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For the latest in red meat R&D

Building a Better Cow Heifer Development

Enoch L Bergman DVM

Swans Veterinary Services

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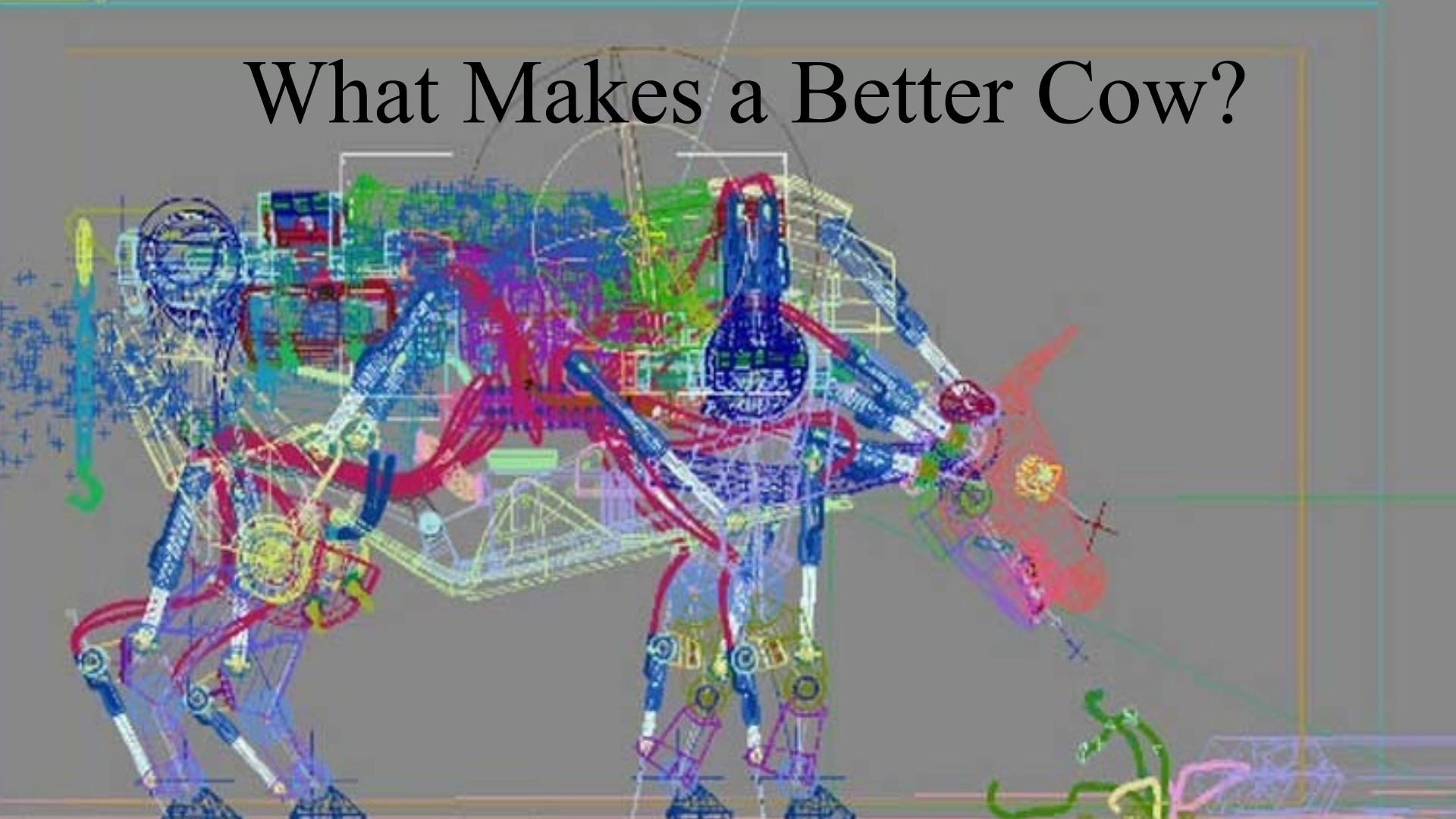
What Makes a Better Cow?



The Perfect New Beef Cow

- Three Year Review
  - She needs to:
    - Deliver a healthy calf within the first month of the calving season
    - Have already weaned one healthy calf
    - Be in good body condition

How do we get there?

Look After the Young

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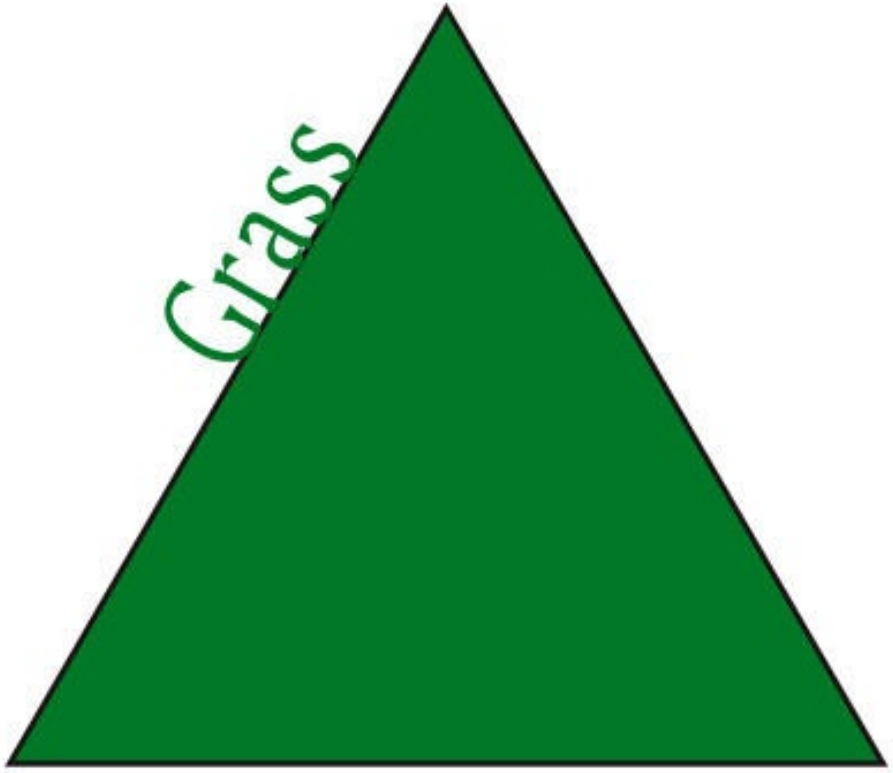
Critical Control Points

- Puberty
  - Target weight of 65% of mature weight at breeding
    - If management allows, beneficial to sort replacements by weight and feed appropriately
  - Rising plane of nutrition through joining
- Calving
  - Target weight of 85% of mature weight at calving
    - Good Moderate Body Condition

Feeding Cows for Dummies



Your Cow's Food Pyramid

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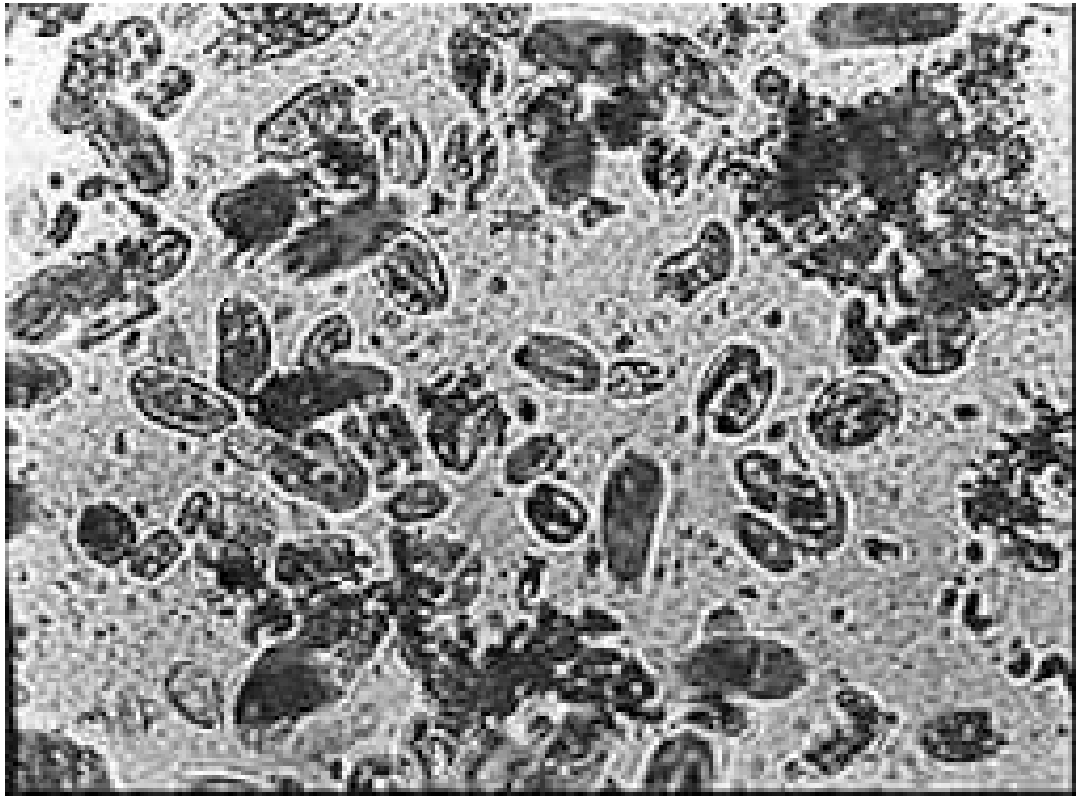
What Cows Really Eat!



