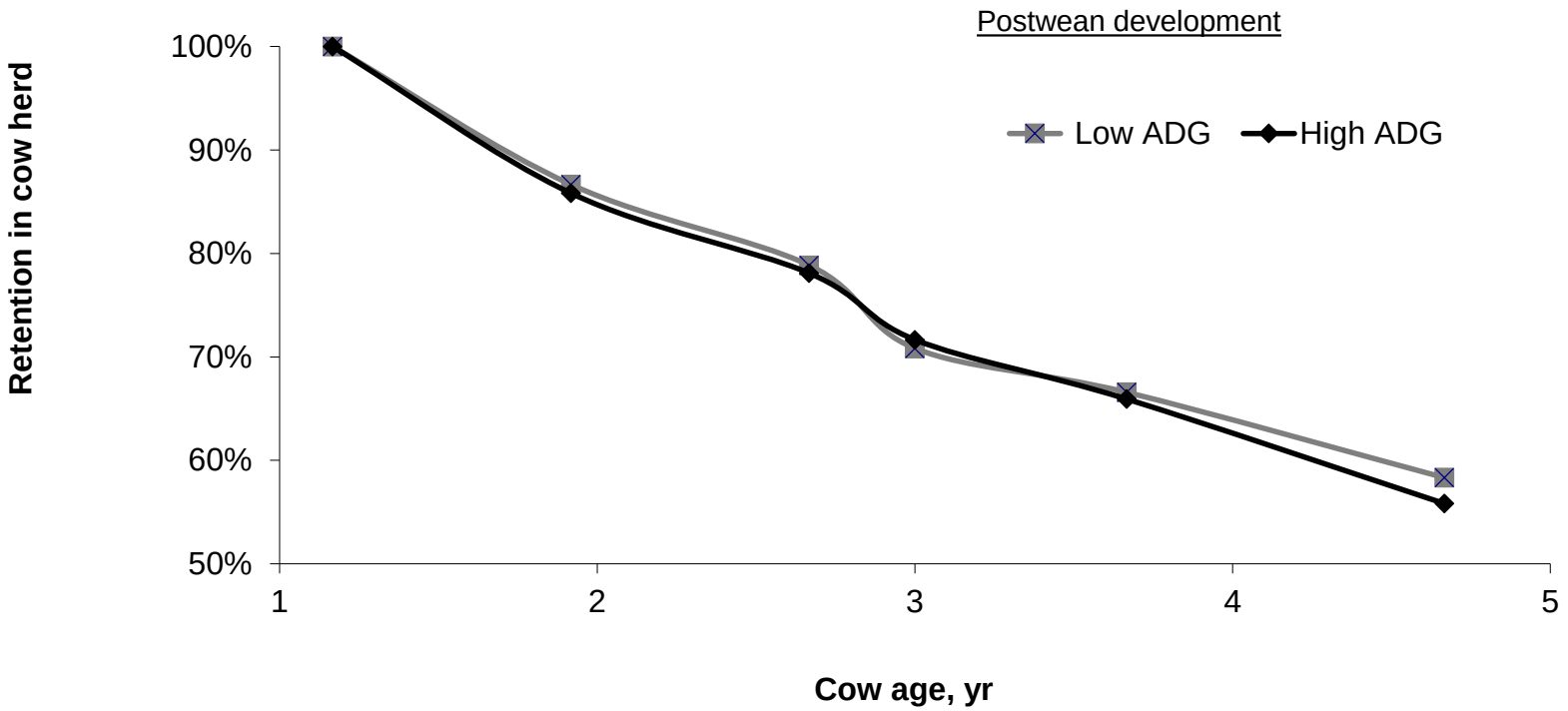
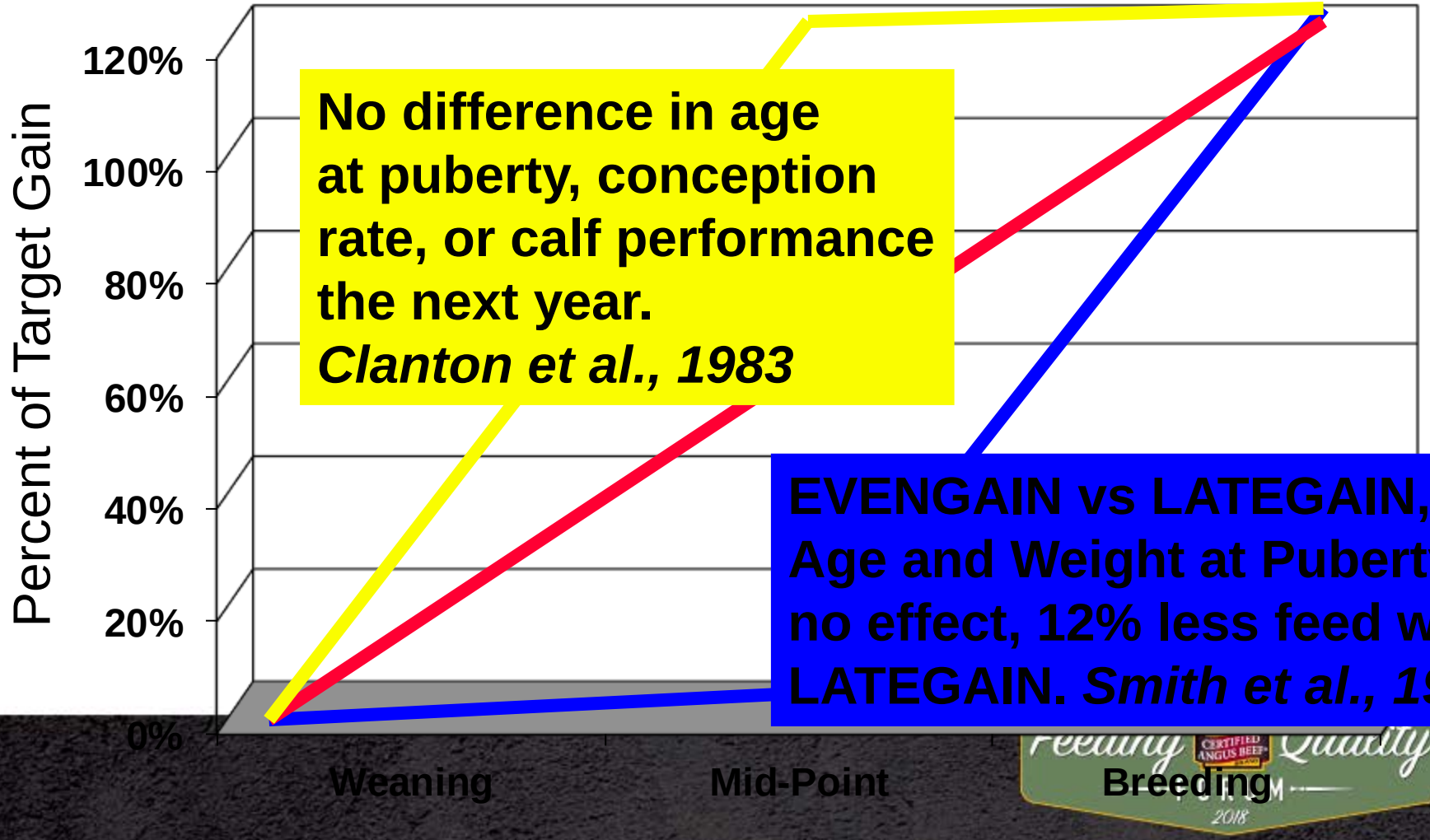
Effect of Post Weaning Growth on Retention



Target Weight Method

Heifer WW Nov. 1	Days/ WT gain	Target WT May 1
500 lb	250 lb over 180 d	750lb
ADG needed 1.40 lb/d		

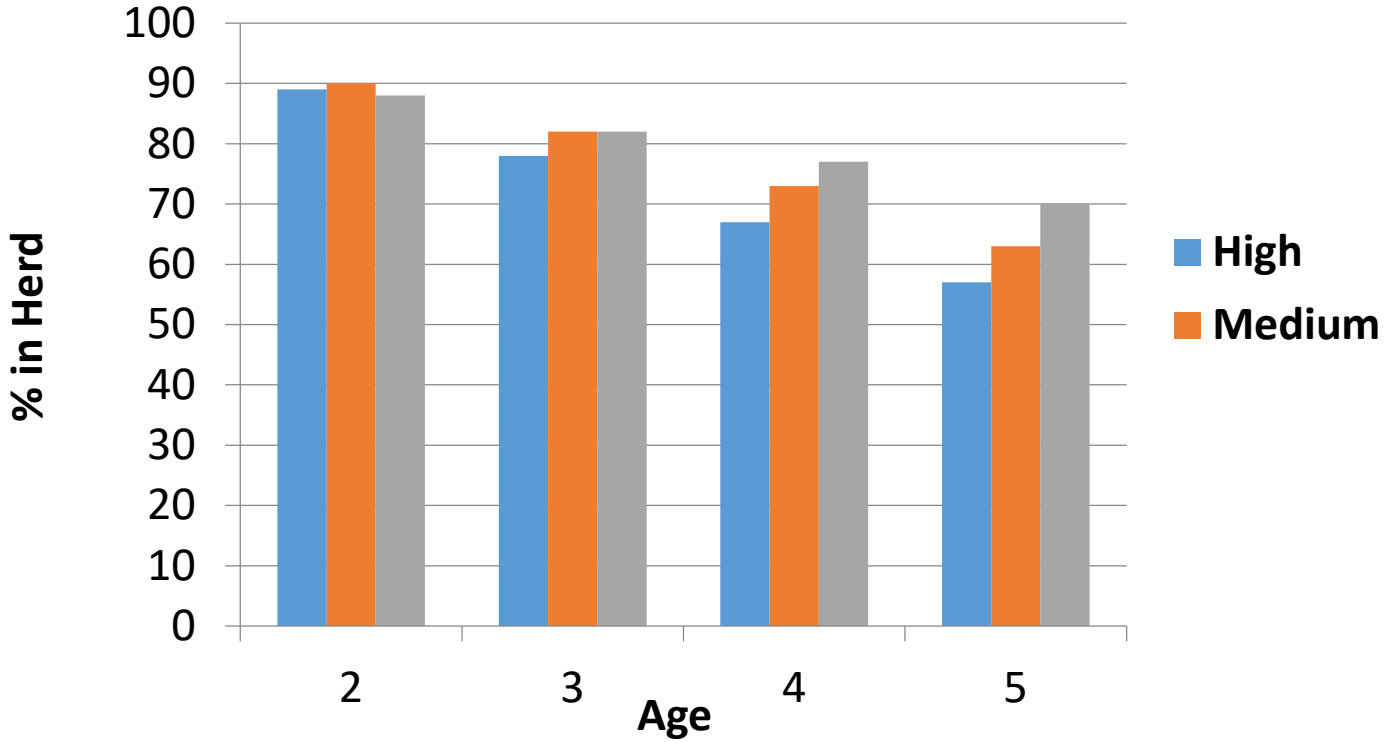
Effect of Time of Gain From Weaning to Breeding on Heifer Performance



