Reproductive Management Update

Sandy Johnson

Nov. 15, 2011

Agent Update

K·STATE
Research and Extension

Knowledge for Life

Symposium registration, including three days and two lunches, is $90 if paid prior to Nov. 20.

Overview

- Fascinating
- Popular with those high on the industry
- Best kept technology secret

K·STATE
Research and Extension

Knowledge for Life

Study of birth records in UK and Europe

- Women - under-nutrition (400 – 600 cal/d) first half of gestation and adequate subsequently
- Babies - normal birth weight, proportionally longer & thinner

- As adults – increased incidence of diabetes, obesity and cardiovascular disease

K·STATE
Research and Extension

The Barker Hypothesis

- Maternal nutrition impacts the fetus's future growth, development, and risk of disease after birth and into adulthood. (Barker, 1992)

Principles

- Critical periods of fetal development
- Permanent effects that change susceptibility to disease
- Involves structural changes to organs
- Placenta plays key role
- Fetus attempts to compensate
- Fetal cellular mechanisms differ from adult
- Passed on, but does not involve changes in genes (epigenetics)
- Different effects for male and female

From *Life in the Womb: The Origin of Health and Disease* by Peter W. Nathanielsz, M.D., Ph.D.

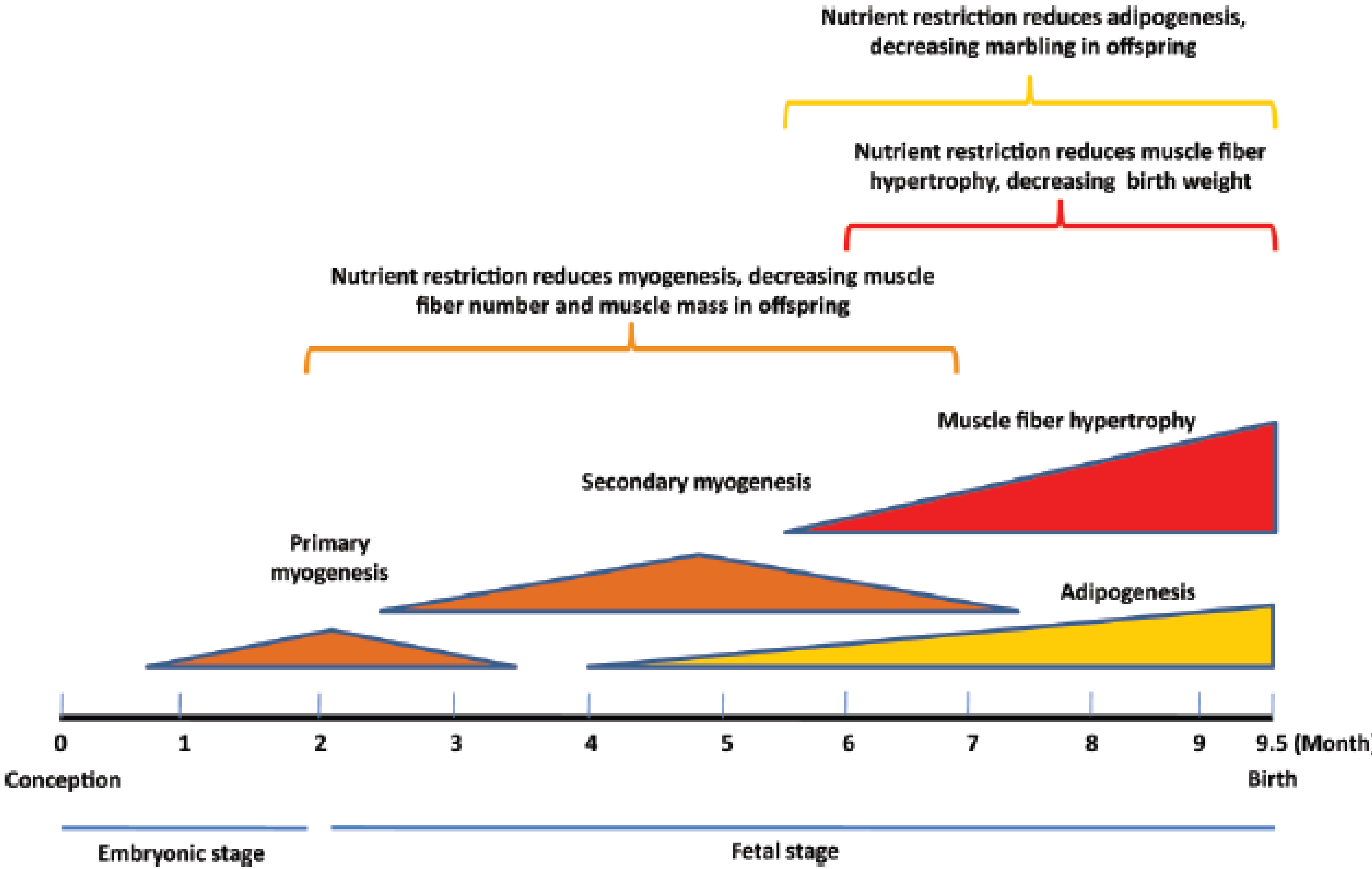


Figure 1. Effects of maternal nutrition on bovine fetal skeletal muscle development. The dates are estimated mainly based on data from studies in sheep, rodents, and humans and represent the progression through the various developmental stages. Nutrient restriction during midgestation reduces muscle fiber numbers, whereas restriction during late gestation reduces both muscle fiber sizes and the formation of intramuscular adipocytes.

No supplement

Protein Suppl
(last trimester)

⇑ ADG, HCW
⇑ marbling score, % choice

Larson et al, 2009

Steer Progeny

Native pasture

Improved pasture
d 120 -180 of gestation

⇑ Wn wt, ADG, HCW

Underwood et al. 2010

No supplement

Protein Suppl
(last trimester)

Heifer Progeny

No difference
- Age at puberty
- Cycling before

Martin et al, 2007

⇑ Weight - adj 205 day, prebreeding, yearling preg check time and as 2 yr olds

⇑ Final Pregnancy rate
⇑ Calved 1st 3 wks

No diff
Hfr wt at prebreeding
Calf production or
heifer calf rebreeding

⇓ Age at puberty
Trend higher PR

Funston et al, 2010

100 vs 65 % Energy last 1/3
Earlier puberty
Corah et al, 1975

No supplement

Protein Suppl
(last trimester)

Animal Health

Fewer steers treated
Mullinkiks et al 2008
Larson et al 2009

No difference
Treated prior to wean or feedlot, Stalker et al 2006
Respiratory treats prior to weaning, Larson et al 2009