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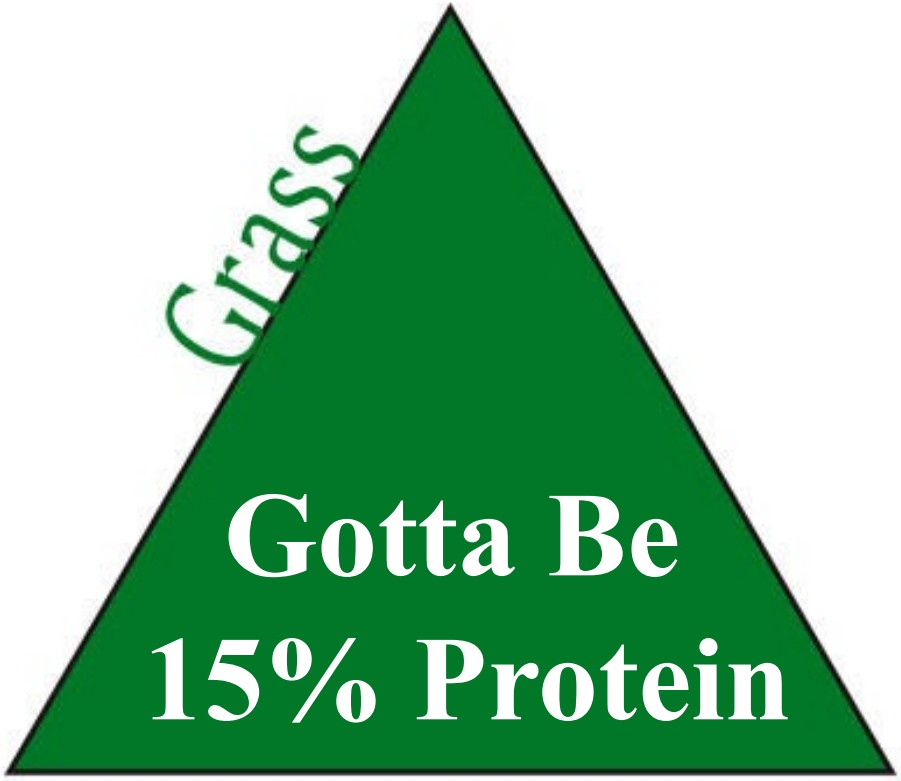
Feeding Cows for Dummies



Your Cow's Food Pyramid

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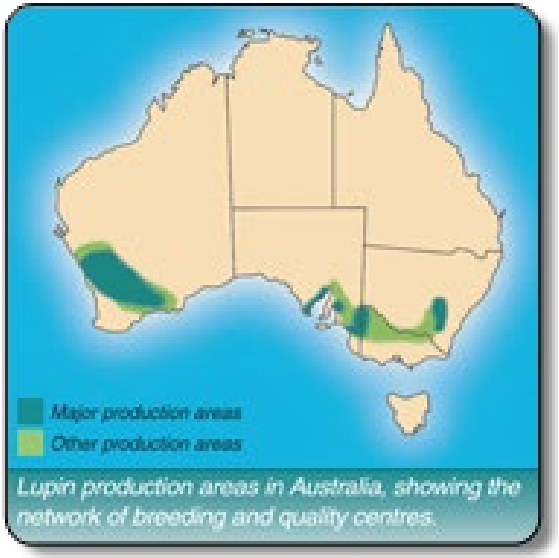
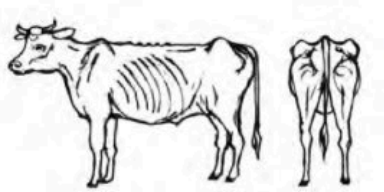
Lupins


Major production areas
Other production areas
Lupin production areas in Australia, showing the network of breeding and quality centres.

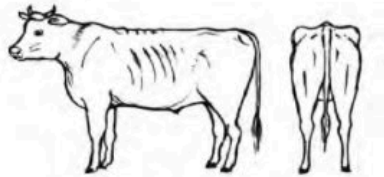
Hitting Our Targets

- Post Weaning Growth
  - Needs to be steady
    - Target weight minus weaning weight divided by available number of days
    - Split replacements into management groups
  - 15% Protein
    - Lupins (Crack ‘em)
  - Calcium/Phosphorous
    - Lime
- Say “No!” to Fat Dumpy Heifers



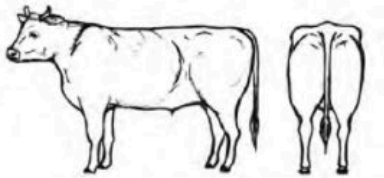
Condition score 1

Backbone prominent
Hips and shoulder bones prominent
Ribs clearly visible
Tail-head area recessed
Skeletal body outline



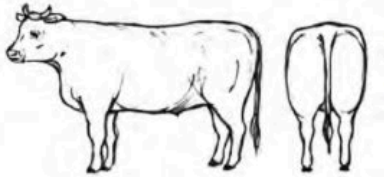
Condition score 2

Backbone visible
Hips and shoulder bones visible
Ribs visible faintly
Tail-head area slightly recessed
Body outline bony



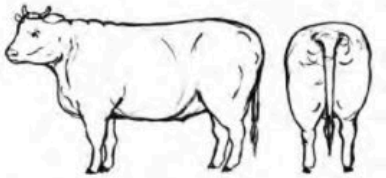
Condition score 3

Hip bones visible faintly
Ribs generally not visible
Tail-head area not recessed
Body outline almost smooth



Condition score 4

Hip bones not visible
Ribs well covered
Tail-head area slightly lumpy
Body outline rounded



Condition score 5

Hip bones showing fat deposit
Ribs very well covered
Tail-head area very lumpy
Body outline bulging due to fat

Condition Score 2 “Backward”

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Condition Score 3 “Moderate”

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Condition Score 4 “Forward”

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Condition Score 5 “Obese”

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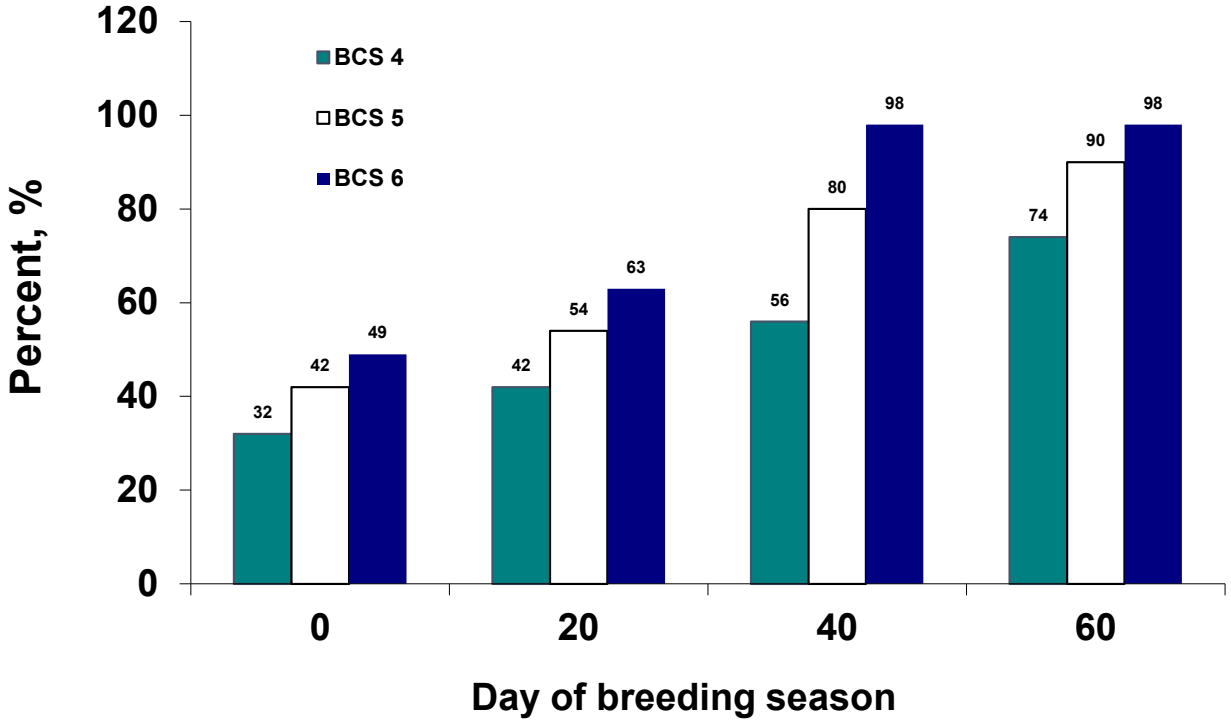
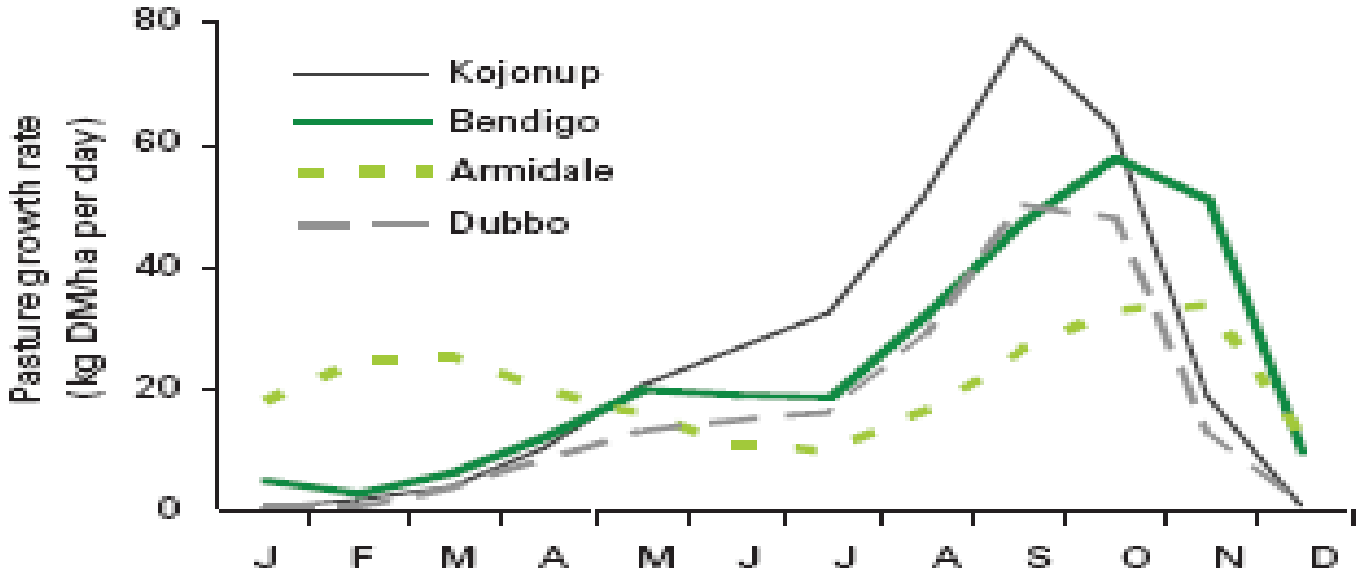
Body Condition Score	Postpartum Interval, days
3	88.5
4	69.7
5	59.4
6	51.7
7	30.6

(Houghton et al., 1990)



(Spitzer et al., 2000)

Are you Calving at the Best Time?