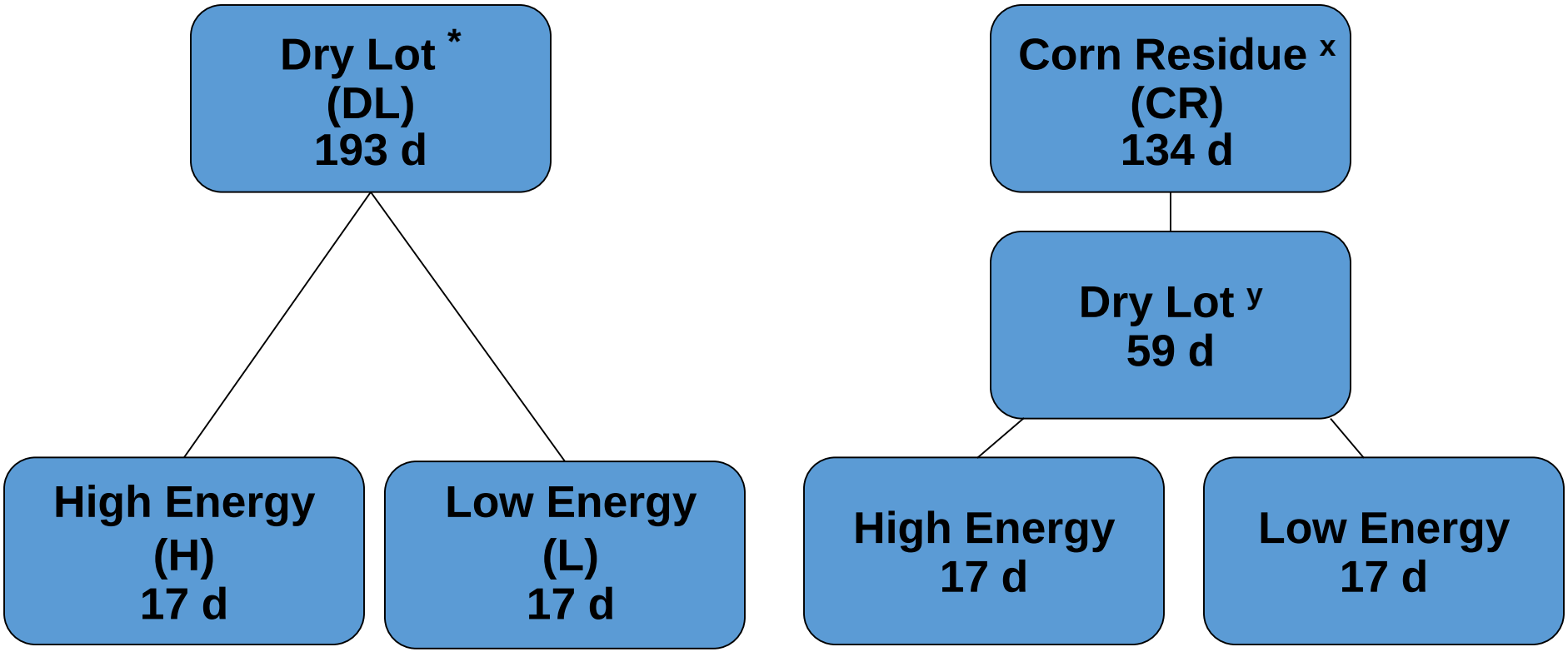
Timing of Gain and Reproductive Performance

	Even Gain	Late Gain
FSCR	56.4	71.1
Overall	87.5	87.5

Longevity and Heifer Development System



Heifer Development Systems

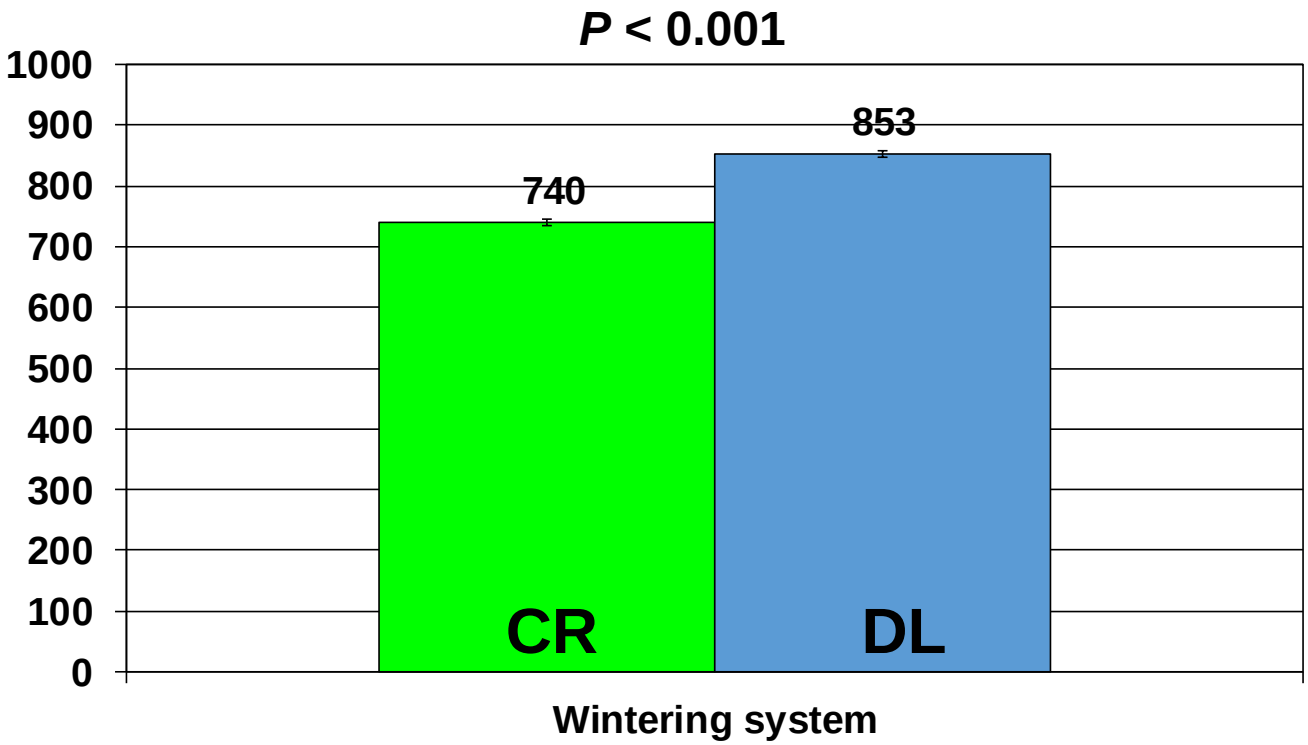


*DM%; Brome hay (62%), corn silage (20%), DDG (13%), supplement (5%, 200 mg/d monensin)

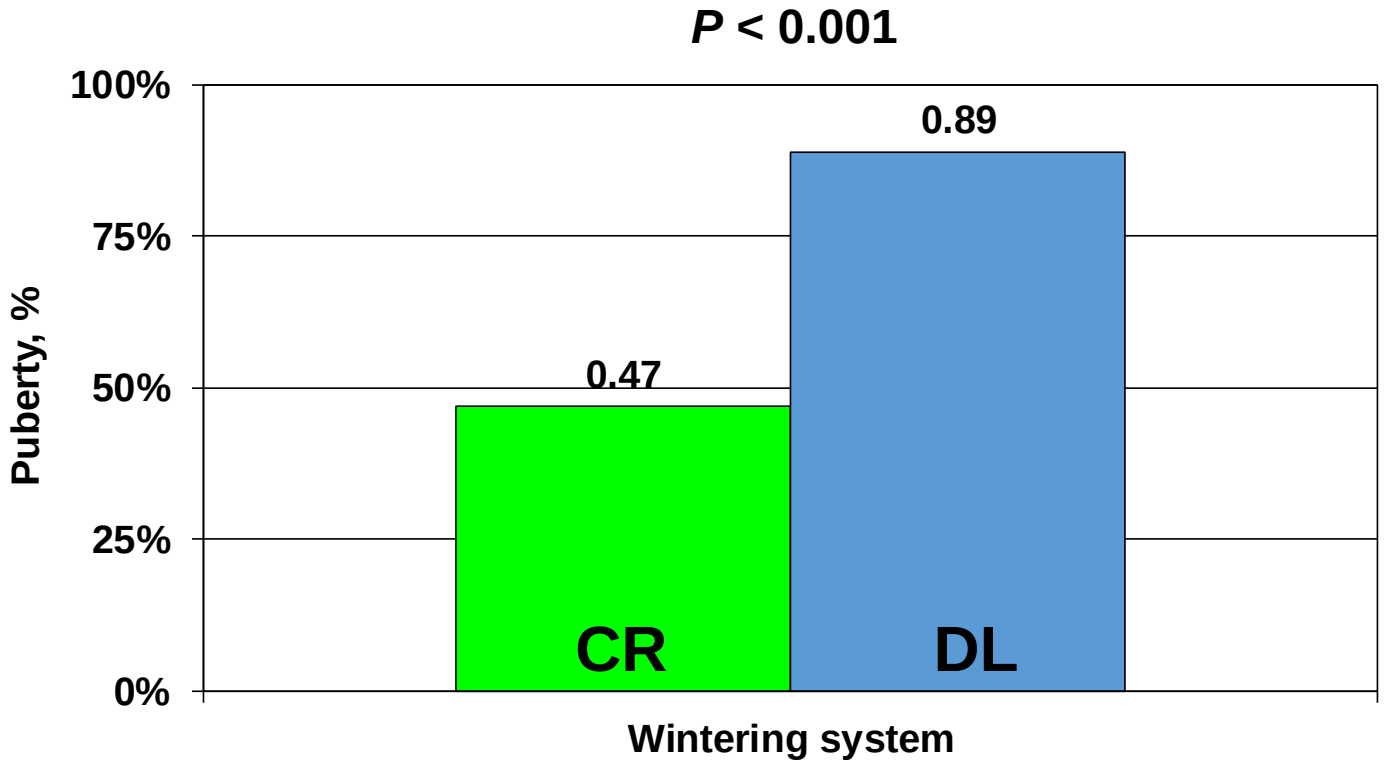
xA daily supplement offered (28 % CP; 62 % DDG, 11 % wheat midds, 2 % urea, 25 % other, 80 mg/d monensin; 0.45 kg/hd/d)

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

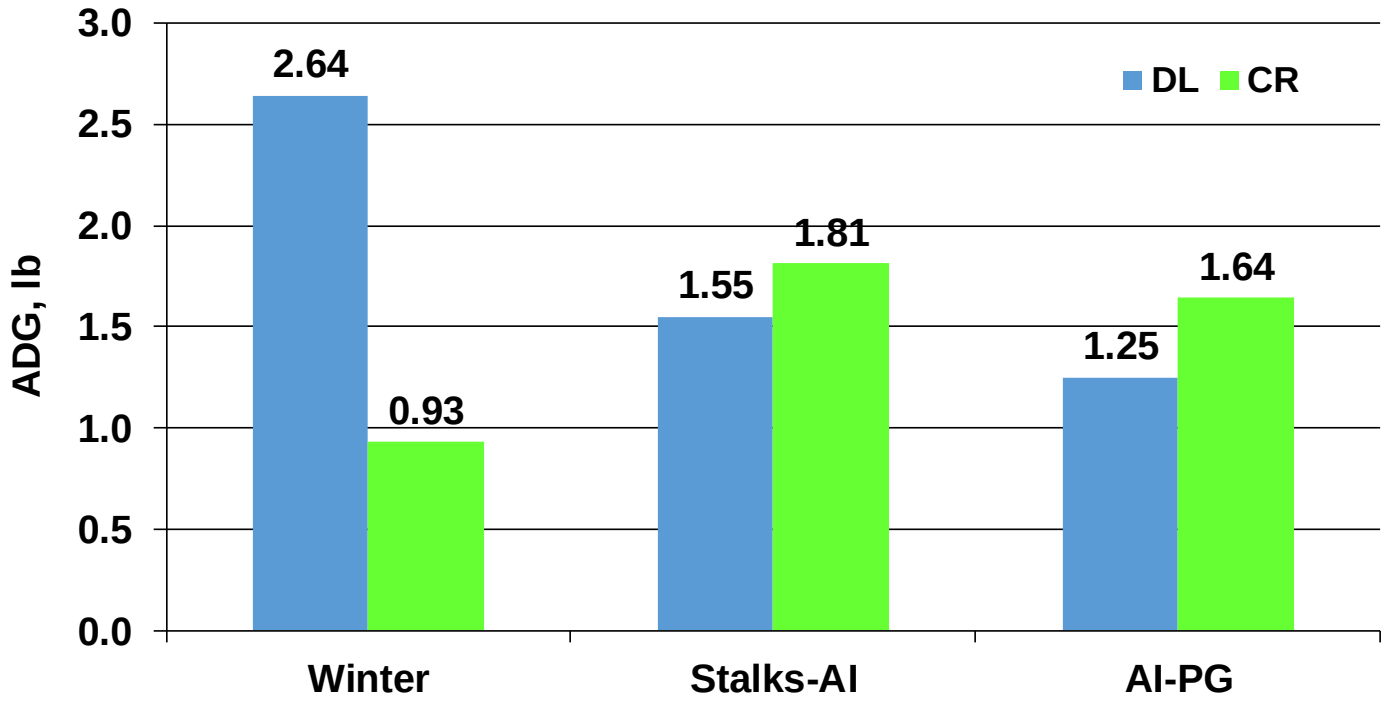
Effect of Wintering System on BW before Breeding