⇑ Live calves weaned
Stalker et al 2006

100 vs 65 % Energy last 1/3
⇑ Morbidity and mortality
Corah et al, 1975

Thrifty phenotype as a result of under-nourished fetus

- Increased appetite
- Prone to insulin resistance and obesity
- Ewes – consumed 50% more feed, no improvement feed efficiency,
- Put on more fat, internal and subcutaneously

Obese Ewes

Fed to normal weight

Maint. Diet during preg

F1 generation

Daughters –
Insulin resistant
⇑ Glucose & insulin concentrations

F2 generation

⇑ Internal fat

Campus farm flock

Nomadic range flock (no supplement)

Under-nourished ewes early to mid-gestation

- Fetal growth retarded
- Pancreas altered
- Heart enlarged

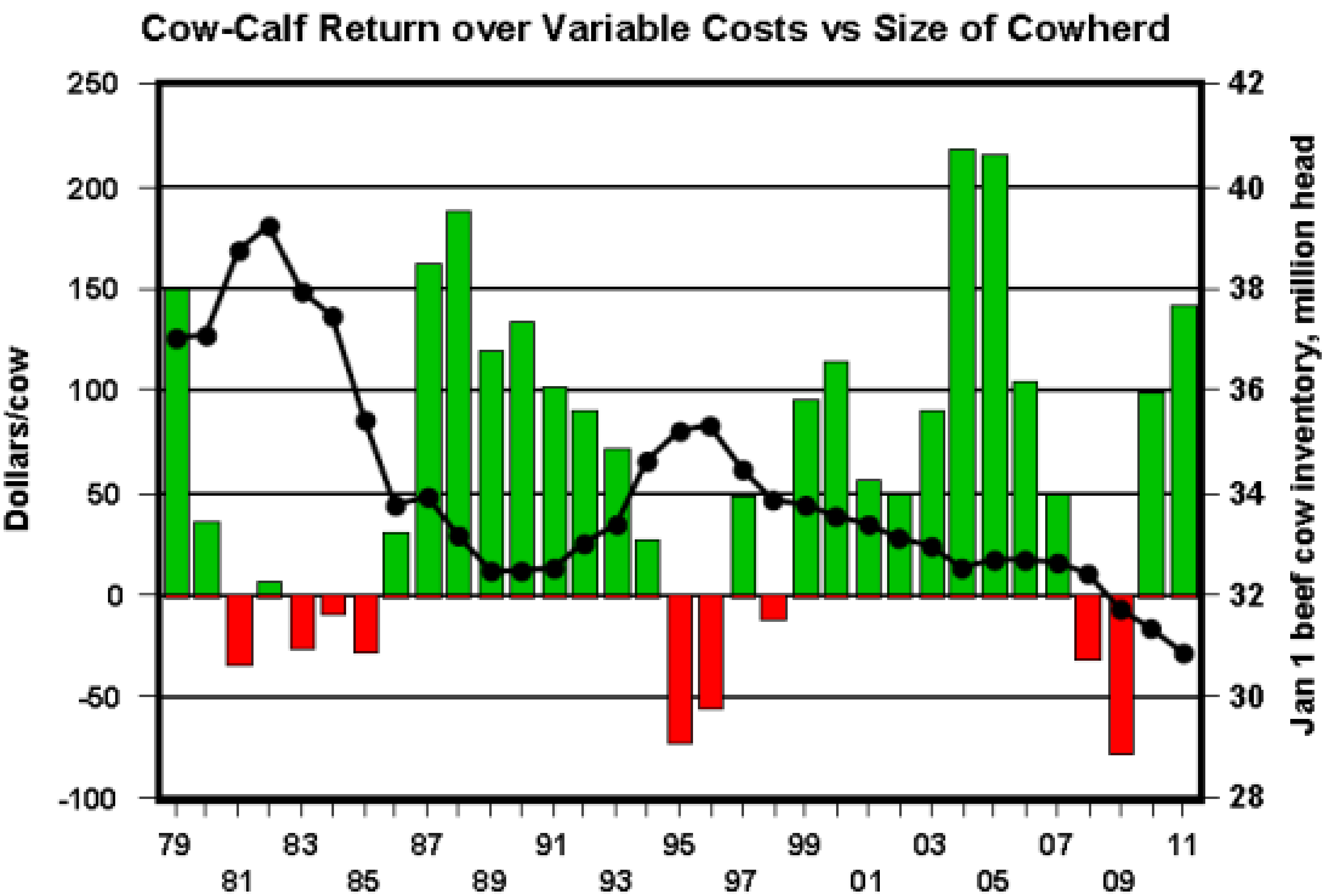
Mid gestation

- Normal fetal growth
- Placenta more efficient

Adults

- ⇑ appetite
- Insulin resistant
- Hypertensive

Normal – adapted to low inputs



Source: K-State KFMA Enterprise Analysis Report and USDA

Replacement heifer decision tools

- Own cost of production - KSU budget
- NPV spreadsheet – Ag Manager

  Livestock decision tools

  http://www.agmanager.info/Tools/default.asp#LIVESTOCK
- Comparing Purchasing vs Raising Beef Replacment Females Spreadsheet

  Currently under news on right column at:

  http://www.ansci.colostate.edu/beef/index.html

Shifts in heifer development thinking

Traditional

- Emphasis on puberty
- Target weight 60 – 65%
- Feedlot system
- Cheap grain, relatively easy to make them fat