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Micromineral Status

- Microminerals necessary for cellular function
  - Growth
  - Immune Function
  - Reproduction
    - Directly
    - Indirectly
- Western Australia is renowned for deficiencies
  - Copper
  - Cobalt
  - Selenium

Multi Dose Vial of Vitamin F

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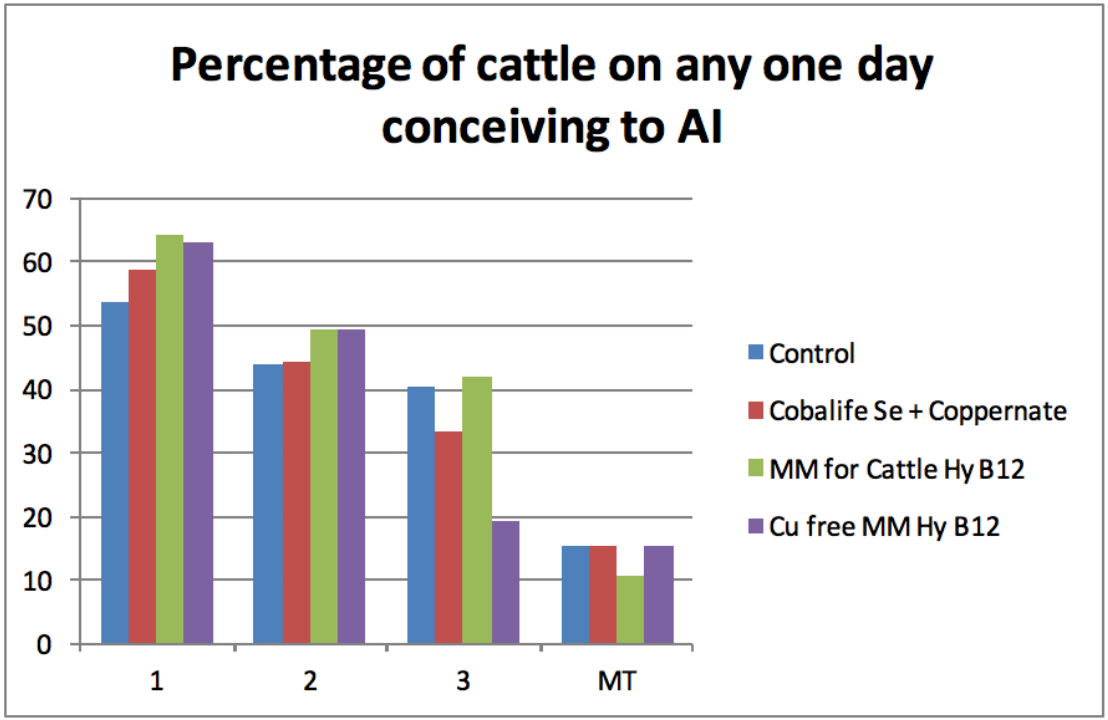
Micromineral Supplementation

- Myriad of Routes of Administration
  - Injections
  - Drenches
  - Water Supplements
  - Bullets
  - Licks
  - Paddock Supplementation

Percentage of cattle on any one day conceiving to AI

treatment	1	2	3	MT	N=
Control	53.7	44.0	40.5	15.4	162
Cobalife Se + Coppernate	58.8	44.3	33.3	15.3	170
MM for Cattle Hy B12	64.4	49.2	41.9	10.5	171
Cu free MM Hy B12	63.0	49.2	19.4	15.2	165



Worm Control

- Young stock and bulls more prone to high worm burden
- Stress of calving lowers innate worm control
  - As well as loss of immunoglobulin to colostrum
- Drench at weaning, pre-joining, and pre-calving
- Annually Thereafter?

Time Spent Grazing

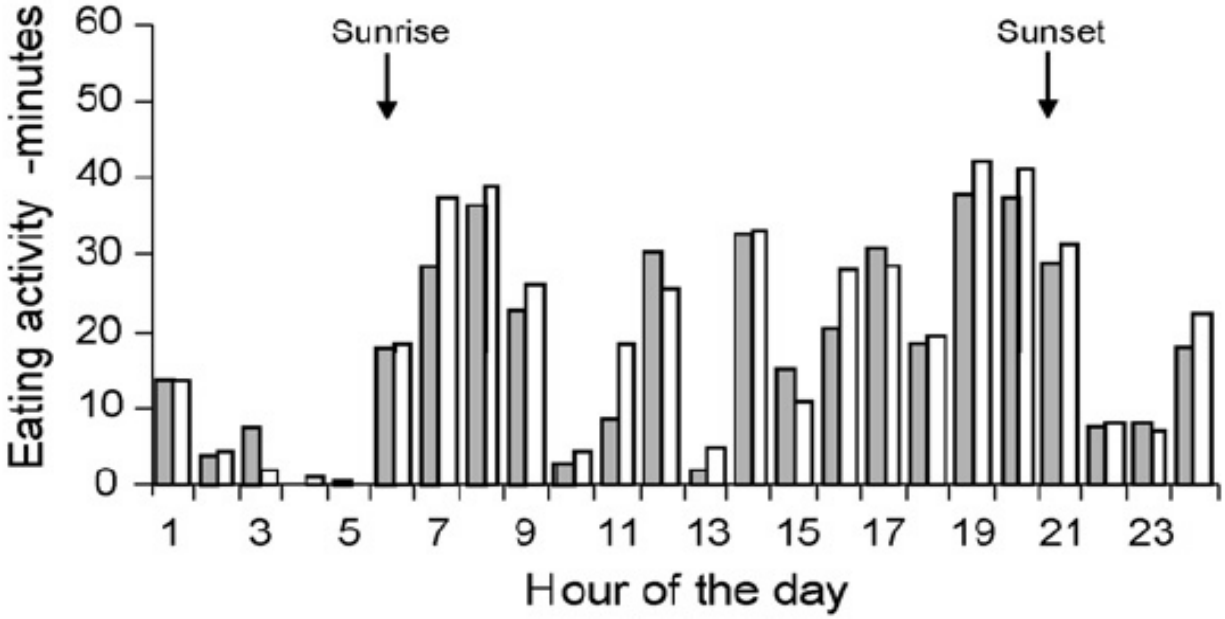


Fig. 3. Time spent eating during each hour of the day by heifers receiving either no anthelmintic (■) or treatment with eprinomectin (□).

Forbes et al. Vet Parasitology 2007


ROTO-MIX

Pfizer feedlot anthelmintic trial 2012

Arithmetic means for *Administration Route* on EPG and larval Culture after feedlot induction

Route	No. Samples	Ave EPG	%<150 EPG	%>150 EPG
Nil	50	104.5	78.0%	22.0%
Injectable	151	6.9	99.3%	0.7%
Oral	240	5.0	99.2%	0.8%
Pour-On	160	22.85	94.4%	5.6%

Table 3

Mean estimates (back transformed from Ln(x)) of C_{max} and AUC of moxidectin in plasma from untreated control calves and calves treated with moxidectin by different routes of administration.

Treatment	C_{max}*	AUC
Moxidectin injection	51.42a	105.64a
Moxidectin oral	10.56b	20.88b
Moxidectin pour-on	1.01c	9.14c
Control 1	0.14d	0.86d
Control 2	0.11d	0.97d

* Means within a column which have a letter in common are not significantly different ($p < 0.01$).

Lets talk about Reproduction!

Reproductive Vaccines Available in Australia

- Leptospirosis
  - Ultravac 7-in-1
  - Leptoshield
  - Clepto-7
  - Cattlevax LC-7
- Vibriosis
  - Vibrovax to bulls
- Bovine Herpesvirus
  - Rhinogard to bulls
  - Bovilis MH + IBR to bulls
- Bovine Viral Diarrhoea Virus
  - Pestigard

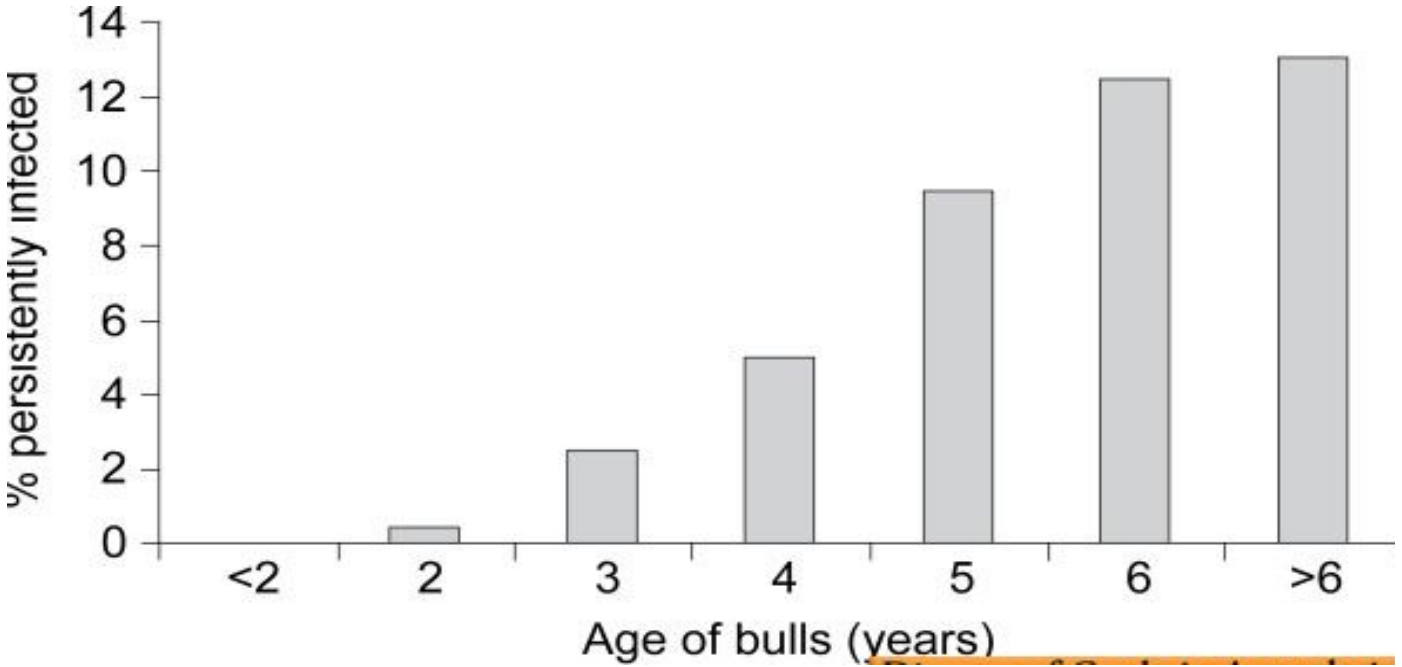
Lepto Control

- Vaccination
  - Lepto vaccination to future breeders
    - Two shots initially at least four weeks apart then an annual booster thereafter

Vibrio Control

- Vaccination
  - Vibrio vaccination to bulls
    - Two shots initially at least four weeks apart then an annual booster thereafter
- Culling
  - Positive bulls
  - Older bulls
  - Empty cows

Vibrio – Carrier Bulls



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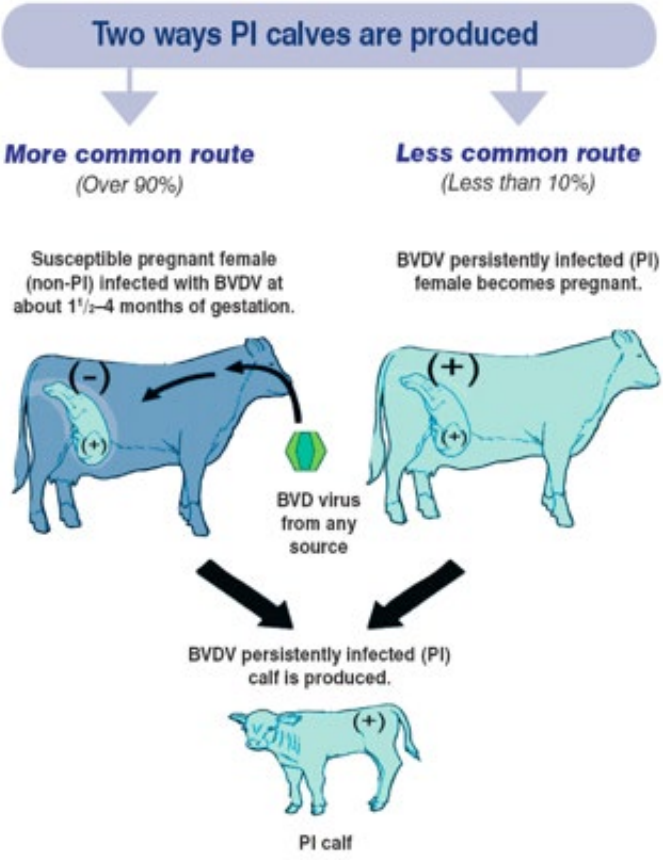
BVDV