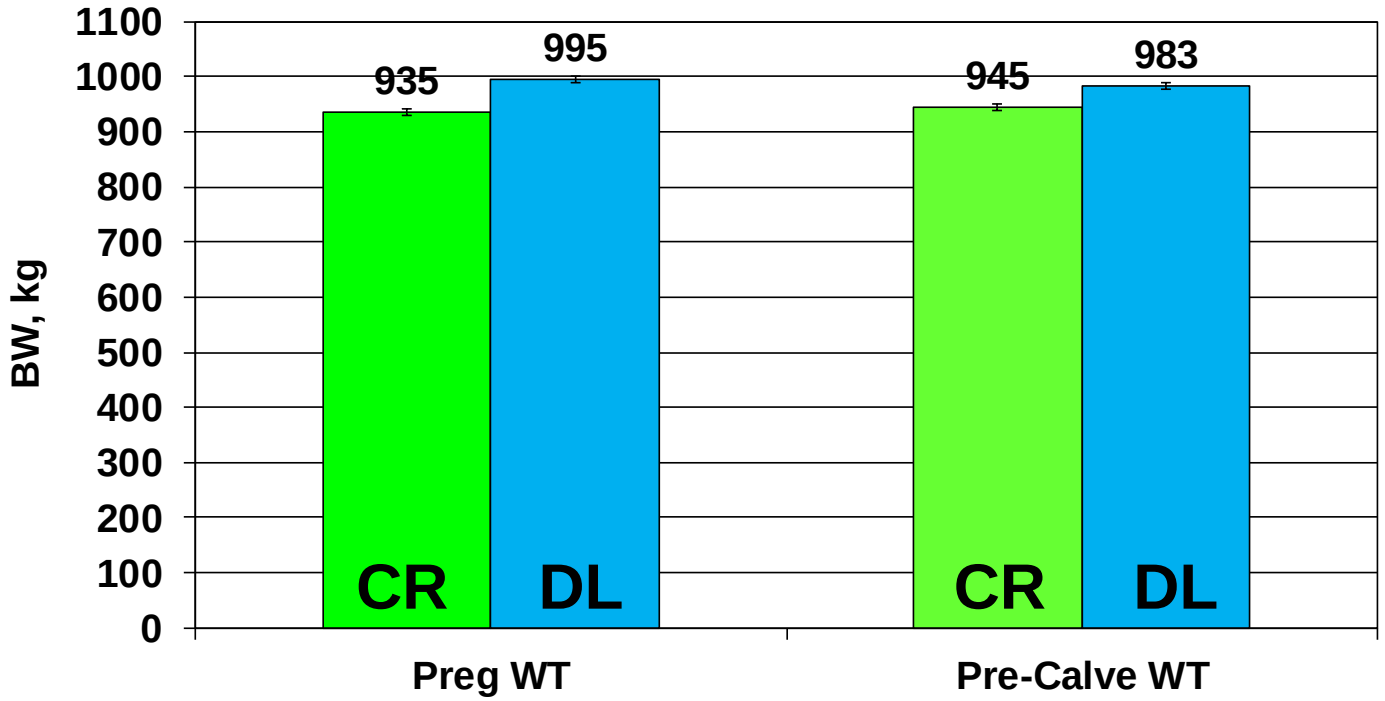
Effect of Wintering System on Puberty Status before Breeding



Effect of Treatment on ADG after Breeding



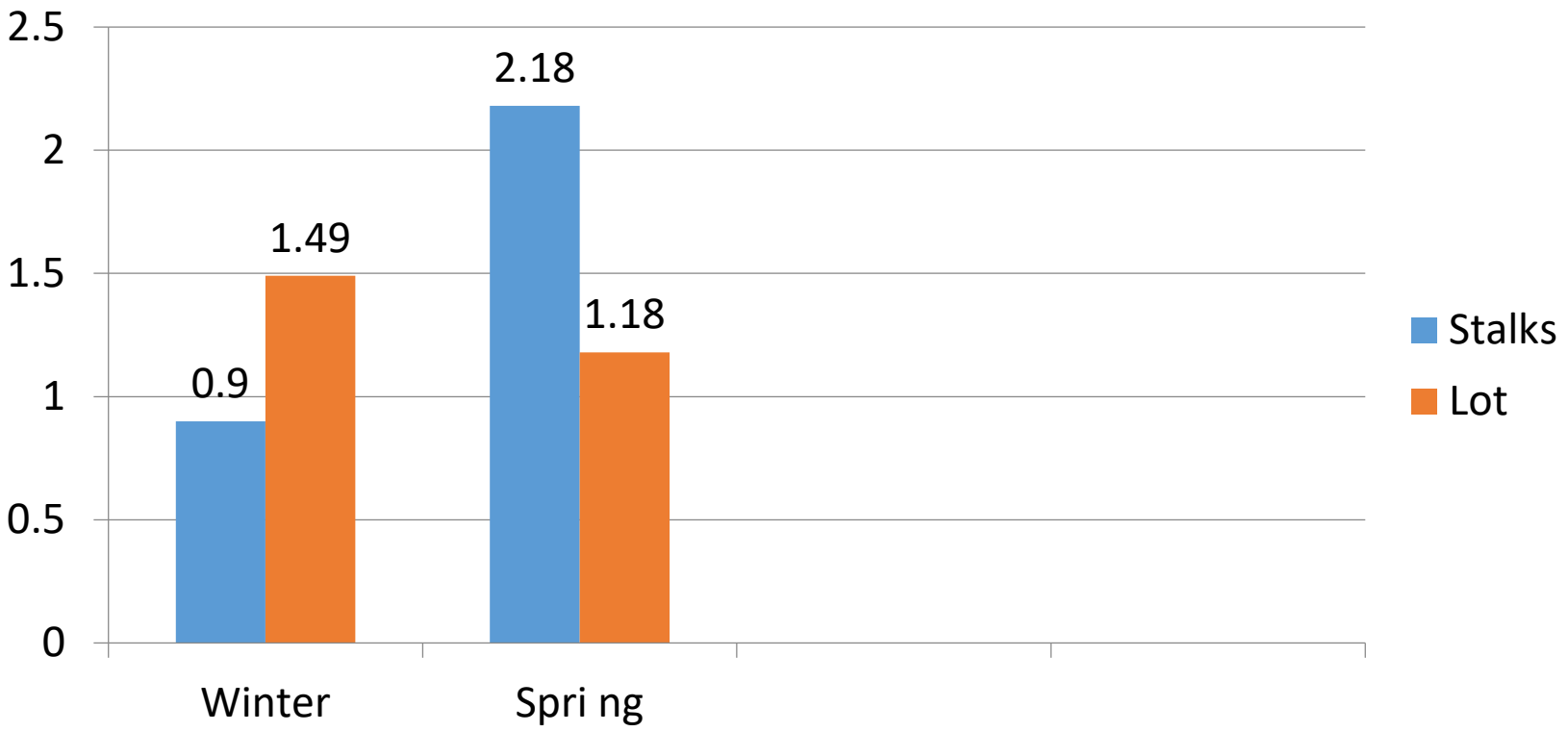
Effect of Treatment on BW at Pregnancy Diagnosis



Heifer Development

Weight, lb	665	727
Wean to Pre-Breed ADG	0.84	1.23
AI Pregnancy, %	65	55
	WHY?	
ADG Pre	1.40	2.14
ADG Post	1.27	0.81

Development Stalks vs Dry Lot

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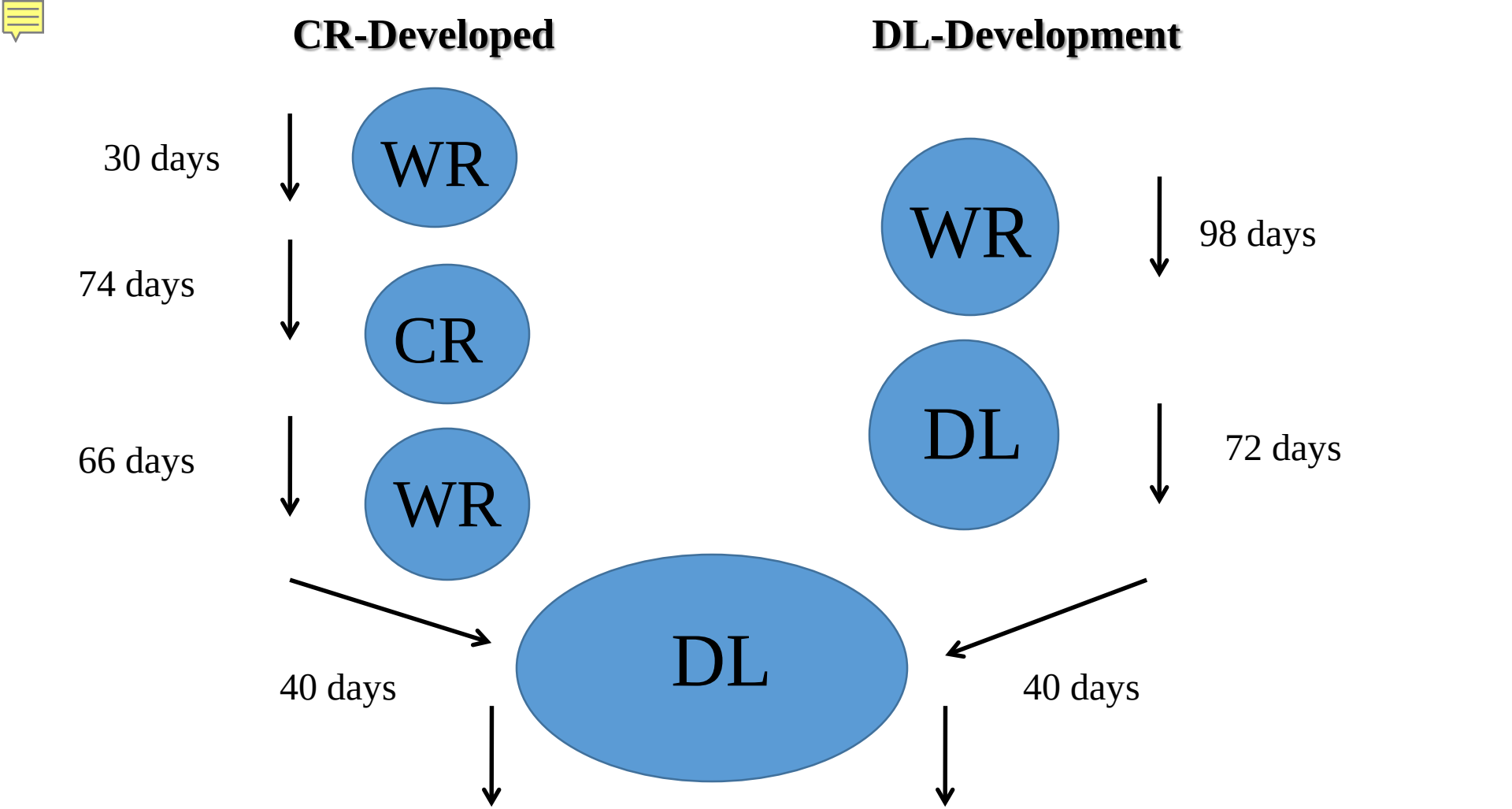
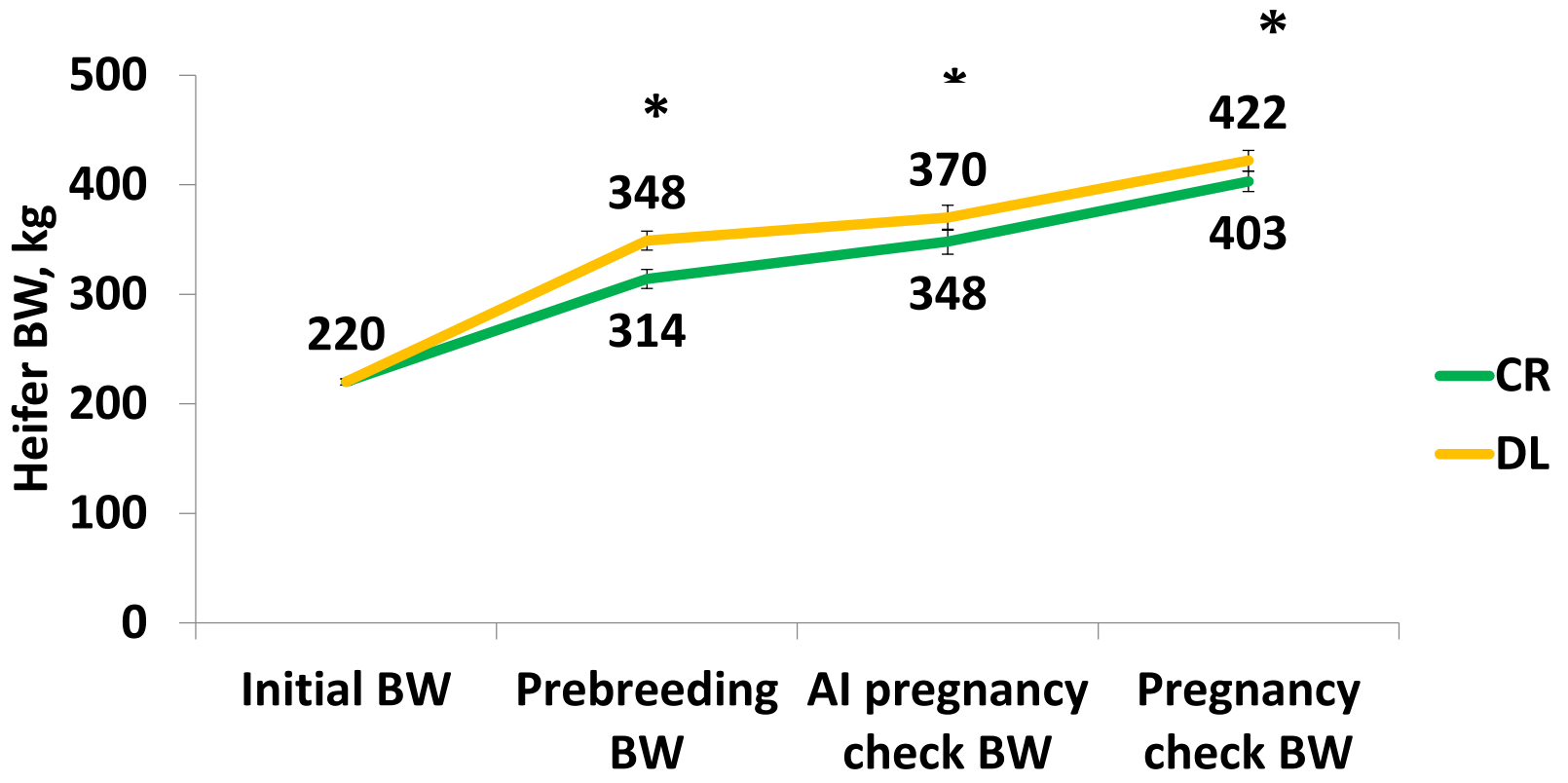