Nontraditional

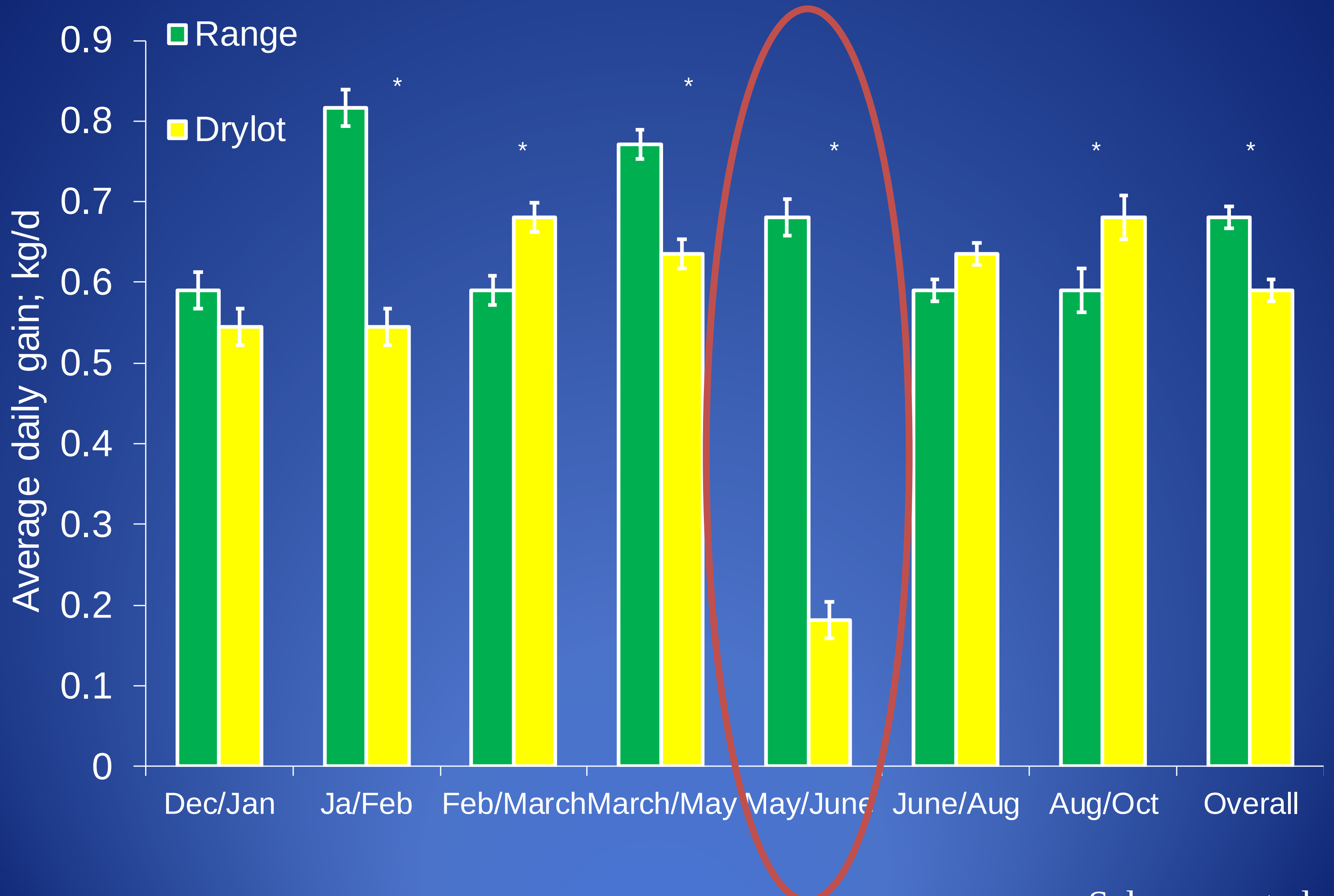
- Puberty less of an issue - heifers becoming pregnant on the cow
- Low cost, low gain lower target weight
- Open yearling heifers profitable

Heifer weight at breeding

	Low gain (53%)	High Gain (58%)
Begin Wt	469	469
Winter ADG	1.1	1.41
Prebreeding wt	636	689
Prebreeding BCS	5.6[a]	6.0[b]
Cycling	74[a]	85[b]
Preg 45 d	92	88
Preg 2nd calf	91	91
Preg 3rd calf	94	92
Preg 4th calf	96	96