- Reproductive loss at any stage
- Immune suppression
- Transmitted almost entirely be “PI” carriers
  - Created by intrauterine exposure



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BVDV Control

- Inititally Screen All Management Groups
  - Don’t Vaccinate Immune Groups
- Annually Screen Heifers
  - Vaccinate Seronegative Mobs
  - Ear Notch Seropositive Mobs
- Every New Heifer
  - Immune
  - PI Free

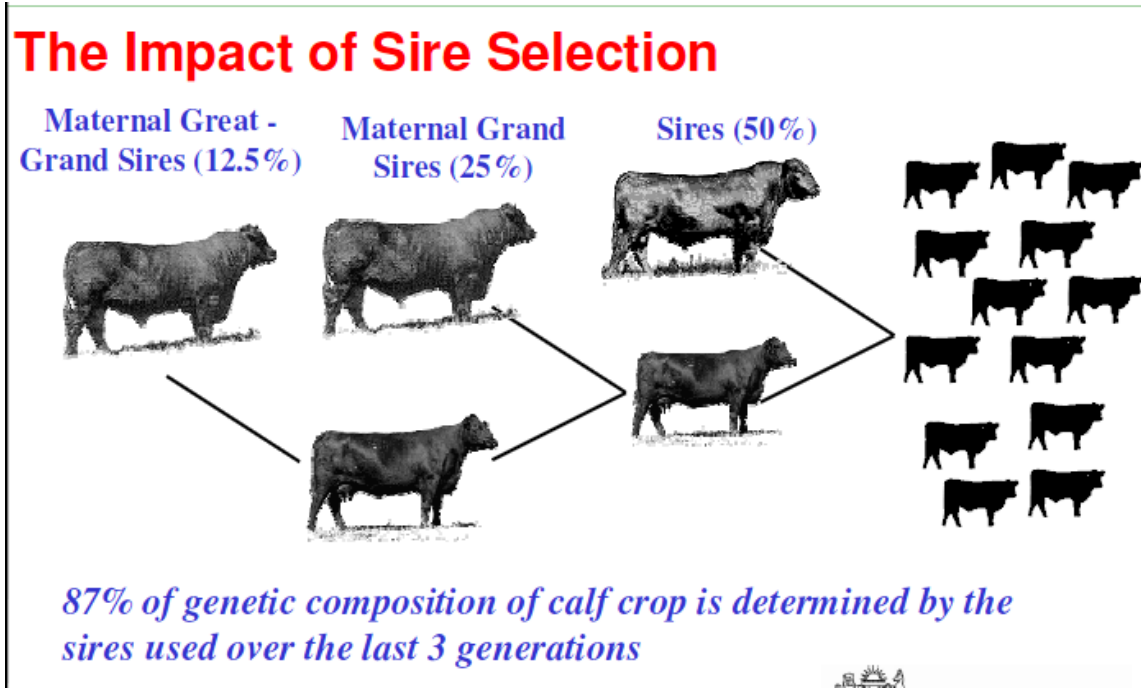
Bovine Herpes Virus Control

- Vaccinate
  - Rhinogard
    - Modified Live
      - One shot per year
      - Before mating
    - Intra-nasal vaccine
    - Somewhat difficult to obtain and distribute
  - Bovilis MH + IBR
    - Killed Product
      - Two Shots followed by annual boosters
    - Subcutaneous
    - Easily sourced

The Right Bulls

- Genetics
- Semen Testing
  - Physical Exam
  - Scrotal Circumference
  - Motility
  - Morphology
- Serving and Capacity Testing
  - Able to Serve
  - Capacity

Bull selection and purchase



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- Developed by AGBU at UNE
- Several registered breeds including Angus, Hereford etc
- Widely used in studs and some commercial herds.

STATISTICS FOR THE JANUARY 2010 ANGUS GROUP BREEDPLAN ANALYSIS

Trait	Number of records	Adjusted Average
Gestation Length	169,368	281 days
Birth Weight	608,246	36 kgs
200-Day Weight	624,284	240 kgs
400-Day Weight	458,606	371 kgs
600-Day Weight	285,113	519 kgs
Mature Cow Wt (kg)	34,027	609 kgs
Heifer Scan P8 Fat (at 500 days)	155,559	7 mm
Heifer Scan Rib Fat (at 500 days)	155,436	5 mm
Heifer Scan EMA (at 500 days)	155,290	61 sq. cm
Heifer Scan IMF% (at 500 days)	133,795	5 %
Bull Scan P8 Fat (at 500 days)	154,587	5 mm
Bull Scan Rib Fat (at 500 days)	154,739	4 mm
Bull Scan EMA (at 500 days)	154,923	81 sq. cm
Bull Scan IMF% (at 500 days)	128,103	3 %
Carcase Wt (at 650 days)	5,186	347 kg
Carcase Rib Fat (at 300 kg)	1,635	10 mm
Carcase Rump Fat (at 300kg)	3,435	14 mm
Carcase EMA (at 300 kg)	2,502	71 sq. cm
Carcase RBY% (at 300 kg)	941	67 %
Carcase IMF% (at 300kg)	3,962	6 %
Scrotal Size (400 days)	129,583	35 cm
Days to Calving	229,549	312 days

NB. includes data from Australian herds only

Impacts of Reproduction to the Poultry Industry

YEAR

1957

Day 43 **Day 57** **Day 71** **Day 85**

2010

(Miles et al., 2011)

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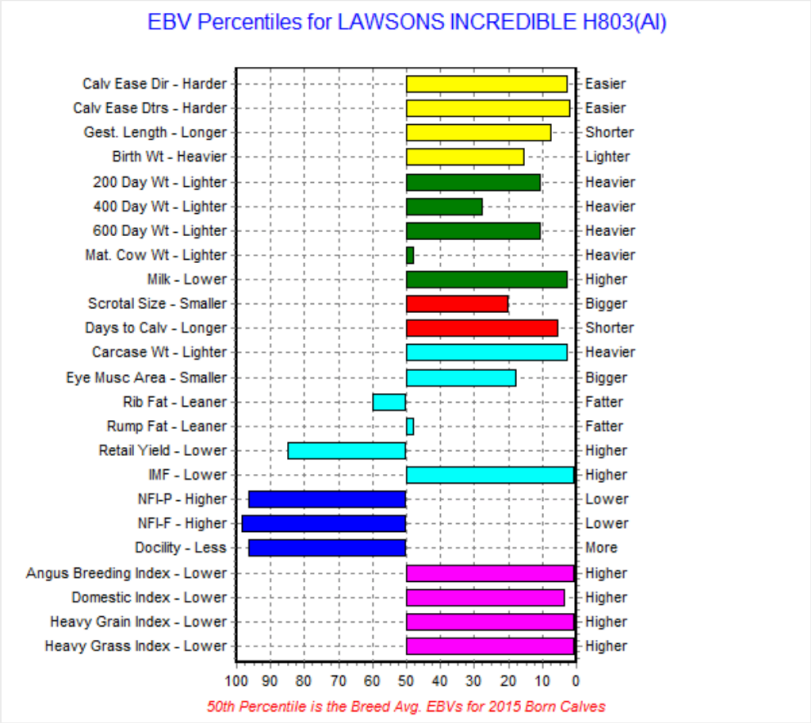
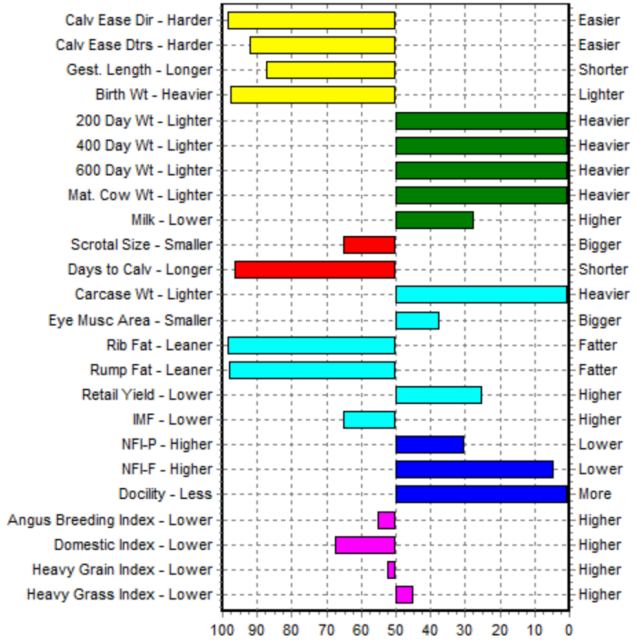


Switch Graph Graph Explanation

Mid-February 2017 Angus Australia BREEDPLAN

	Calving Ease Dir (%)	Calving Ease Dtrs (%)	Gestation Length (days)	Birth Wt. (kg)	200 Day Wt. (kg)	400 Day Wt. (kg)	600 Day Wt. (kg)	Mat. Cow Wt. (kg)	Milk (kg)	Scrotal Size (cm)	Days to Calving (days)	Carcase Wt. (kg)	Eye Muscle Area (sq.cm)	Rib Fat (mm)	Rump Fat (mm)	Retail Beef Yield (%)	IMF (%)	NFI-P (kg/day)	NFI-F (kg/day)	Docility
EBV	**+4.5**	**+4.3**	-6.7	+2.8	+49	+84	+117	+89	+23	+2.2	-6.9	**+76**	+6.6	-0.3	-0.1	-0.5	**+4.1**	+0.47	+0.74	-14
Acc	82%	62%	98%	98%	97%	97%	94%	85%	72%	94%	54%	80%	83%	84%	82%	77%	81%	64%	65%	83%
Breed Avg. EBVs for 2015 Born Calves Click for Percentiles																				
EBV	+0.0	+0.1	-3.7	+4.3	+42	+77	+100	+87	+15	+1.7	-3.8	+56	+4.6	+0.0	-0.2	+0.3	+1.6	+0.09	+0.16	+6

EBV Percentiles for COONAMBLE ELEVATOR E11



50th Percentile is the Breed Avg. EBVs for 2015 Born Calves

Switch Graph Graph Explanation

January 2017 Angus Australia BREEDPLAN																				
	Calving Ease Dir (%)	Calving Ease Dtrs (%)	Gestation Length (days)	Birth Wt. (kg)	200 Day Wt. (kg)	400 Day Wt. (kg)	600 Day Wt. (kg)	Mat. Cow Wt. (kg)	Milk (kg)	Scrotal Size (cm)	Days to Calving (days)	Carcase Wt. (kg)	Eye Muscle Area (sq.cm)	Rib Fat (mm)	Rump Fat (mm)	Retail Beef Yield (%)	IMF (%)	NFI-P (kg/day)	NFI-F (kg/day)	Docility
EBV	-7.3	-3.0	-1.5	+7.2	**+61**	**+116**	**+158**	+162	+17	+1.4	+0.4	**+92**	+5.3	-2.4	-2.6	+0.8	+1.2	0.00	-0.25	+41
Acc	88%	74%	99%	98%	98%	98%	98%	94%	93%	97%	59%	89%	89%	89%	89%	84%	86%	69%	71%	94%
Breed Avg. EBVs for 2015 Born Calves Click for Percentiles																				
EBV	+0.0	+0.1	-3.7	+4.3	+42	+77	+100	+88	+15	+1.7	-3.8	+56	+4.6	+0.0	-0.2	+0.3	+1.6	+0.09	+0.15	+5