AI Breeding

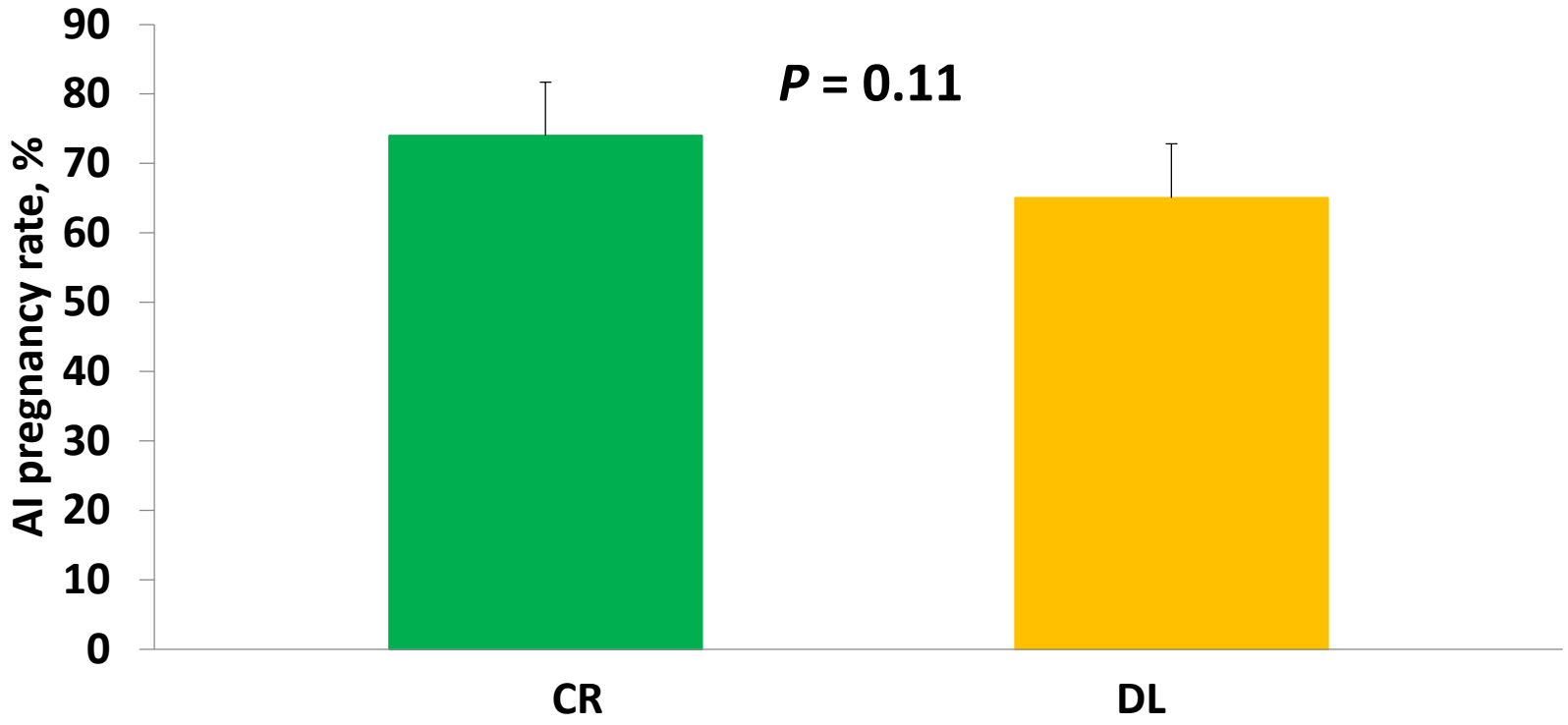
Summer Pasture – Mixed Grass

Effect of heifer development system on heifer BW



* P-value ≤ 0.05

Effect of heifer development system on AI pregnancy rate

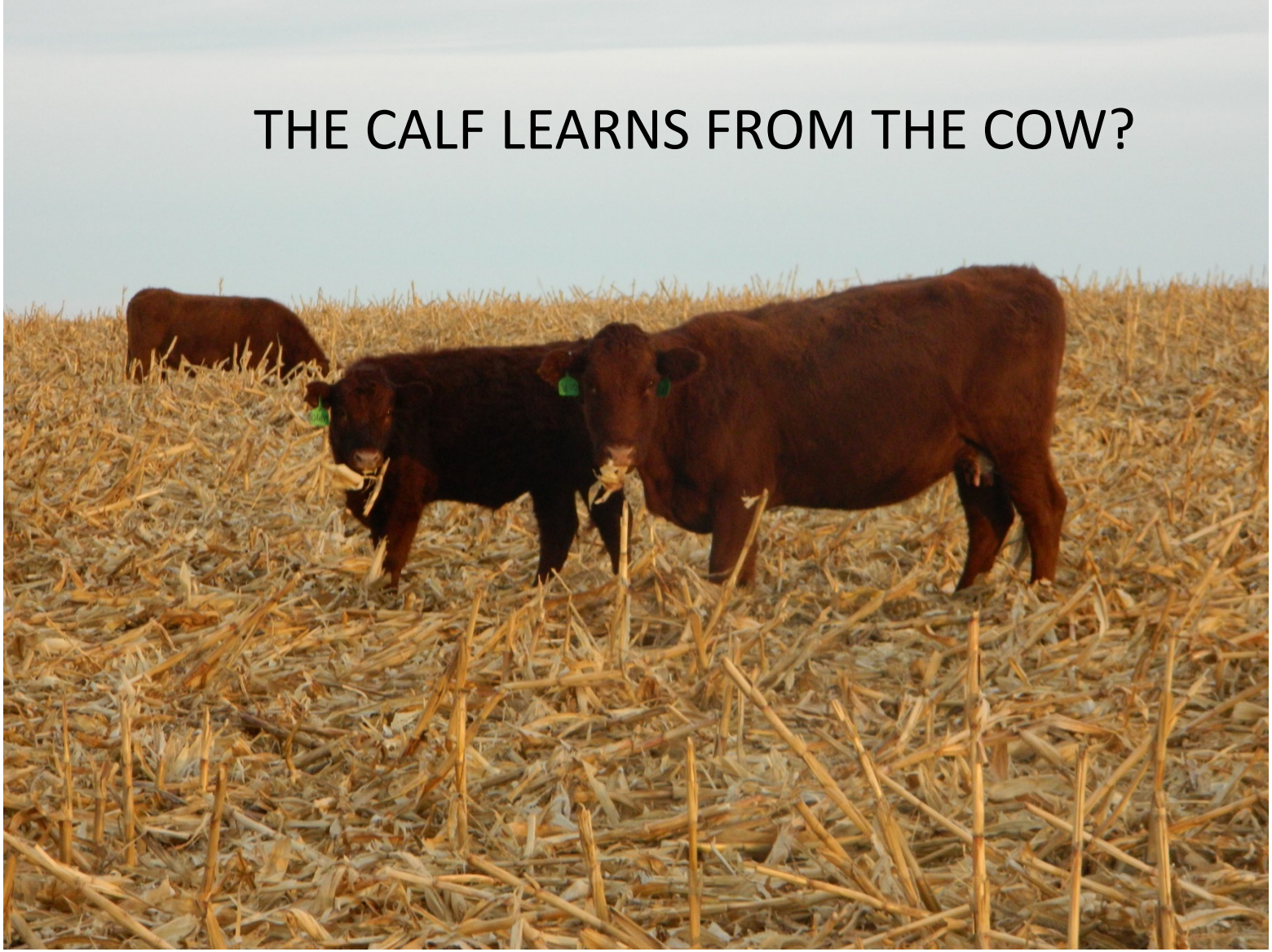


Effect of heifer development system on ADG while grazing CR during late gestation[1]

Item	CR	DL	SEM	P-value
n	4	4		
Initial BW, kg	428	455	4	0.01
Final BW, kg	453	469	12	0.06
ADG, kg/d	0.30	0.14	0.13	0.03

[1]Heifers developed at West Central Research and Extension Center North Platte, NE.

THE CALF LEARNS FROM THE COW?