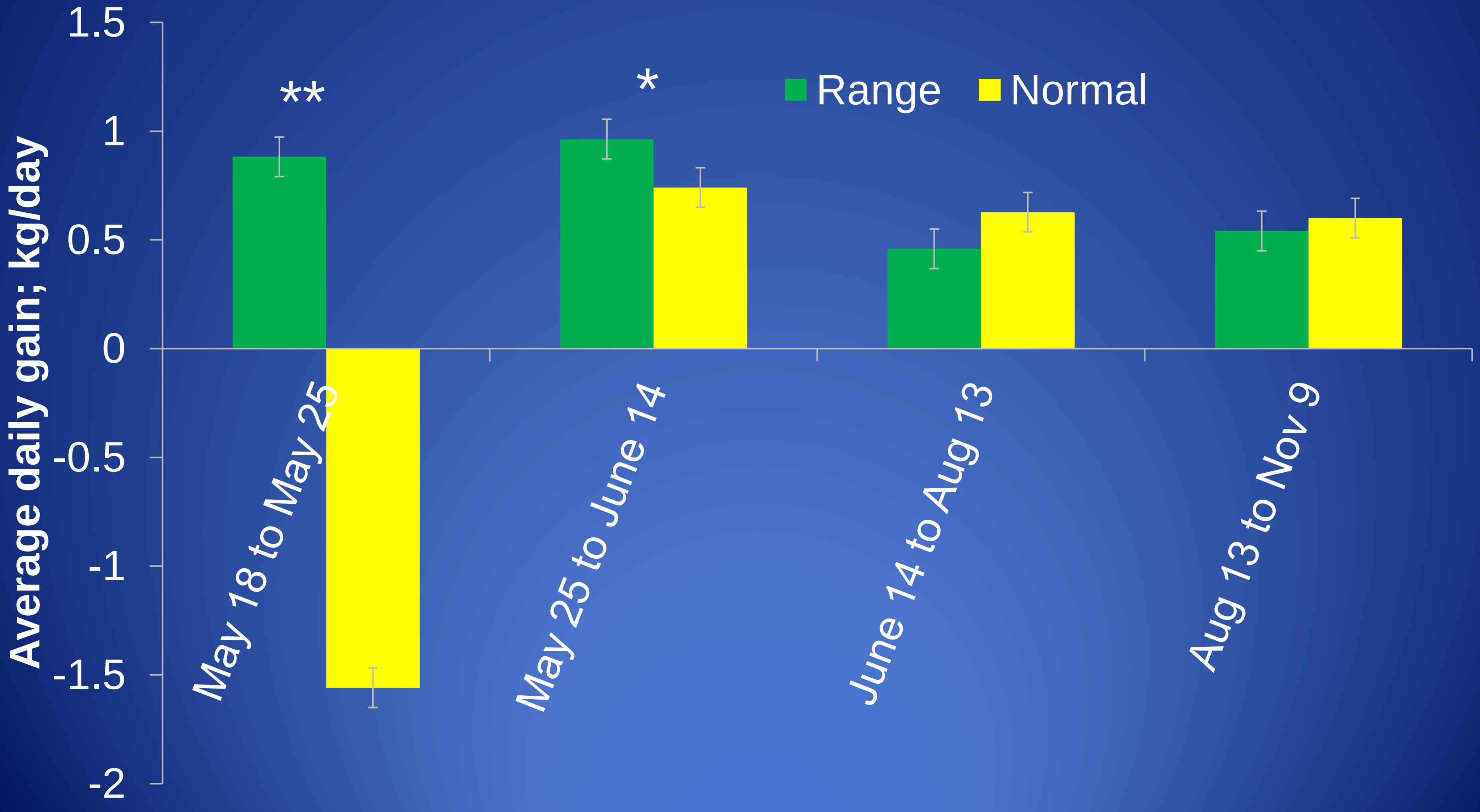
Funston & Deutscher, 2004

Forage vs Drylot (normal) Development

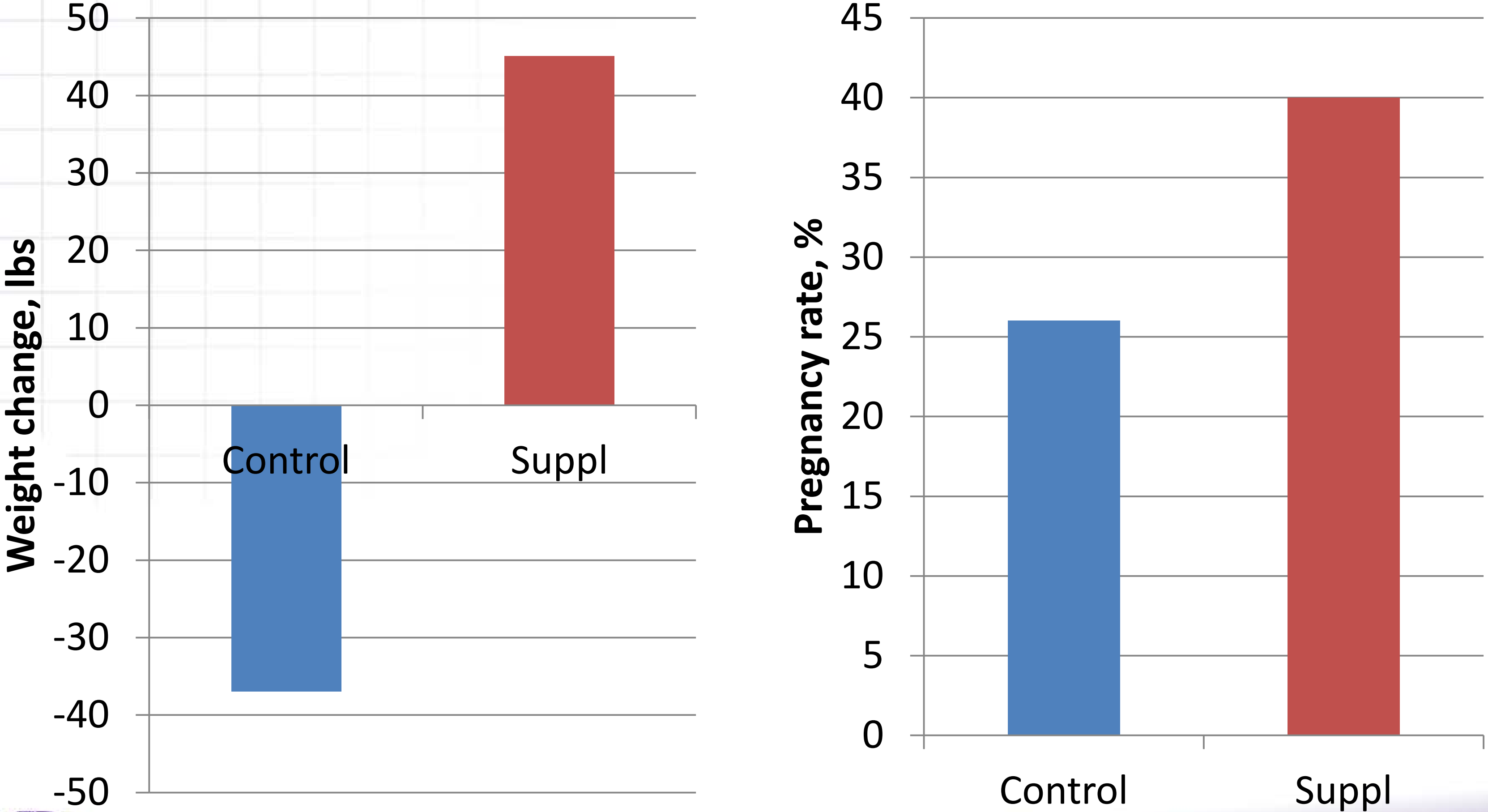


Salverson et al., 2005

Forage vs Drylot (normal) Development

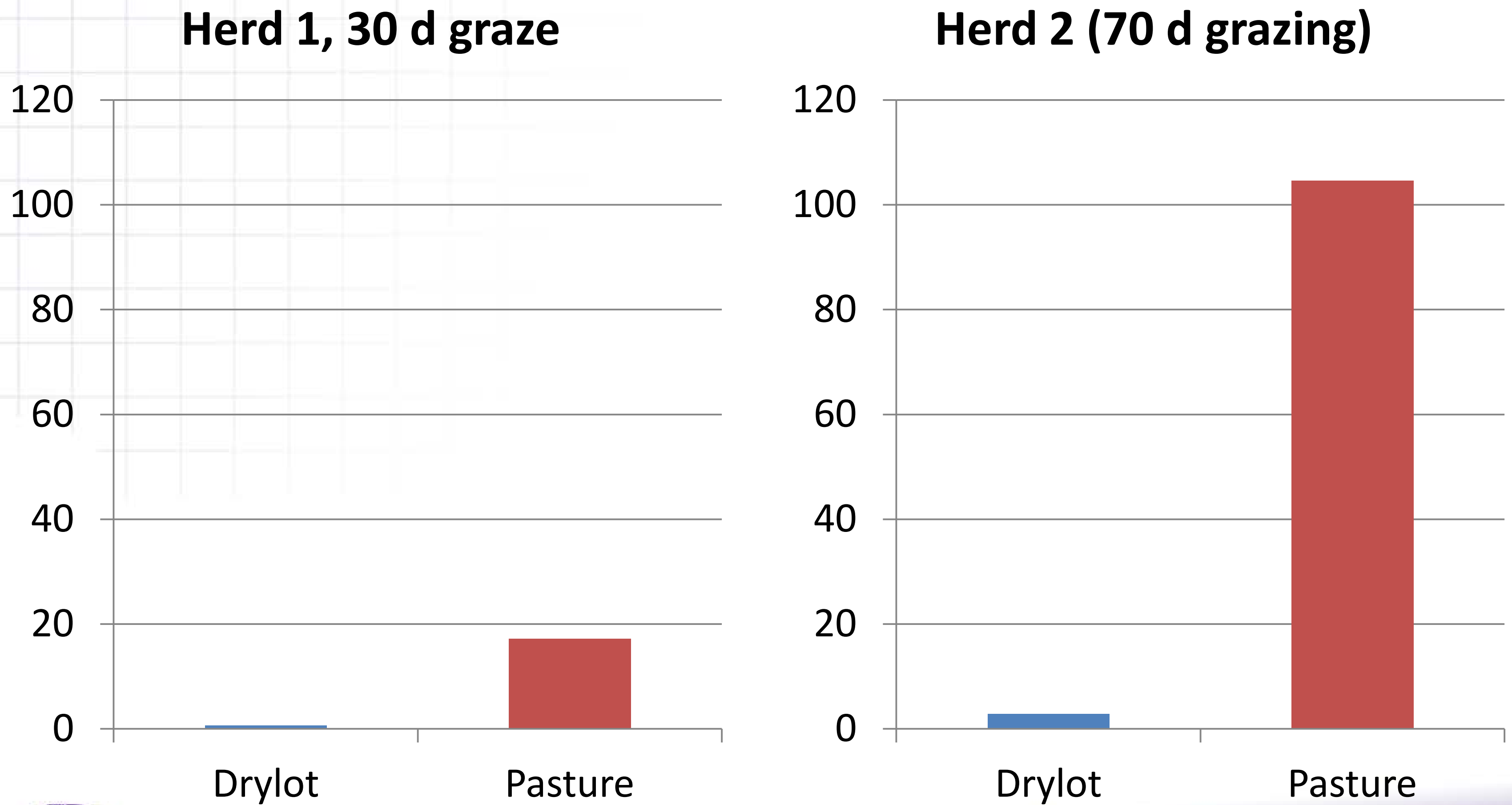


Effect of 5 lbs DDGs fed 30 days on pasture to heifers after AI



Perry et al, 2011

Effect of grazing prior to synchronization on weight change after AI



P=0.07

P<0.01

Perry et al, 2011

Effect of grazing prior to synchronization on AI pregnancy success