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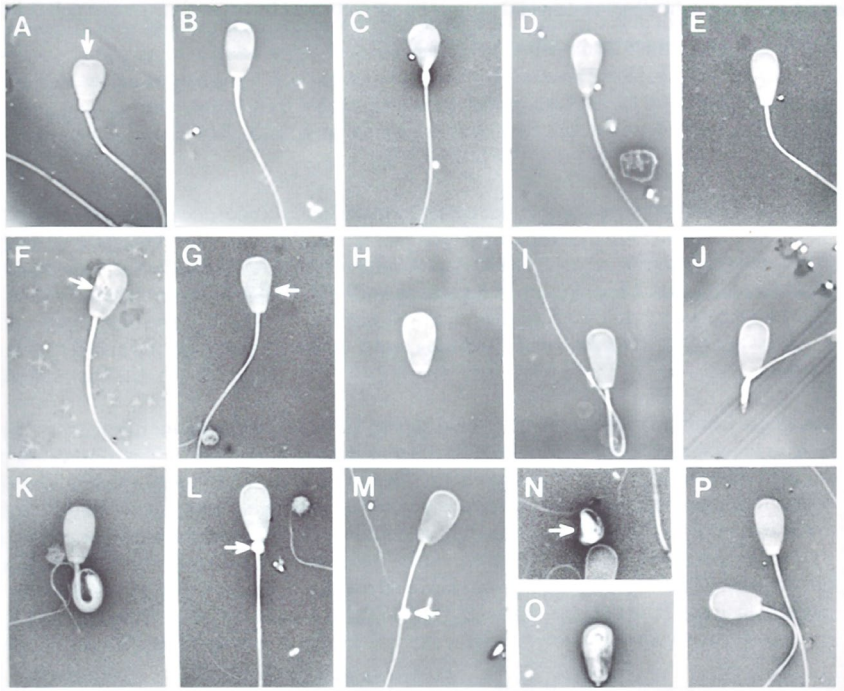
Morphology



A. Knobbed acrosome (common form)
B. Knobbed acrosome (beaded form)
C. Pyriform head (severe)
D. Pyriform head (moderate)
E. Pyriform head (slight)
F. Nuclear vacuoles
G. Diadem defects
H. Detached head
I. Distal reflex
J. Dag-like defect (broken midpiece)
K. Dag-like defect (severely bent midpiece)
L. Proximal droplet
M. Distal droplet
N. Teratoid (severe)
O. Teratoid (moderate)
P. Normal spermatozoa

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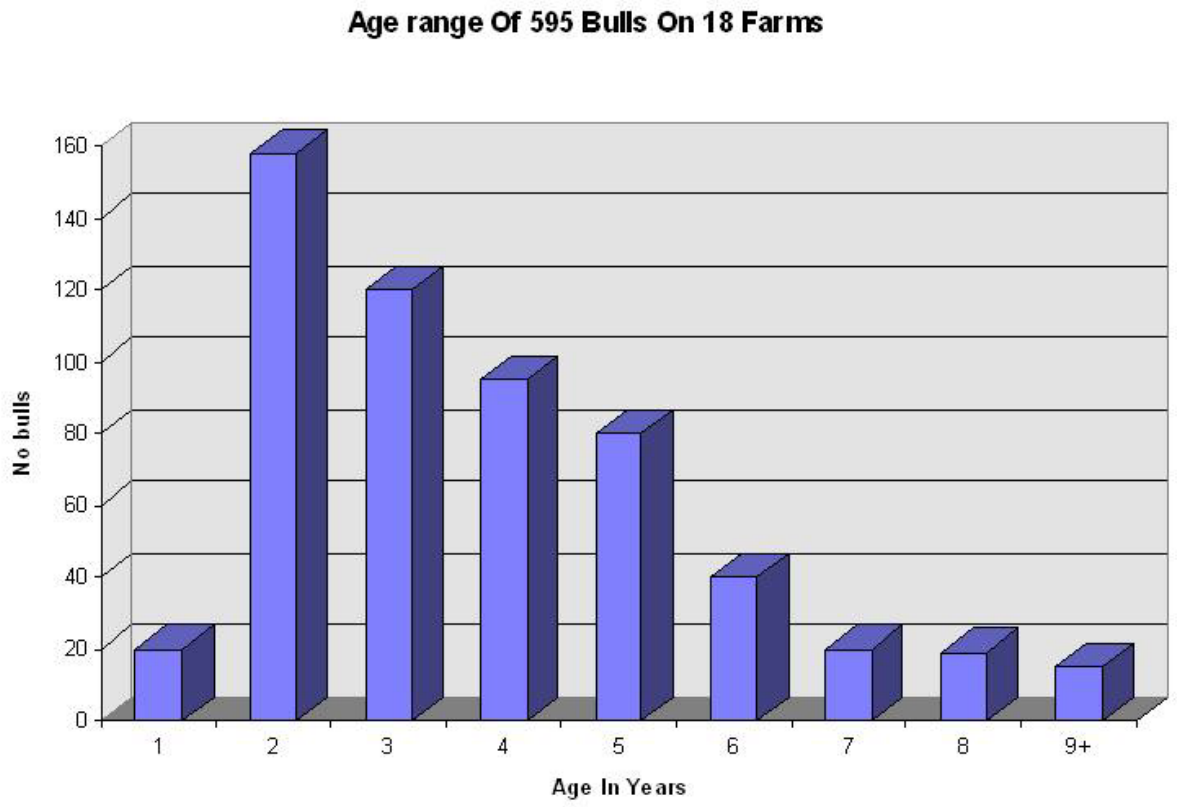
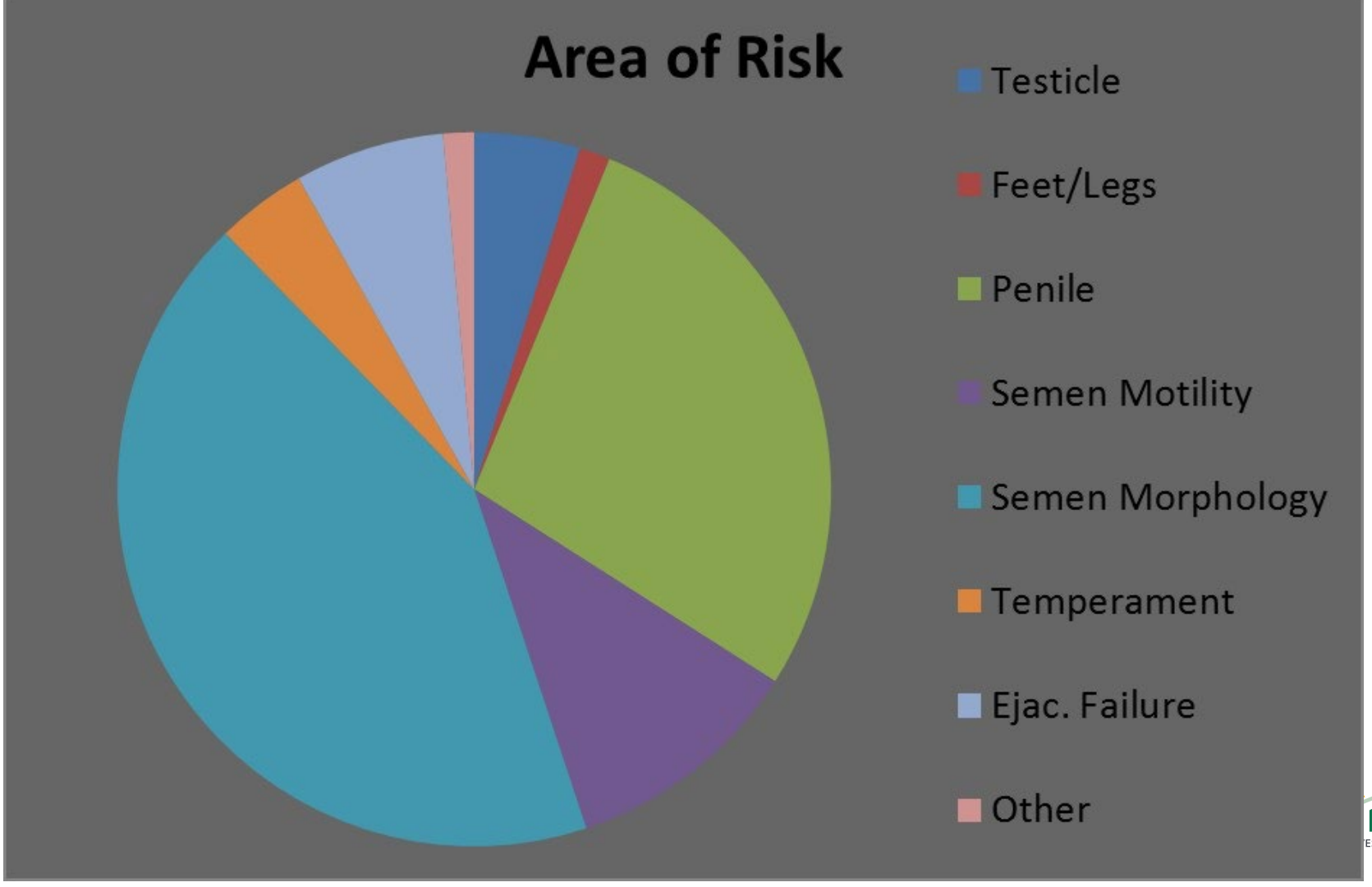
Good Genetics
Good Semen Quality




Area of Risk
Testicle
Feet/Legs
Penile
Semen Motility
Semen Morphology
Temperament
Ejac. Failure
Other

Back to Building a Better Cow!