Extensive heifer development systems

- Lower Development Costs $100 +
- Selling open heifers was profitable
- Determine adaptability early?
- Short breeding season
- Lighter breeding weights
- Lighter mature weights?
- Must continue to grow through calving

- Metabolizable protein supply while grazing dormant winter forage during heifer development alters pregnancy and subsequent in-herd retention rate

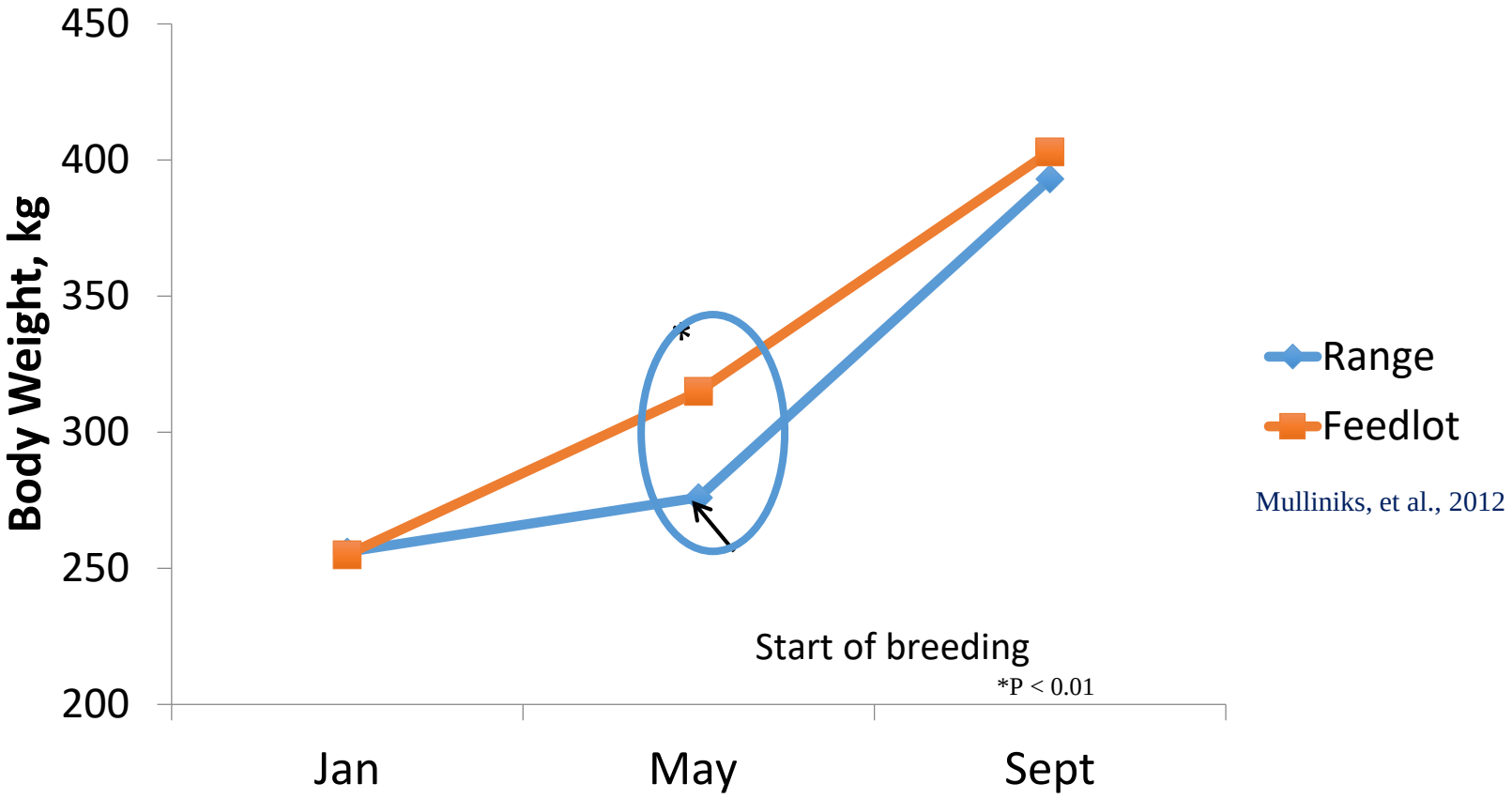
Mulliniks, J. T., D. E. Hawkins, K. K. Kane, E. J. Scholljegerdes, and M. K. Petersen

J. Anim. Sci.

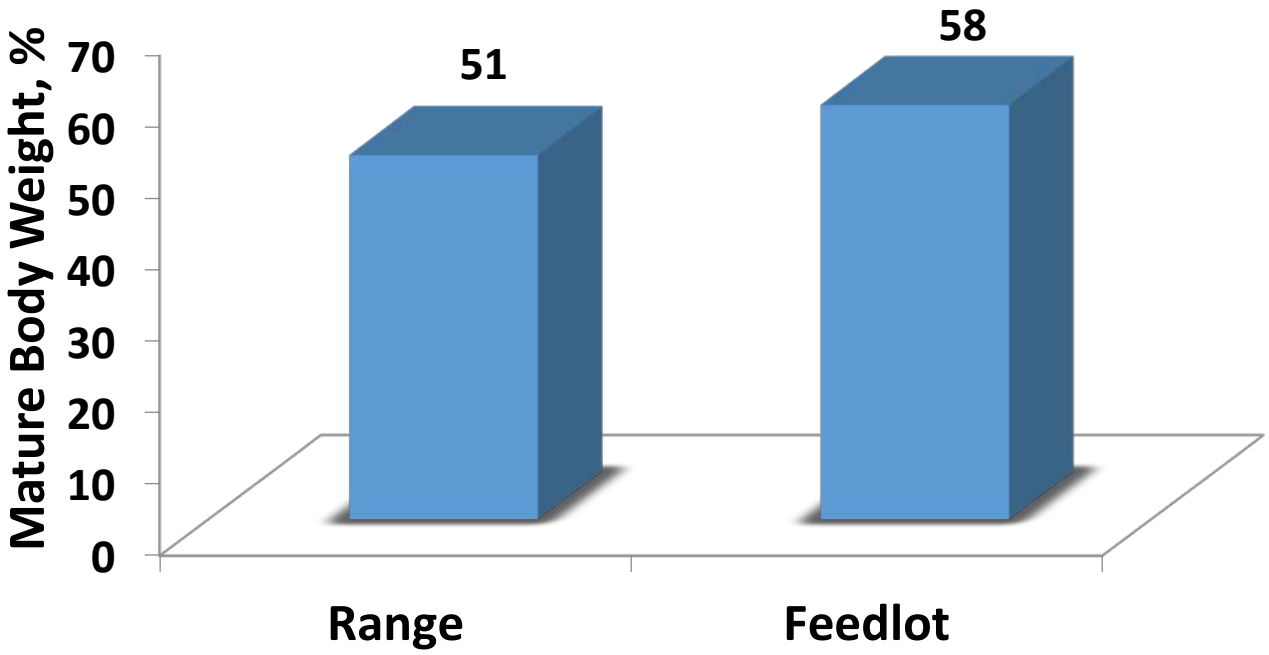
Materials and Methods

- Heifer Development Treatments
  - 36% CP (50% RUP, **RUP**) at 0.9 kg/hd/d
  - Commercial growing diet in feedlot (**Feedlot**) fed to gain 0.7 kg/d
- Initiated in February and terminated at breeding (~ 100 d)
- 45 d breeding season

Increased Heifer BW at Breeding in Feedlot Developed Heifers

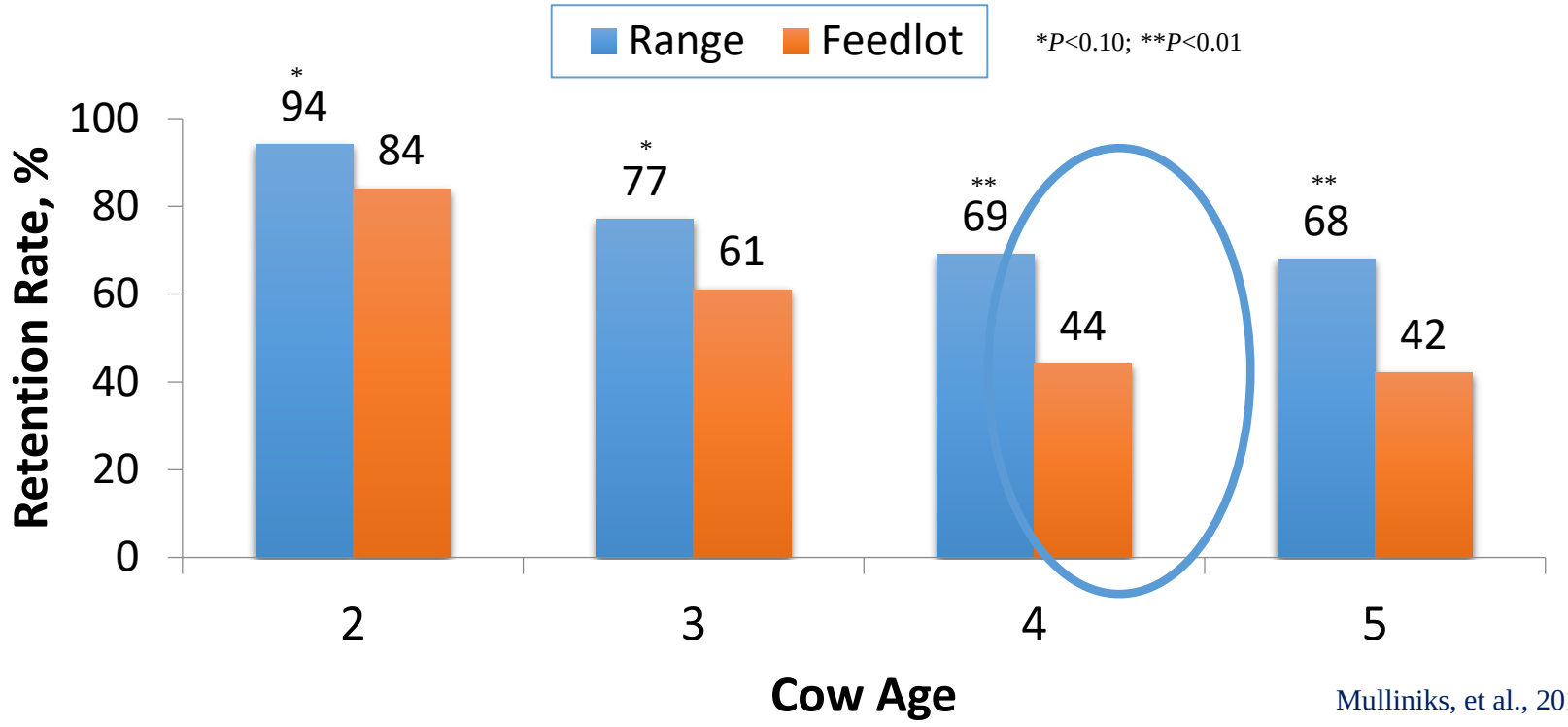


Greatest % mature BW at breeding in feedlot developed heifers



$P < 0.01$

New Mexico: Increased Retention Rate in RUP-Supplemented Range Heifers



Mulliniks, et al., 2012

Genetic Potential and Productivity

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Correlations of Genetics and Longevity

- Lasslo et al. (1985) suggested ewes maintained under extensive range environments may not express their maternal production potential due to limitations in feed intake.
- High genetic value for growth and size may leave the herd because they either phenotypically appear to be unfit for breeding.
- Genetic correlations between 120W and stayability traits generally ranged from −0.20 to −0.40 and those with adult BW were generally not less than −0.20 (Borg et al. 2009)