	Pasture	Drylot
Herd 1	50 % (12/24)	46 % (11/24)
Herd 2	59 % (57/96)	50 % (49/98)
Total	**58 % (69/120)**	**49 % (60/122)**

P = 0.17

Higher pregnancy rates natural service or AI?

- No difference was detected

6,310 first service natural mating

13,942 first service AI

NZ dairy cattle

Williamson et al., 1978

Results from on-farm field demonstrations of fixed-time AI in Missouri

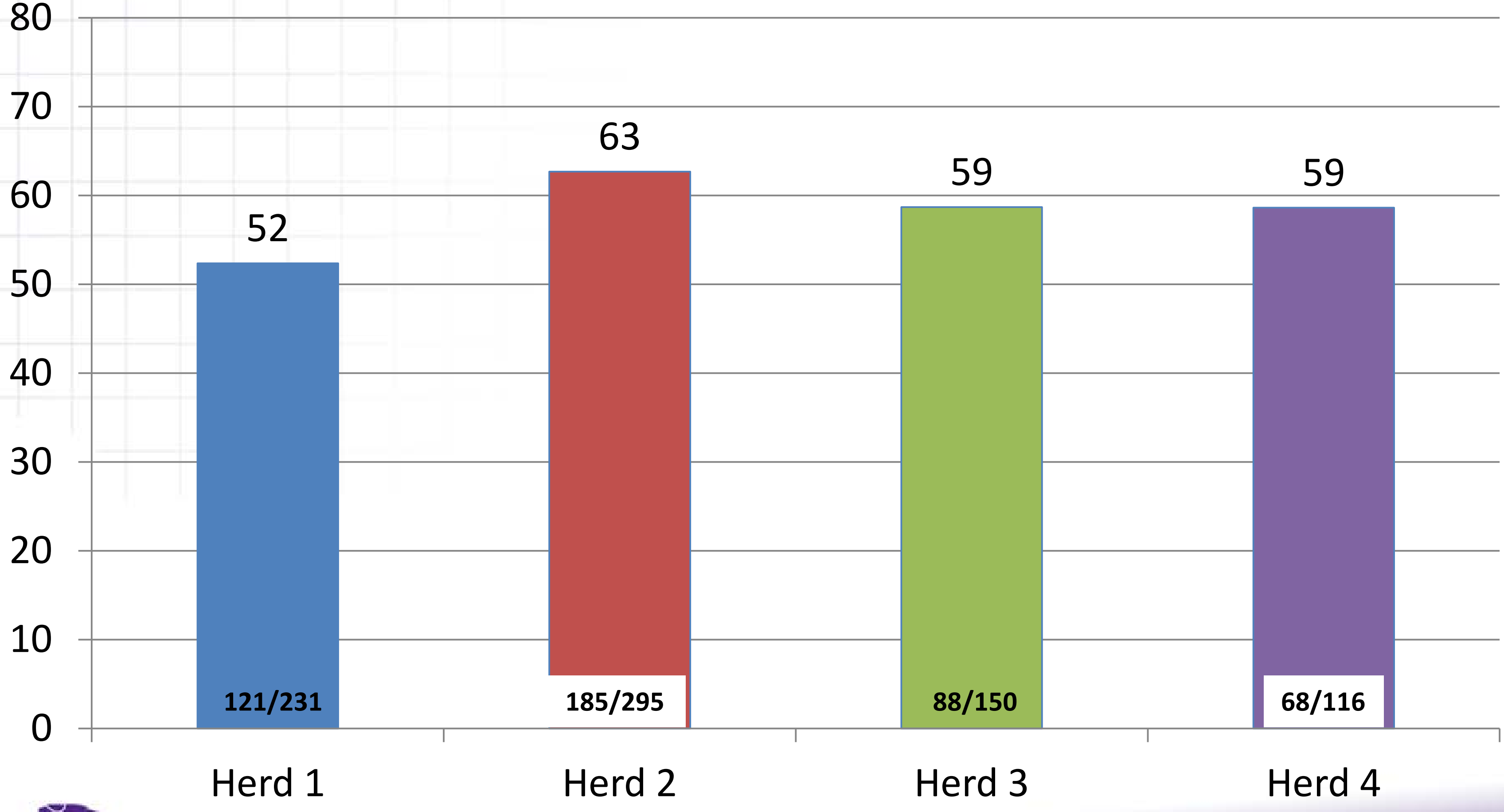
Item	Herds	Cows inseminated	AI pregnancy rate	range
Fixed-time AI	73	7028	4327/7028 (62%)	38 – 86%**