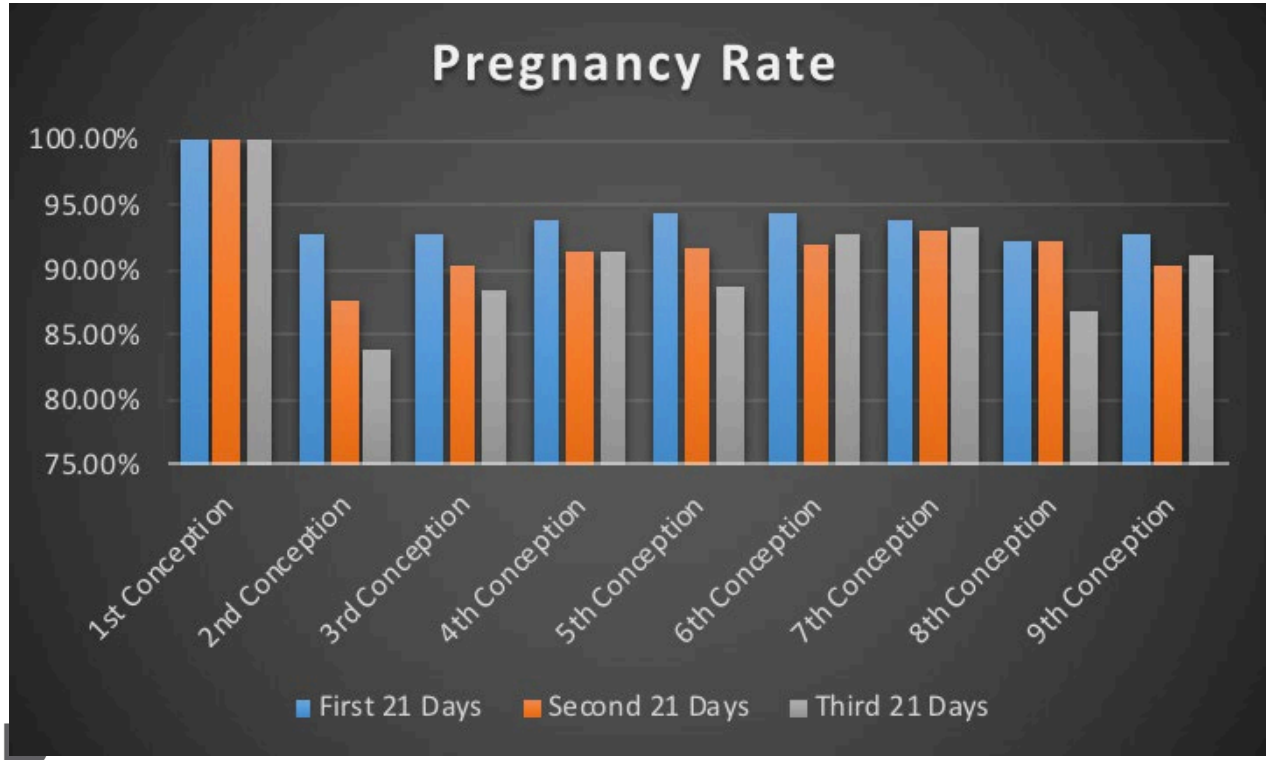
Getting Three Year Olds to Calve Early

- Industry used to join heifers at 27 months.
  - Larger Frame
    - Less Dystocia
  - Bred Back Better
    - Less Competition for Resources
      - 80% Grown Out
  - Not economically viable
    - First Calf Saleable after 3.75 years of Feeding
      - $1200 in feed costs and opportunity loss

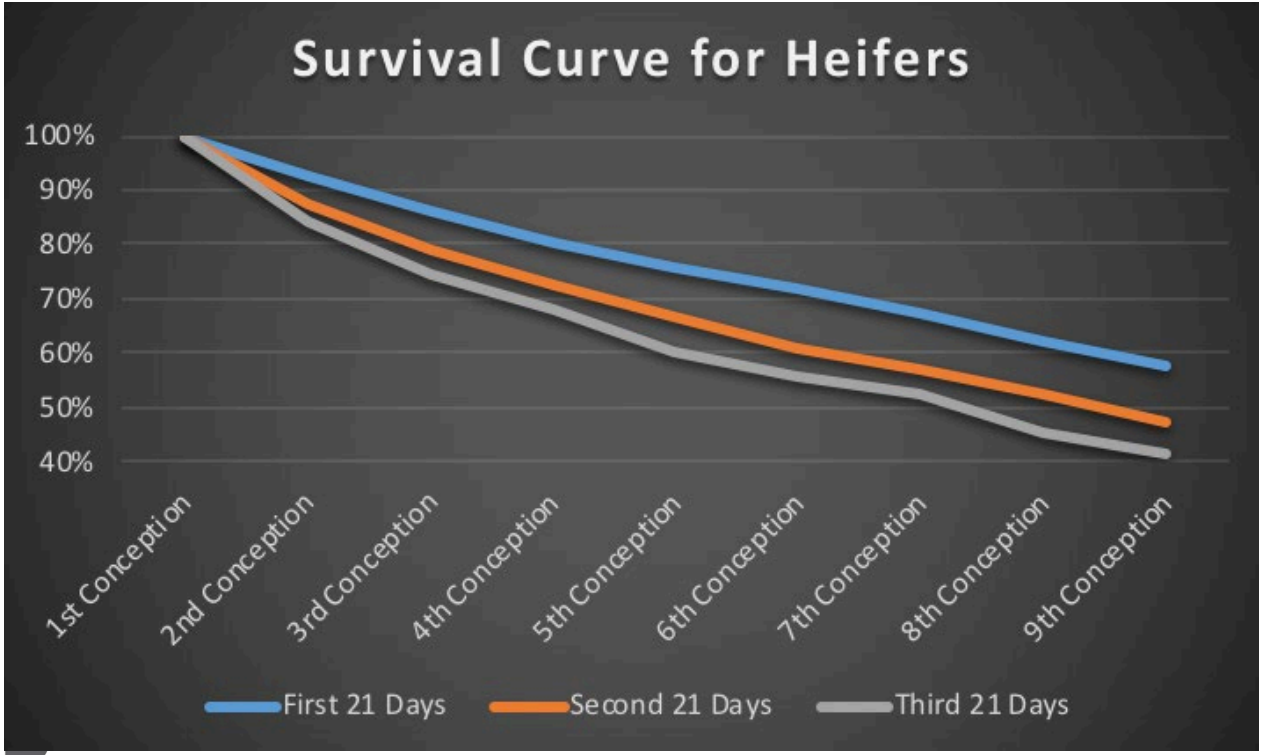
Getting Three Year Olds to Calve Early

- Heifers take from 20 to 30 days longer than cows to breed back after they calve
- Heifers that conceive at the same time as cows will calve at the same time but will conceive later than cows the following year
- Heifers that get pregnant late are often empty as 1st Calvers

Cushman et al. 2013



Cushman et al. 2013



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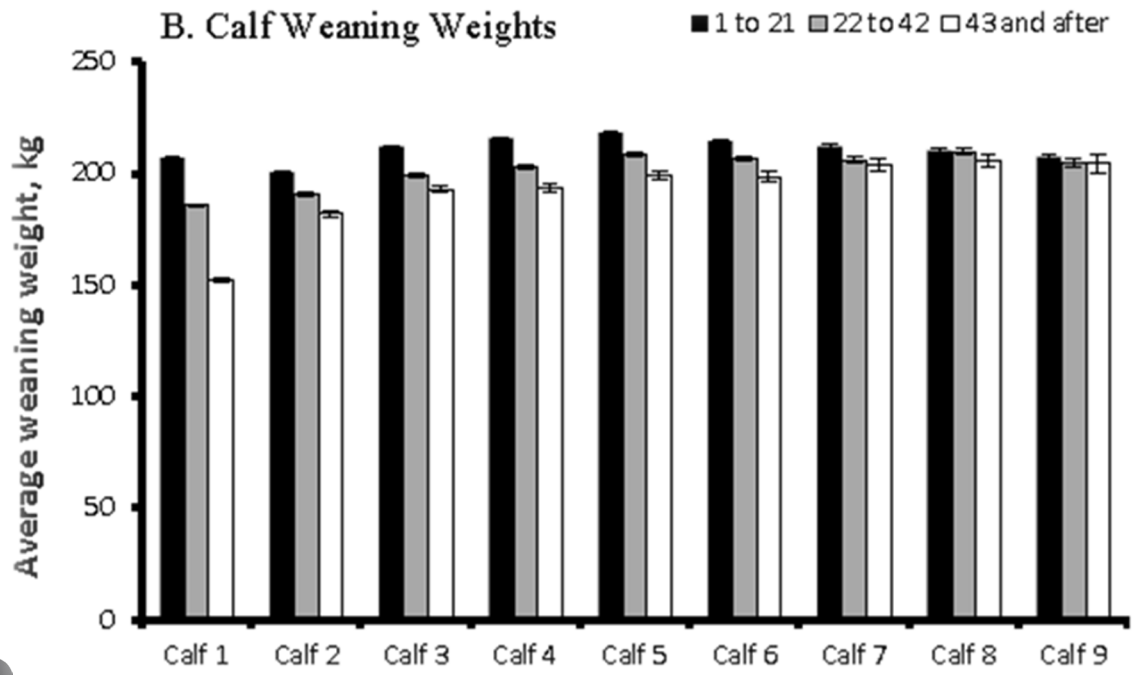
Cushman et al. 2013



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Buying More Time

- We need 13 months in a year!
- Shorter Gestation?
- Calve one month later each year?
  - We can for their second mating!

Early and Short Heifer Joining Equals Early and Short Heifer Calving

- Join heifers before and for less time than cows
  - Good selection tool for reproductive efficiency
  - Older, bigger weaners from heifers
  - Releases a few extra bulls
  - Easier heifer calving management
  - Buys heifer more time to get back in calf the second time!

Short and Early Joining

- Empty heifers marketable as yearlings in early September
  - Can market empty heifers with remainder of yearlings
    - Assuming 6-8 week joining and preg test at 42 days
- Lower conception rates than with a longer joining
  - Less room for error
    - Bull break down
    - Insufficient growth
    - Poor plane of nutrition
    - Reproductive disease
    - Seasonal Conditions

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Join More Heifers and Let Love Pick Your Keepers!

The Best Heifers are the Pregnant Heifers!