Impact of milk production level on beef cow-calf productivity in Tennessee

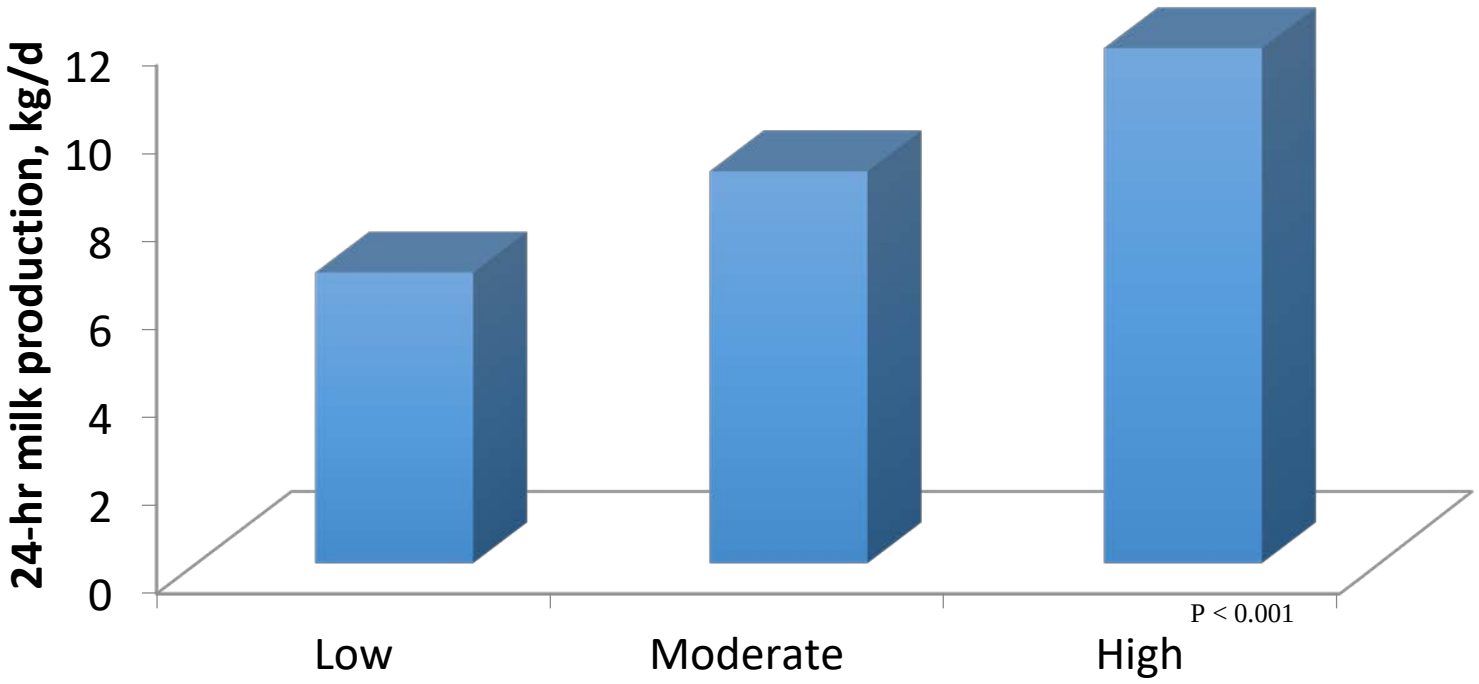
S. R. Edwards and J. T. Mulliniks

University of Tennessee, Knoxville

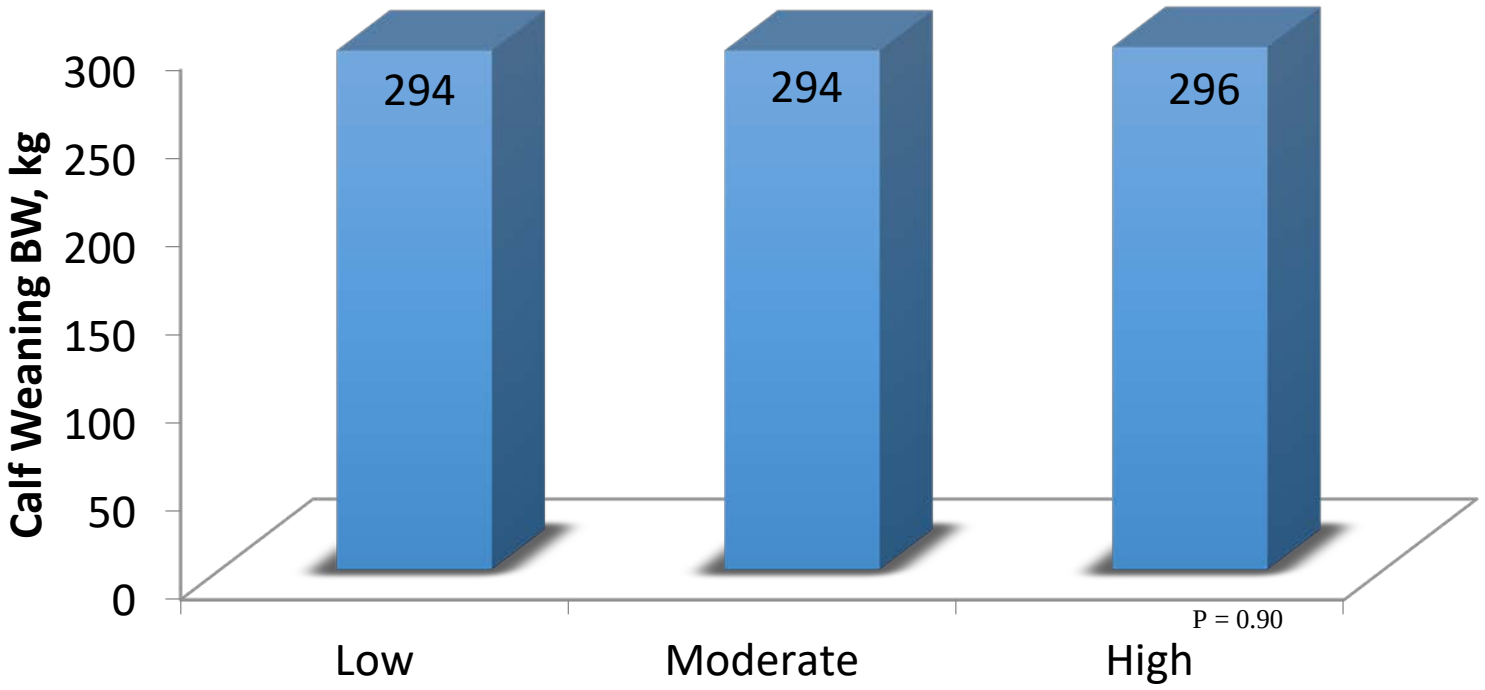
Materials and Methods

- 239 Angus sired Cows (620 ± 10 kg)
- Milked 58 Days Postpartum and 129 Days Postpartum.
- Cows were grouped by their milk yield.
    - Low < 8kg
    - Moderate = 8-9kg
    - High ≥ 10 kg