*three handlings with last being AI

** Only 7 of 73 herds realized pregnancy rates < 50% from fixed-time AI

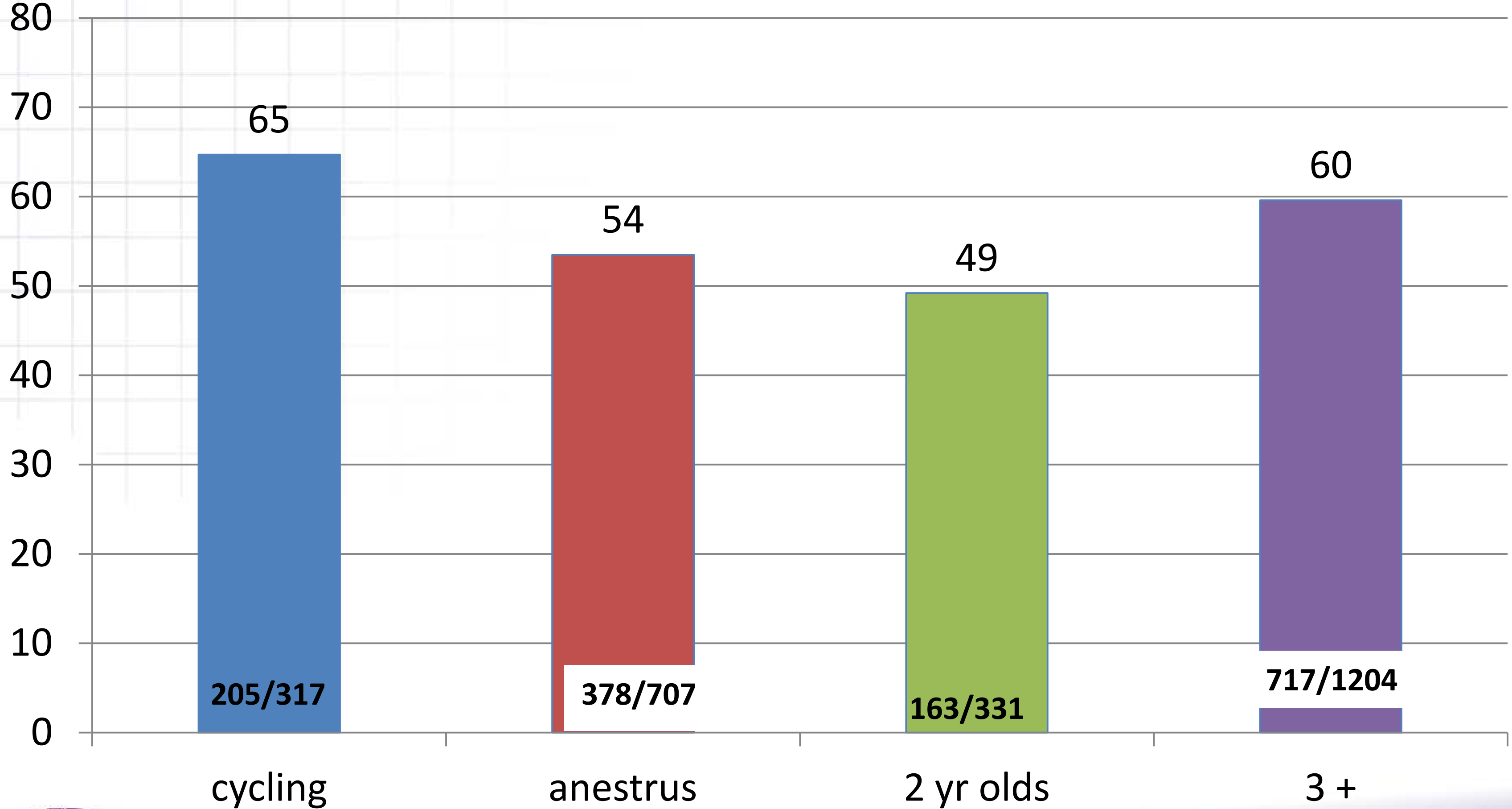
Patterson et al., 2011

Fixed-time AI pregnancy rates in heifers



Perry et al; 2011

Pregnancy rate to fixed-time AI, 8 locations, 4 states, 1538 cows



Hill et al., 2011

K·STATE Research and Extension

Knowledge for Life

Protocol Sheets/Estrus Synchronization Planner

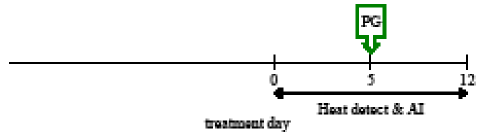
S.K. Johnson, R.N. Funston, J.B. Hall, G.C. Lamb, J.W. Lauderdale, D.J. Patterson and G.A. Perry

Beef Heifer Protocols - 2011

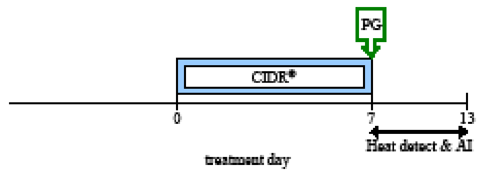
www.beefrepro.info

Heat Detection

1 Shot PG



7-day CIDR®-PG

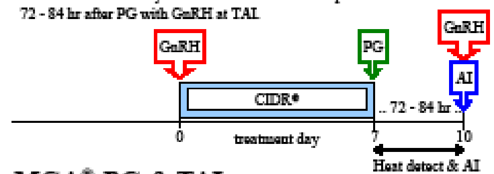


MGA®-PG

Heat Detect & Time AI (TAI)

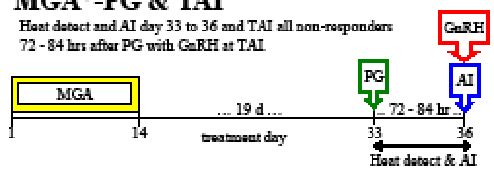
Select Synch + CIDR® & TAI

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



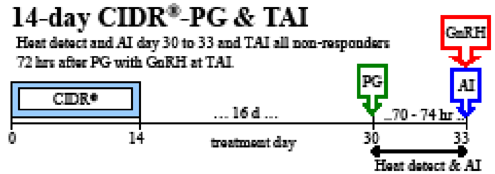
MGA®-PG & TAI

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

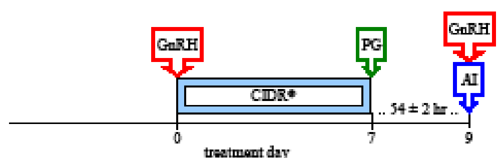
Heat detect and AI day 30 to 33 and TAI all non-responders 72 hrs after PG with GnRH at TAI.



Fixed-Time AI (TAI)*

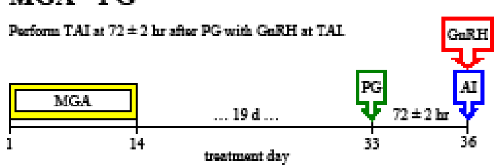
7-day CO-Synch + CIDR®

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



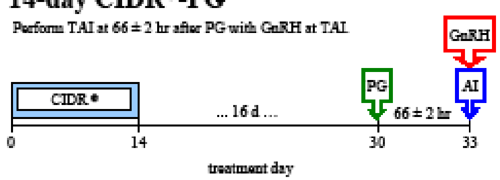
MGA®-PG

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.



COMPARISON OF PROTOCOLS FOR BEEF HEIFERS

HEAT DETECTION	COST	LABOR
1 Shot PG	Low	High
7-day CIDR®-PG	High	Medium
MGA®-PG	Low	Low/Medium
HEAT DETECT & TAI		
Select Synch + CIDR® (TAI non-responders 72-84 hr after PG)	High	Medium
MGA®-PG (TAI non-responders 72-84 hr after PG)	Medium	Medium
14-day CIDR®-PG (TAI non-responders 70-74 hr after PG)	High	Medium
FIXED-TIME AI (TAI)		
CO-Synch + CIDR® (TAI 54 ± 2 hr after PG with GnRH at TAI)	High	Medium
MGA®-PG (TAI 72 ± 2 hr after PG with GnRH at TAI)	Medium	Medium
14-day CIDR®-PG (TAI 66 ± 2 hr after PG with GnRH at TAI)	High	Medium

* 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.