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There is No Tragedy in an Empty Heifer

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Don’t Get Married To Your Heifers

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Synchronization

- Synchronize cycling heifers to tighten joining period
- Heifers must be cycling
  - Protocol does not bring on anestrus females
- Two shots prostaglandins 11-14 days apart before bulls go in
  - 2 Heat Cycles in 4 weeks
  - 3 Heat Cycles in 7 weeks
- Need Plenty of 1st Cycle

  Bull Power

Fixed Time Artificial Insemination

- Ultimate synchrony
- Access to superior genetics
  - Manage dystocia proactively
- No heat detection
  - More matings
    - More pregnancies

23 Day Mating

- 2 Round AI Program
  - FTAI followed by resynchrony and 2nd AI to heat detection
- 1 Round AI backed up by 2% bull battery
  - Bulls in day 15, out day 30
    - Producers could leave one bull for the 3rd and 4th cycles
      - Preg Test, Stage Pregnancies, Sell as PTIC

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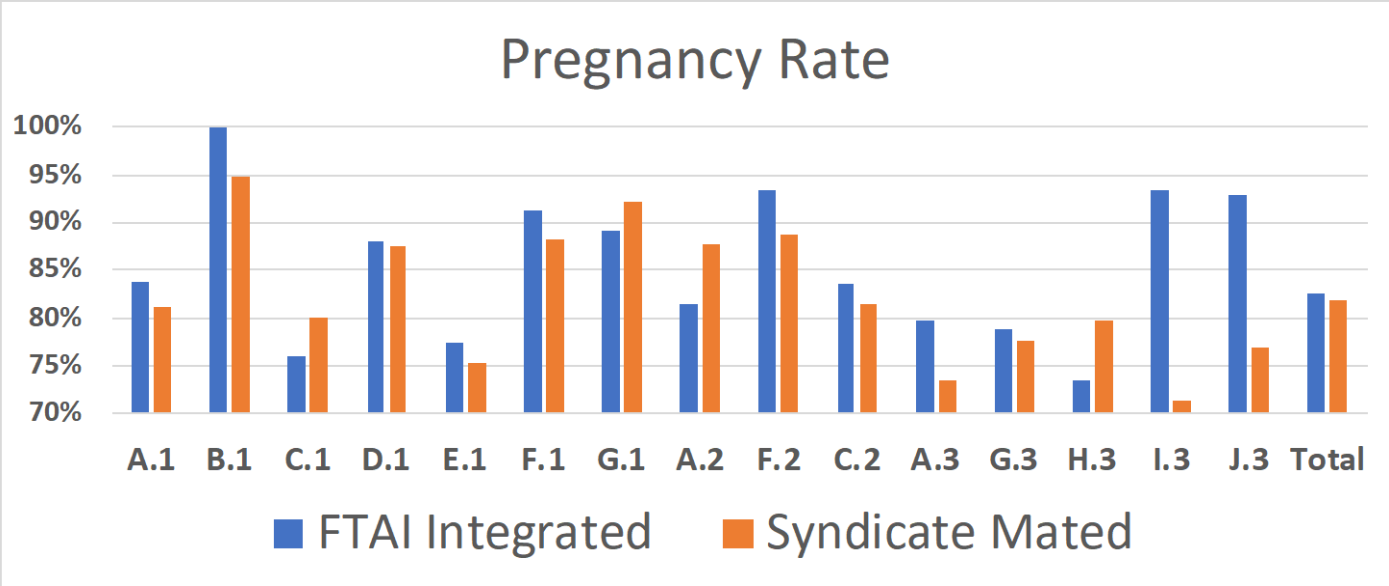
MLA Producer Demonstration Site

- Integrating Fixed Time AI into Commercial Heifer Mating Programs
  - 50:50 Based on Last Digit of Ear Tag
  - 50% of Heifers Synchronized and AI'd on Mating Start Date
  - Other 50% of Heifers Exposed to Bulls on Mating Start Date
  - Heifers Boxed 10 Days After Mating Start Date
  - 15 Sites
  - Approximately 2450 Heifers Enrolled



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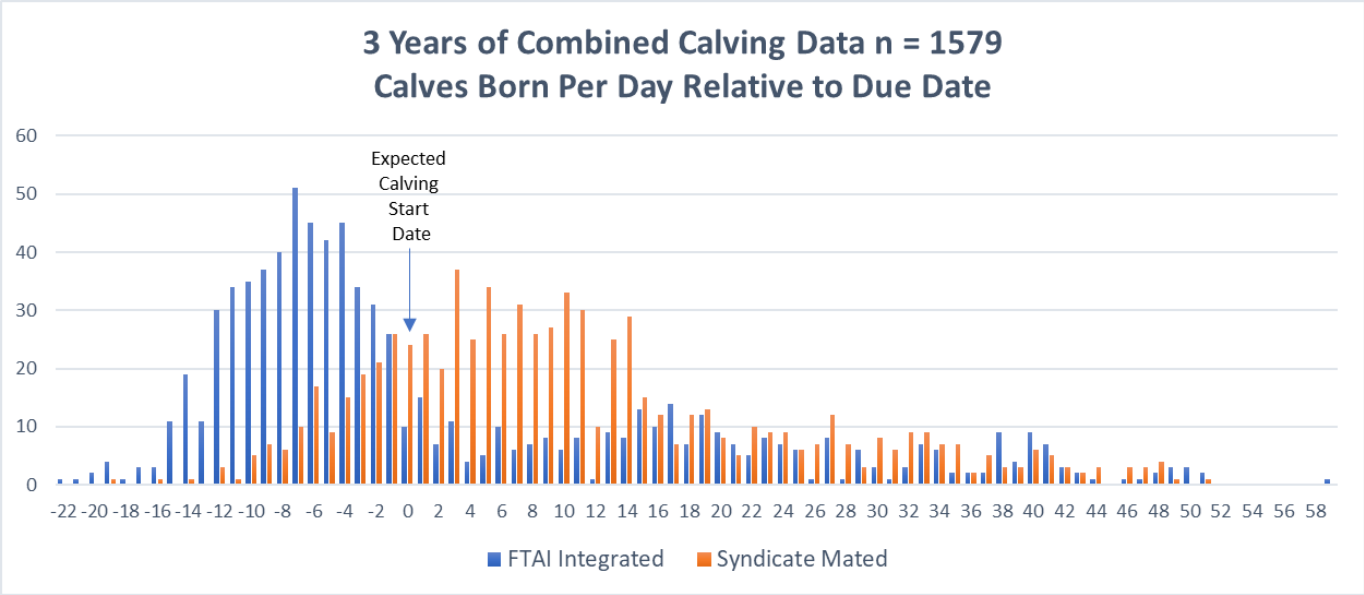
Pregnancy Rate

	Integrated FTAI			Syndicate Mated			Difference	% Reduction in Empties
Farm	Preg Tested	Empty	% Empty	Preg Tested	Empty	% Empty		
A.1	173	28	16.2%	218	41	18.8%	2.6%	13.9%
B.1	19	0	0.0%	19	1	5.3%	5.3%	100.0%
C.1	25	6	24.0%	25	5	20.0%	-4.0%	-20.0%
D.1	25	3	12.0%	24	3	12.5%	0.5%	4.0%
E.1	71	16	22.5%	73	18	24.7%	2.1%	8.6%
F.1	58	5	8.6%	51	6	11.8%	3.1%	26.7%
G.1	102	11	10.8%	102	8	7.8%	-2.9%	-37.5%
A.2	177	33	18.6%	173	21	12.1%	-6.5%	-53.6%
F.2	45	3	6.7%	44	5	11.4%	4.7%	41.3%
G.2	85	14	16.5%	86	16	18.6%	2.1%	11.5%
A.3	174	35	20.1%	192	51	26.6%	6.4%	24.3%
G.3	118	25	21.2%	99	22	22.2%	1.0%	4.7%
H.3	106	28	26.4%	114	23	20.2%	-6.2%	-30.9%
I.3	15	1	6.7%	7	2	28.6%	21.9%	76.7%
J.3	14	1	7.1%	13	3	23.1%	15.9%	69.0%
Site Average			14.5%			17.6%	3.1%	17.5%
Combined Dataset	1207	209	17.3%	1240	225	18.1%	0.8%	4.6%

Pregnancy Rate Value Difference

- Producer Group Survey
  - Estimated Pregnant Heifer $100 over Value of Empty Heifer
  - 0.8% Difference Favouring FTAI
  - $0.80 Difference

Calving Distribution and Weaning Weights



Bulls +10.8 Days
AI Integrated +2.7 Days
Gain = 8.1 Days

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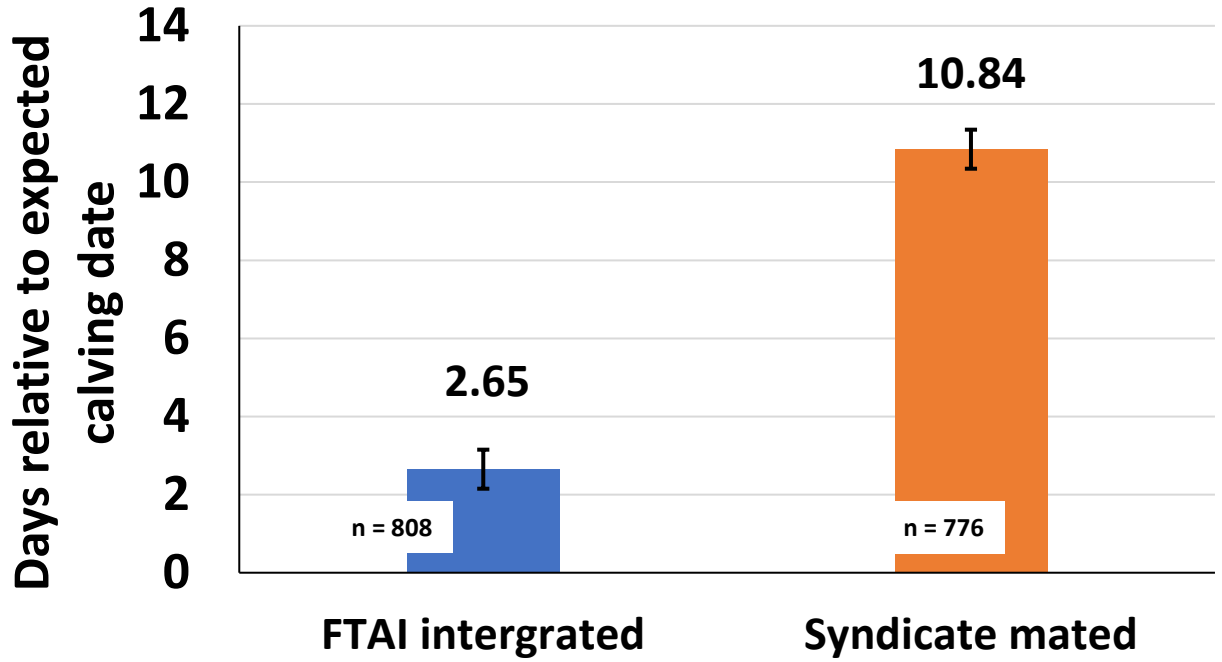
Mean calving date relative to expected calving date



FTAI integrated differs from Syndicate mated (P < 0.01)