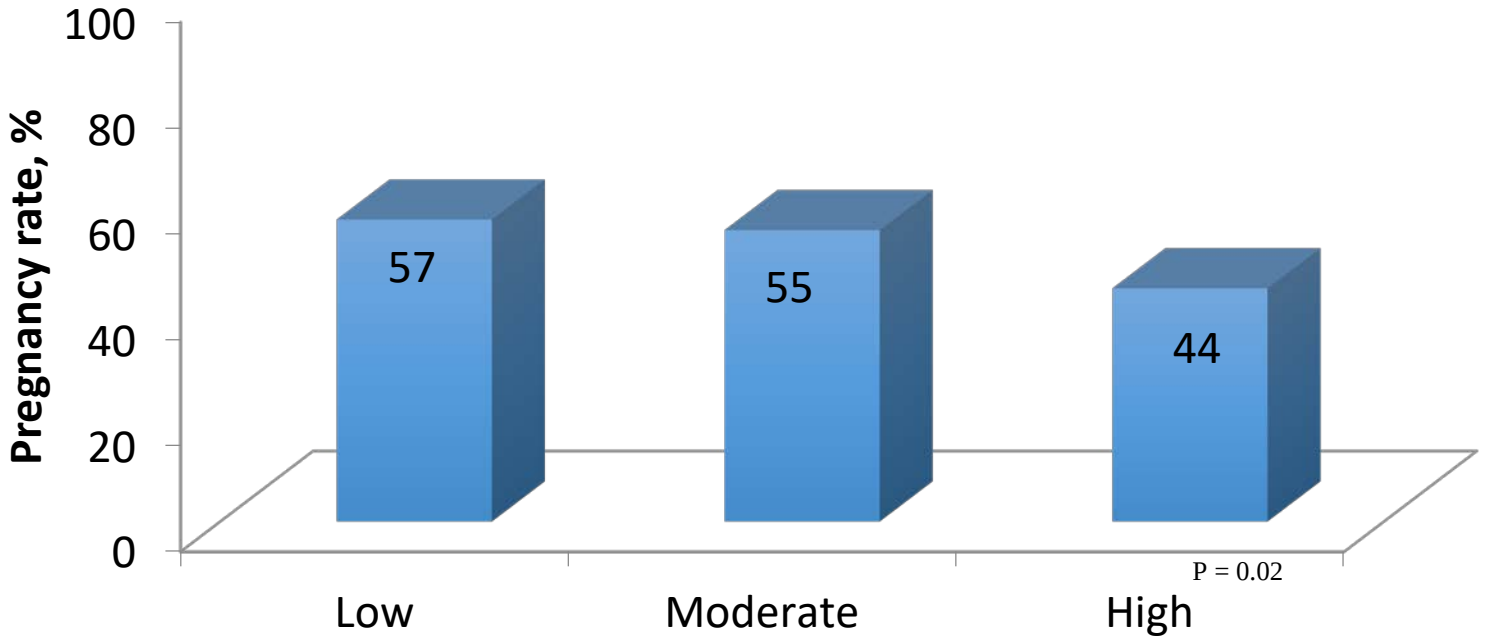
Overall Milk Average



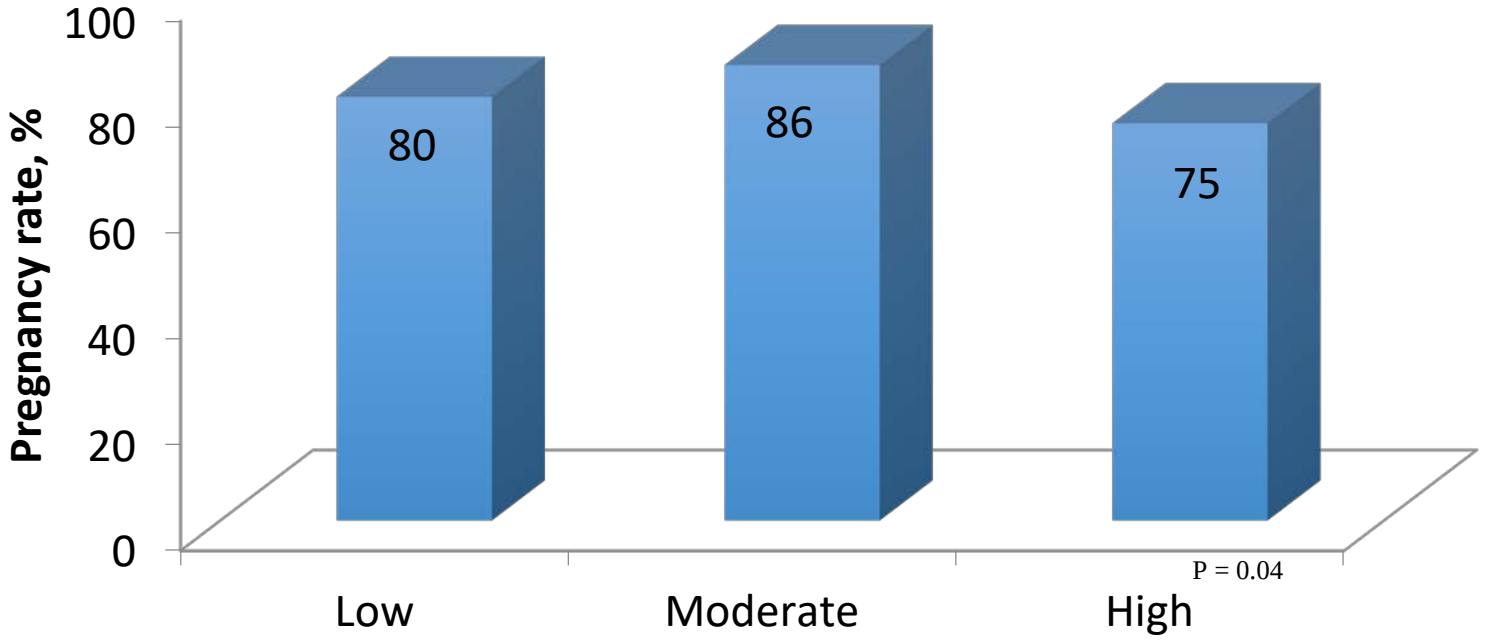
Calf Weaning Weight



Timed-AI Pregnancy Rates



Pregnancy Rates



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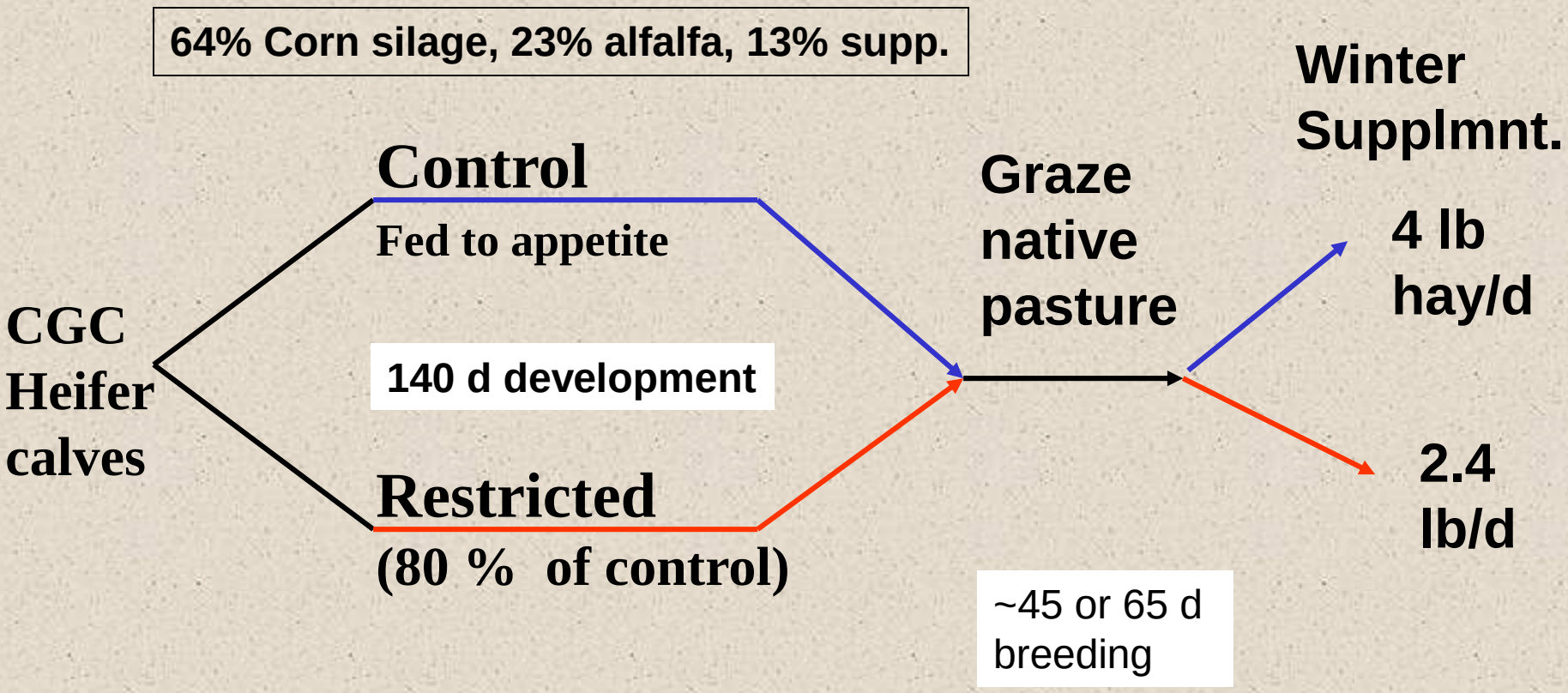
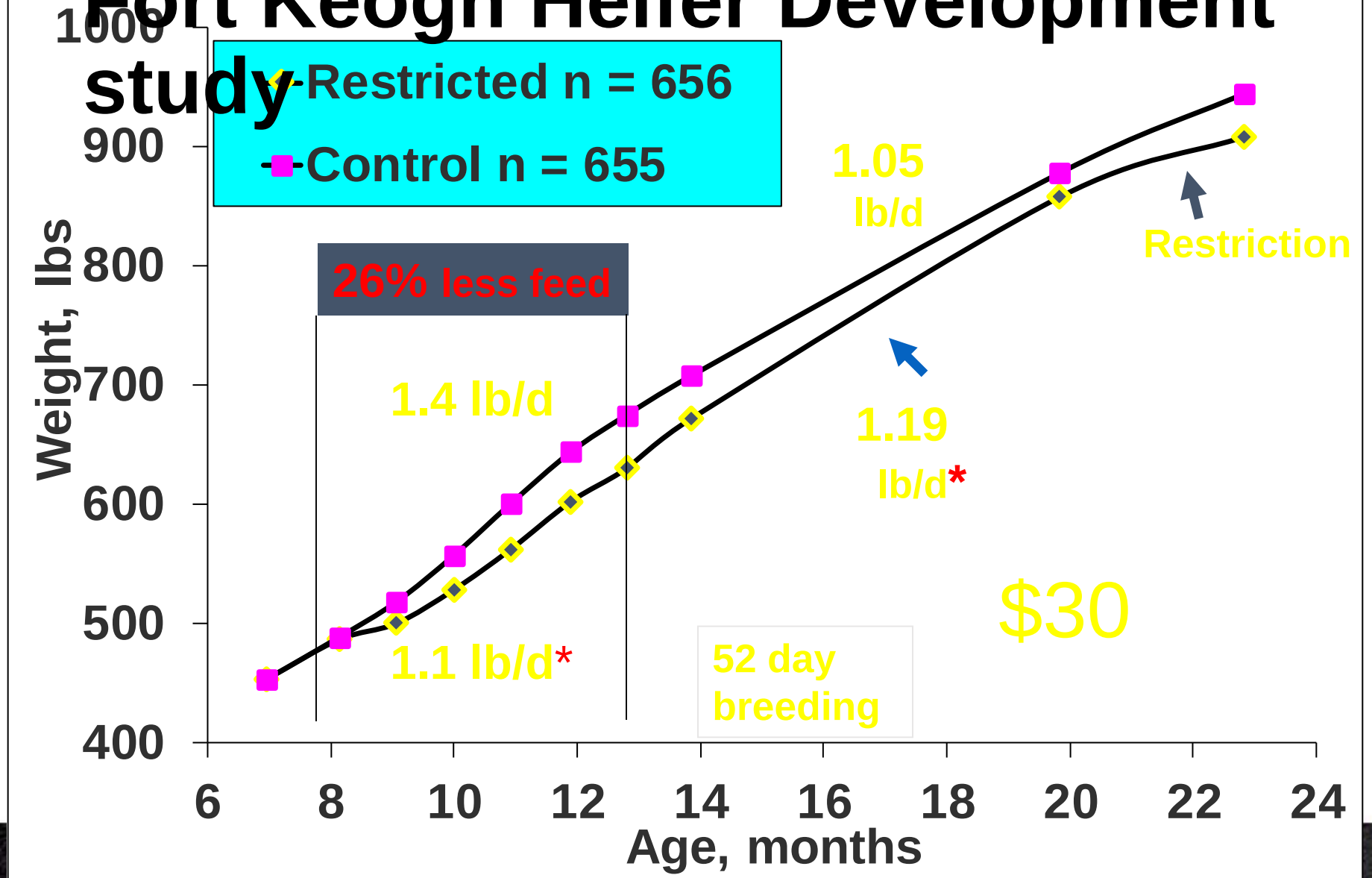
Experiment Design for Calves