GnRH Cystorelin®, Factrel®, Fertagyl®, OvaCyst®

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

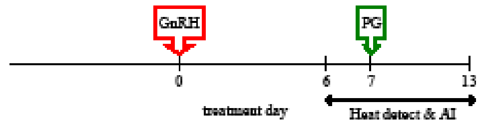
Approved 12-01-10

Beef Reproduction Task Force

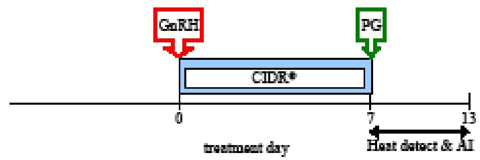
Beef Cow Protocols - 2011

Heat Detection

Select Synch

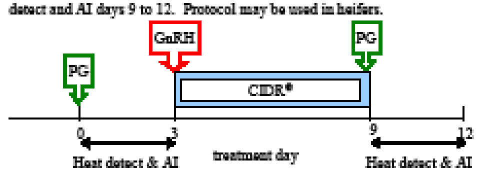


Select Synch + CIDR®



PG 6-day CIDR®

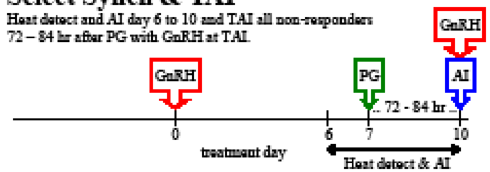
Heat detect and AI days 0 to 3. Administer CIDR to non-responders and heat detect and AI days 9 to 12. Protocol may be used in heifers.



Heat Detect & Time AI (TAI)

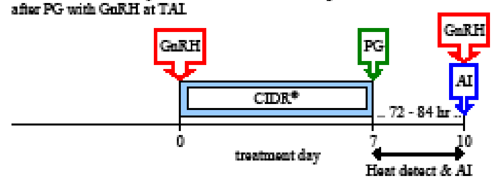
Select Synch & TAI

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



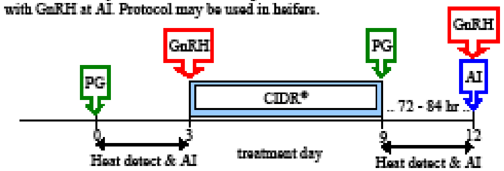
Select Synch + CIDR® & TAI

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

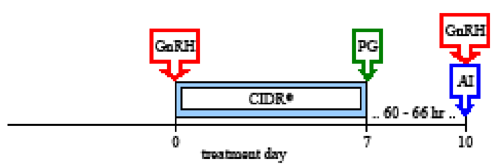
Heat detect & AI days 0 to 3. Administer CIDR to non-responders & heat detect and AI days 9 to 12. TAI non-responders 72 - 84 hr after CIDR removal with GnRH at AI. Protocol may be used in heifers.



Fixed-Time AI (TAI)*

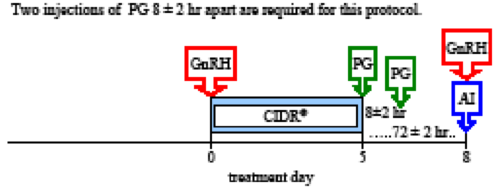
7-day CO-Synch + CIDR®

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



5-day CO-Synch + CIDR®

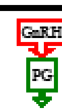
Perform TAI at 72 ± 2 hr after 1st PG with GnRH at TAI.
Two injections of PG 8 ± 2 hr apart are required for this protocol.



Comparison of Protocols for Beef Cows

Heat Detection	Cost	Labor
Select Synch	Low	Medium/High
Select Synch + CIDR®	High	Medium
PG 6-day CIDR®	Medium	Medium/High
Heat Detect & TAI		
Select Synch (TAI non-responders 72-84 hr after PG)	Low	Medium/High
Select Synch + CIDR® (TAI non-responders 72-84 hr after PG)	High	Medium
PG 6-day CIDR® (TAI non-responders 72-84 hr after PG)	Medium	Medium/High
Fixed-Time AI (TAI)		
7-day CO-Synch + CIDR® (TAI 60 to 66 hr after PG with GnRH at TAI)	High	Medium
5-day CO-Synch + CIDR® (TAI 72 ± 2 hr after 1st PG with GnRH at TAI)	High	High

* 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 cows to inseminate, labor, and facilities.



Cystorelin®, Factrel®, Fertagyl®, OvaCyst®

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

Beef Reproduction Task Force

Approved 12-01-10

Products

GnRH — Cystorelin®, Factrel®, Fertagyl®, OvaCyst®

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

- Make sure to give the correct injection on the day specified in the protocol
- Within product category, all products are equally effective
- Use at label dose
- Follow BQA guidelines for all injections