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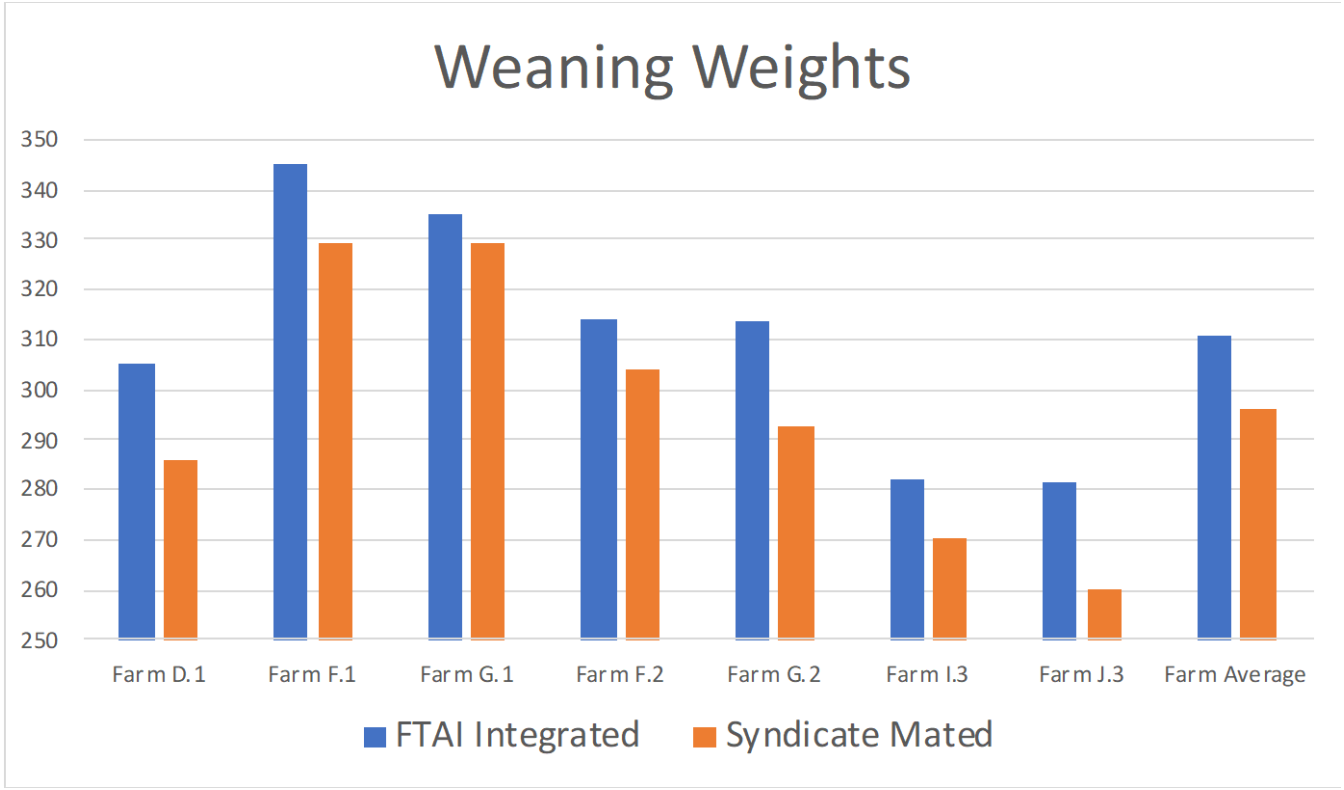

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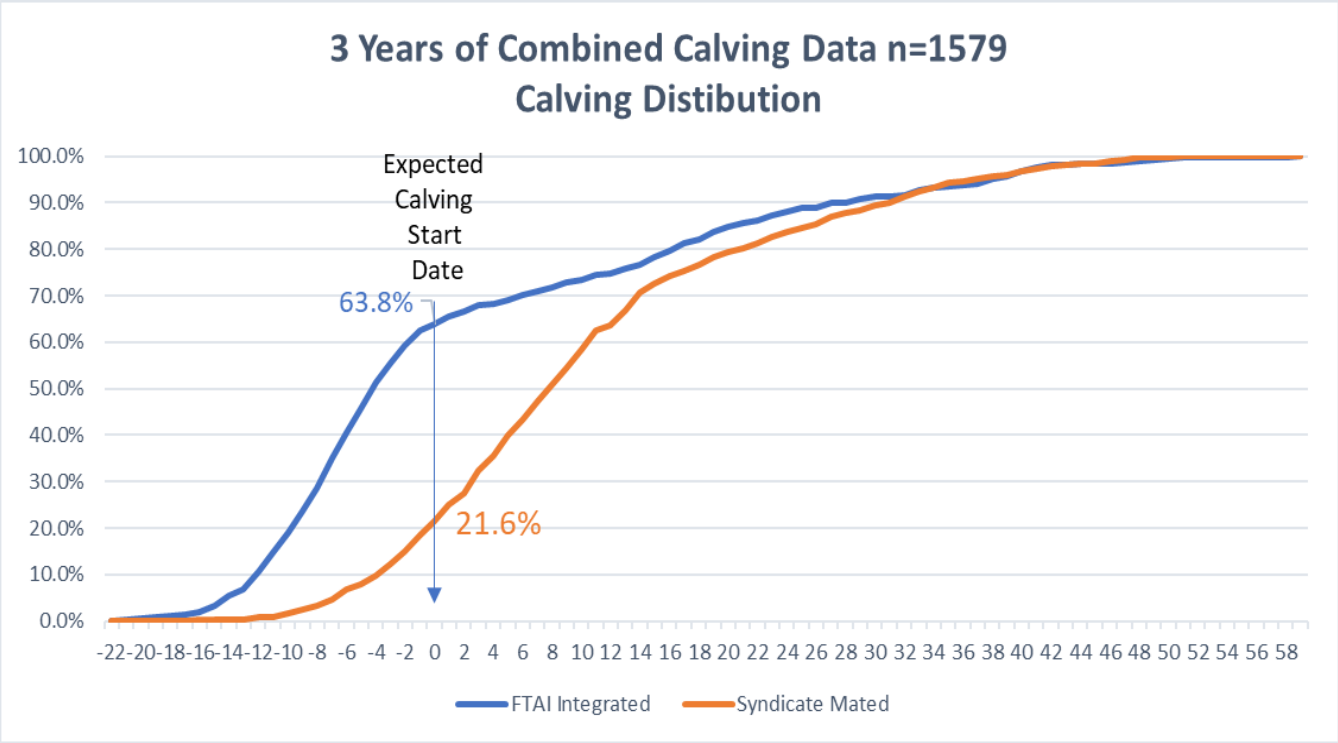
Weaning Weights

	FTAI Integrated		Syndicate Mated		Difference
	Number	Average Weight	Number	Average Weight	
Farm D.1	20	305	18	285.7	19.3
Farm F.1	42	345	31	329.5	15.5
Farm G.1	75	335.1	81	329.1	6
Farm F.2	39	313.9	34	303.9	10
Farm G.2	64	313.6	62	293	20.6
Farm I.3	11	282	5	270	12
Farm J.3	11	281.5	6	260	21.5
Site Average	262	310.9	237	295.9	15.0

Weaning Weight Difference

- Producer Group Survey
  - Conservative Mixed Sex Value of $4 per Kg
  - 15 Kg Difference Favoring FTAI
  - $60.00 Difference

Rebreeding Rate



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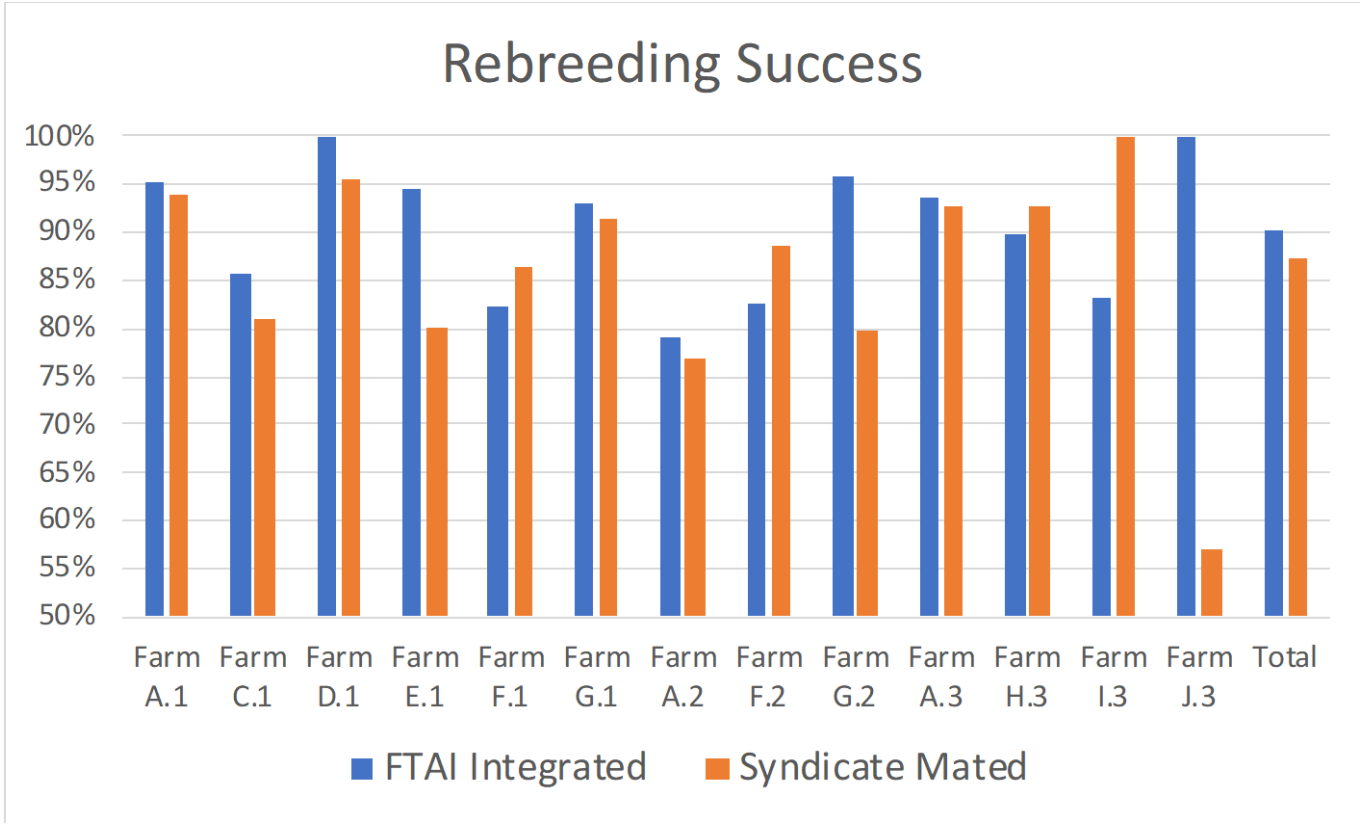

Rebreeding Rate

	FTAI Integrated			Syndicate Mated			Difference	% Reduction in Empties
Farm	Joined	Empty	% Empty	Joined	Empty	% Empty		
A.1	126	6	4.8%	145	9	6.2%	1.4%	23.3%
C.1	21	3	14.3%	21	4	19.0%	4.8%	25.0%
D.1	22	0	0.0%	22	1	4.5%	4.5%	100.0%
E.1	55	3	5.5%	55	11	20.0%	14.5%	72.7%
F.1	34	6	17.6%	37	5	13.5%	-4.1%	-30.6%
G.1	86	6	7.0%	83	7	8.4%	1.5%	17.3%
A.2	138	29	21.0%	148	34	23.0%	2.0%	8.5%
F.2	40	7	17.5%	35	4	11.4%	-6.1%	-53.1%
G.2	70	3	4.3%	54	11	20.4%	16.1%	79.0%
A.3	123	8	6.5%	137	10	7.3%	0.8%	10.9%
H.3	78	8	10.3%	82	6	7.3%	-2.9%	-40.2%
I.3	12	2	16.7%	5	0	0.0%	-16.7%	-100.0%
J.3	11	0	0.0%	7	3	42.9%	42.9%	100.0%
Site Average			9.6%			14.2%	4.5%	31.9%
Combined Dataset	816	81	9.9%	831	105	12.6%	2.7%	21.4%

Rebreeding Rate Difference

- Producer Group Survey
  - Estimated Pregnant First Calf Heifer $1000 over Value of Empty First Calf Heifer
  - 2.7% Difference
  - $27.00 Difference

Pick your Heifers BEFORE
They are born!

Always look to the Dam
+
Get Good Bulls


Thank you for your attention
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