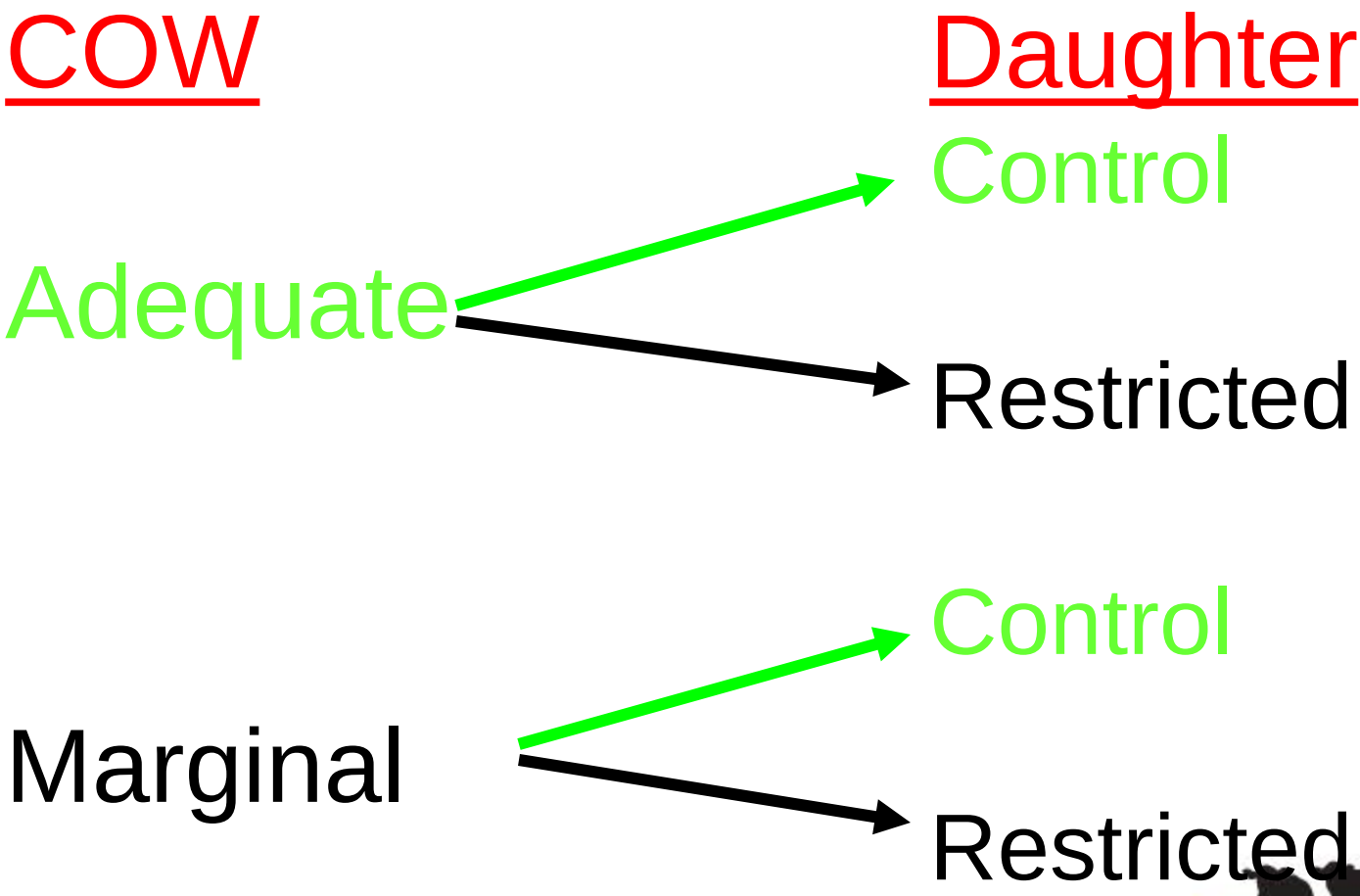


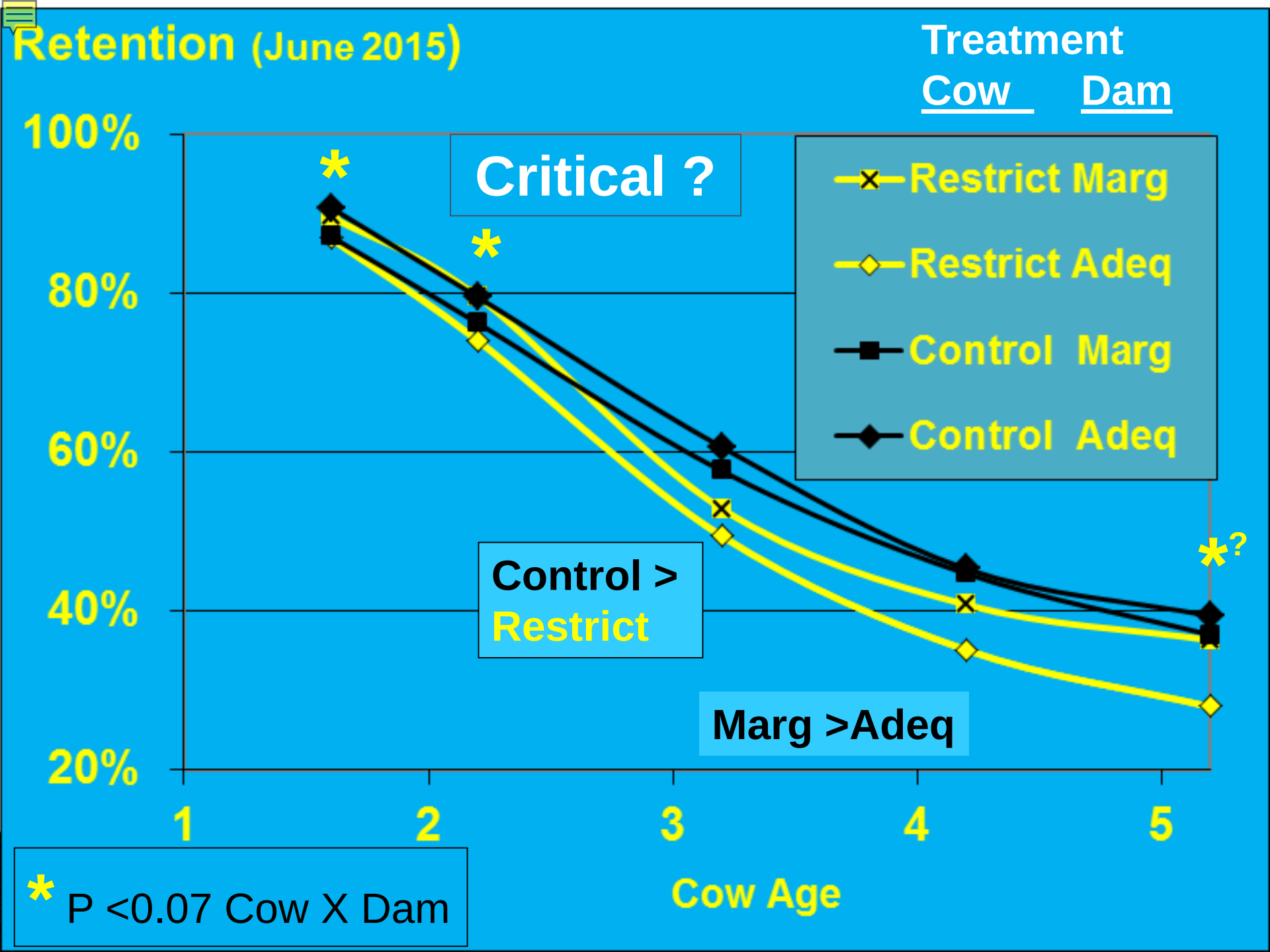
Fort Keogh Heifer Development study



Heifers born 2002-2011

Level of harvested feed input and production




Retention (June 2015)
Treatment
Cow
Dam
100%
80%
60%
40%
20%
1
2
3
4
5
Cow Age
Critical ?
*
*
*?
Restrict Marg
Restrict Adeq
Control Marg
Control Adeq
Control >
Restrict
Marg >Adeq
* P <0.07 Cow X Dam

Level of harvested feed input and production

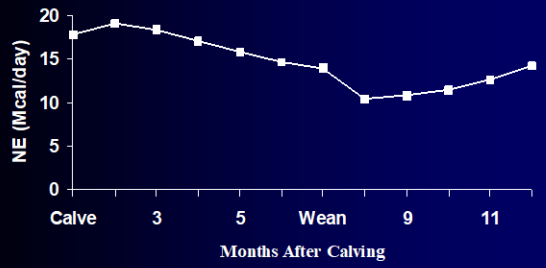
Dam treatment	Cow treatment	Calf birth wt	Calf wean wt
Adequate	Control	77	449
Marginal	Control	77	442
Adequate	Restricted	77	444
Marginal	Restricted	74	431

Probability
Dam X Cow treatment
Dam treatment
Cow treatment

Fetal Programming ?????

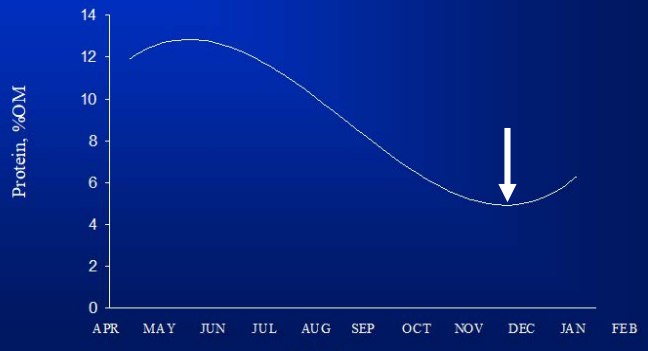
Winter Supplementation

Net Energy (NE) Requirement for a 1200 Lb March Calving Cow With 23 Lbs/day Peak Milk Production

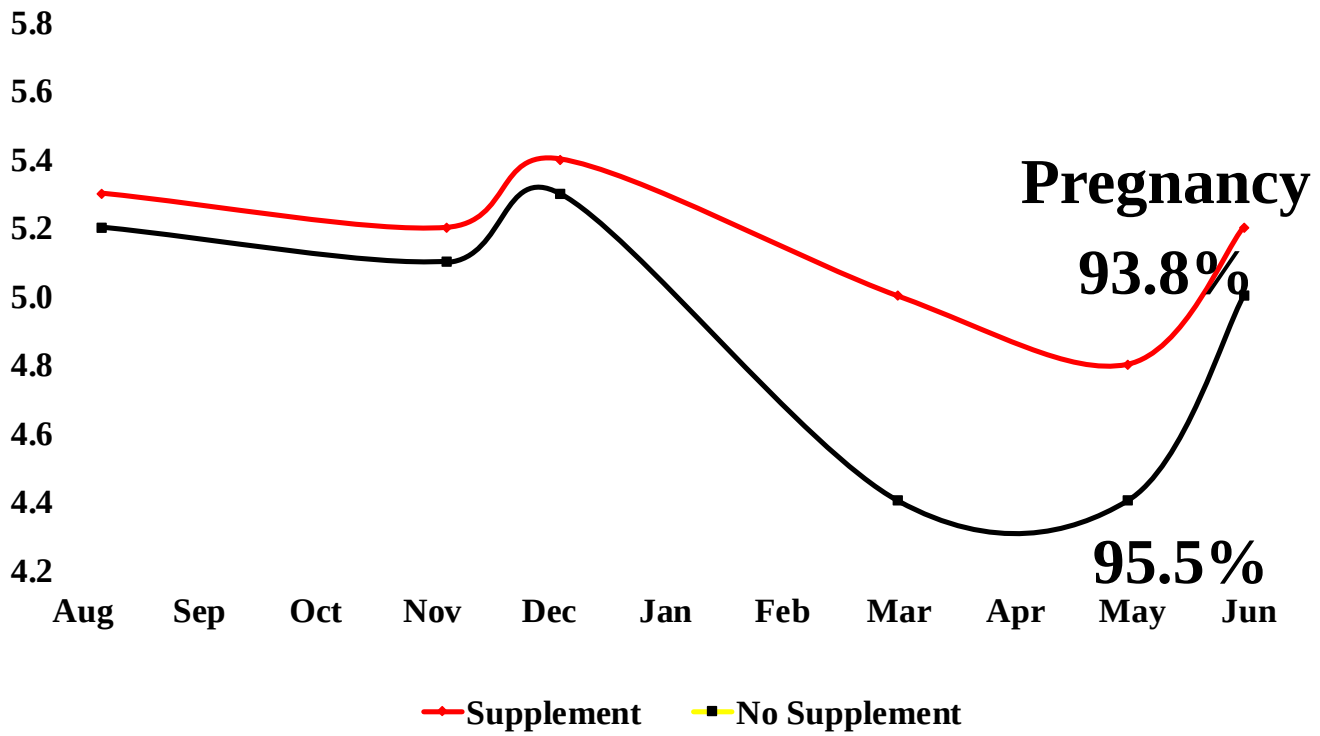


NRC (1996)

Crude protein in cattle diets on Sandhills range

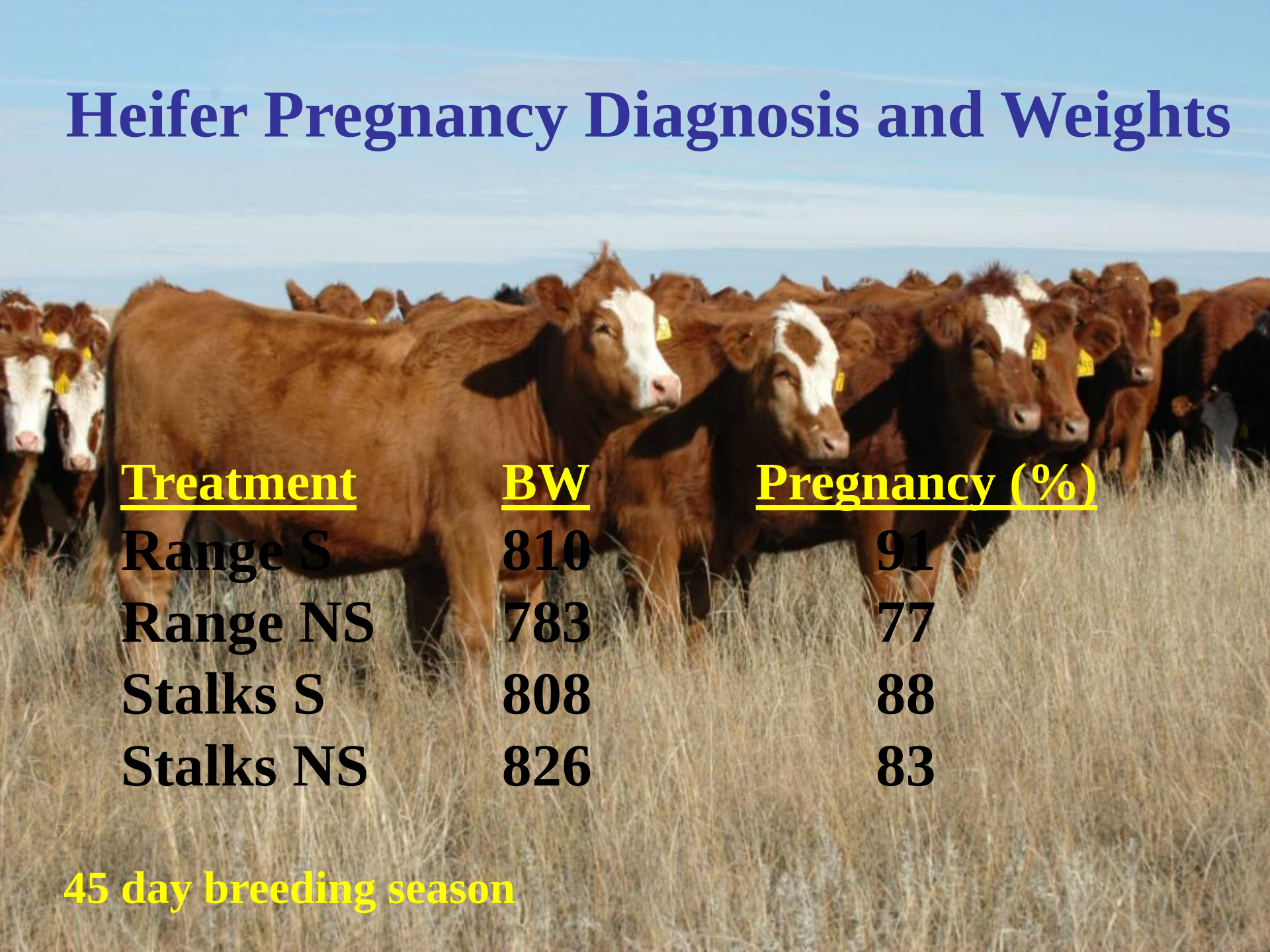


Effect of Protein Supplementation on Cow BCS



P<.0001

Heifer Pregnancy Diagnosis and Weights



Treatment	BW	Pregnancy (%)
Range S	810	91
Range NS	783	77
Stalks S	808	88
Stalks NS	826	83

45 day breeding season

Final Live Weight and ADG

RS	1371	829	3.77
RNS	1303	787	3.66
SS	1343	811	3.73
SNS	1354	818	3.66

Quality Grade (% Choice)

RS	85	43	PS	86
RNS	77	27	NS	71
SS	88	35		
SNS	65	15		


The consequences of nutrient restriction must be considered not only for individual animal performance…

The consequences of nutrient restriction must be considered not only for individual animal performance…

but also for the developing fetus.

Fetal Programming: Stimuli experienced during fetal development may impact postnatal growth and physiology

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- Profit Tips
- International Marketing
- Reports

Grazing Corn Stalk Residue

Seems that annual cow costs get higher each year, or at least they can potentially increase each year. This year is no

Educational Programs

Beef Profit Tips - Holt County
Dec 7, 1:00 PM , Holt County Courthouse Annex

Beef Profit Tips - Boyd County
Dec 7, 7:00 PM , Boyd County Courthouse

Beef Profit Tips - Neligh
Dec 8, 1:00 PM , Antelope County Courthouse

Beef Profit Tips - Center, NE
Dec 8, 6:00 PM , Center

Beef Profit Tips - Norden
Dec 12, 11:00 AM , Keya Paha County Fairgrounds

More events...

Beef Home Study Course

FORUM 2018

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Questions???

rfunston2@unl.edu ; 308-696-6703