Estrus Synchronization Planner

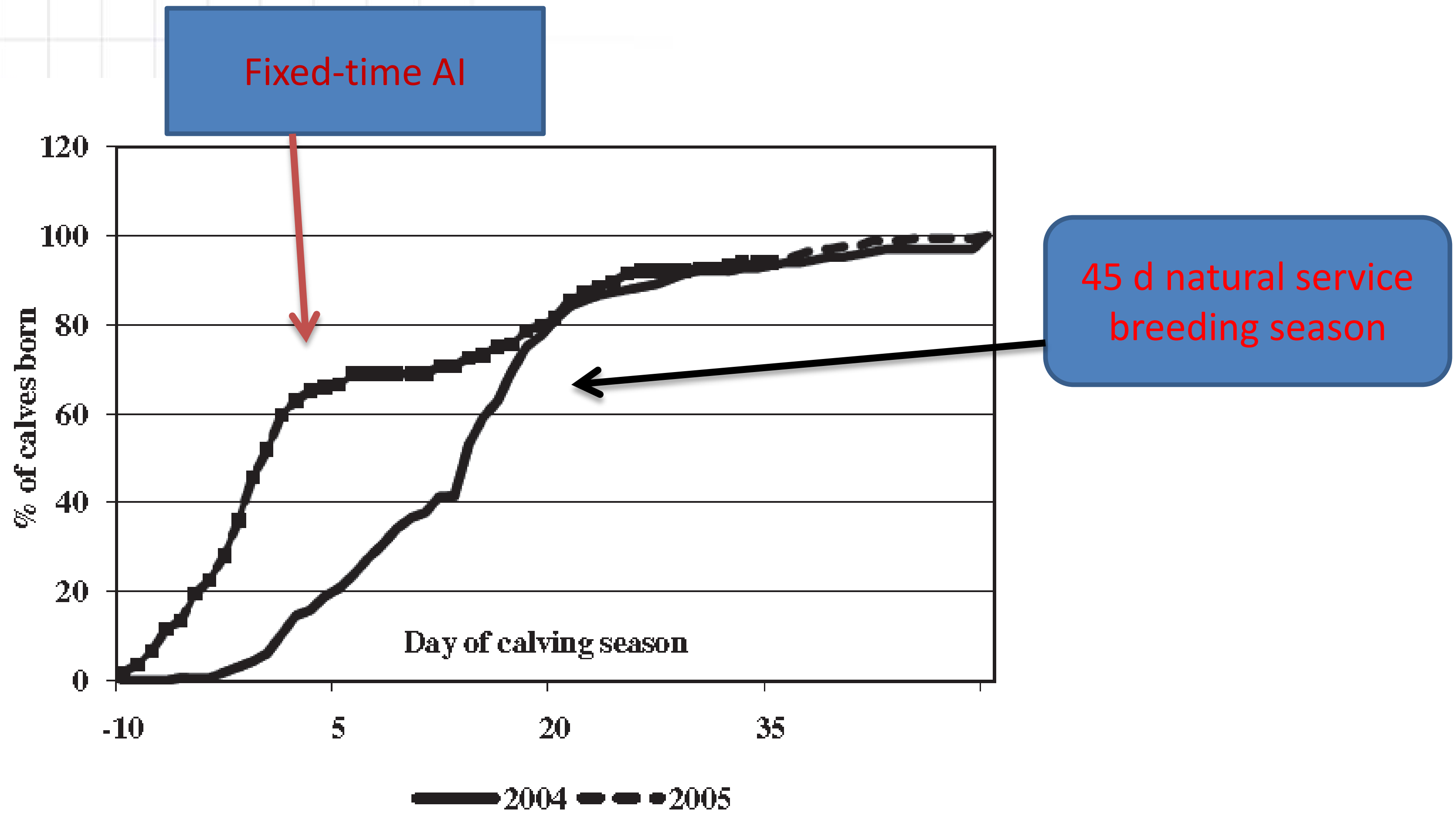
Now free download updated 2011 version

http://iowabeefcenter.org/estrus_synch.html

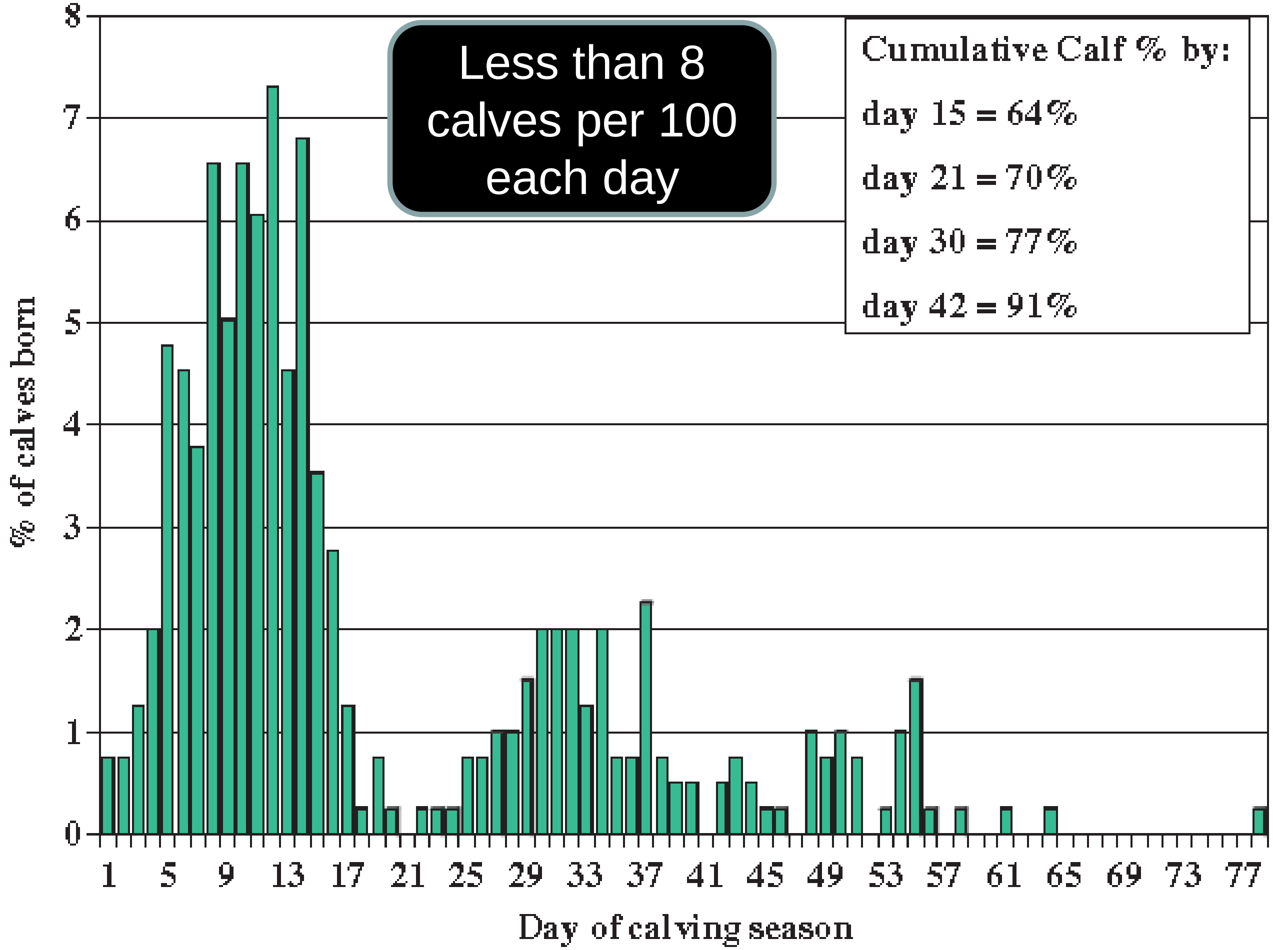
Iowa Beef Center

Features

- Recommended systems for cows & heifers
- Select systems by type
  - Heat detect & AI systems
  - Heat detect & cleanup AI systems
  - Fixed-Timed AI Systems
- List of daily activities
- Generates Barn Calendar
- Cost per AI pregnancy
- Support materials


Fixed-time AI
45 d natural service breeding season
120
100
80
60
40
20
0
% of calves born
Day of calving season
-10
5
20
35
2004
2005

Proportion calving each day following fixed-time AI



Schafer, 2005