

Building a Foundational Repro Program

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Professor of Dairy Science



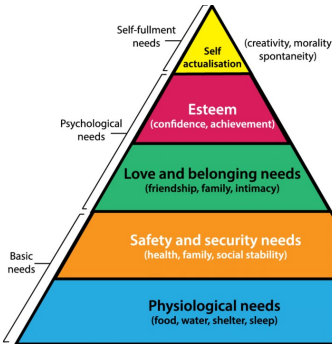
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Maslow's Hierarchy of Needs

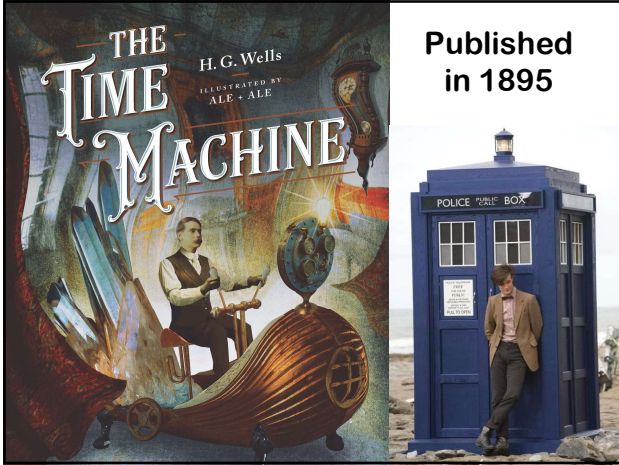


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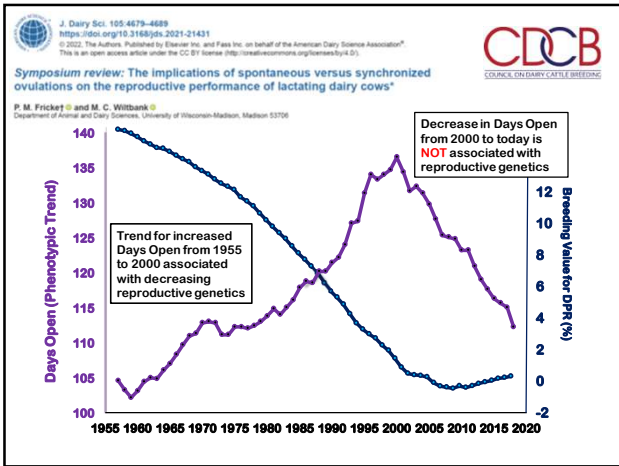
Dr. Fricke's Hierarchy of Repro Needs



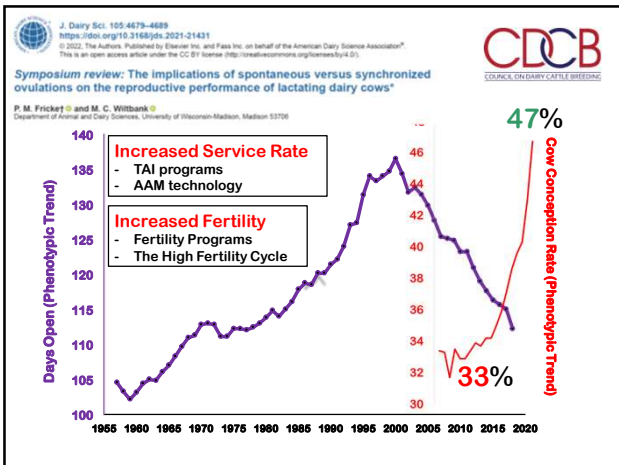
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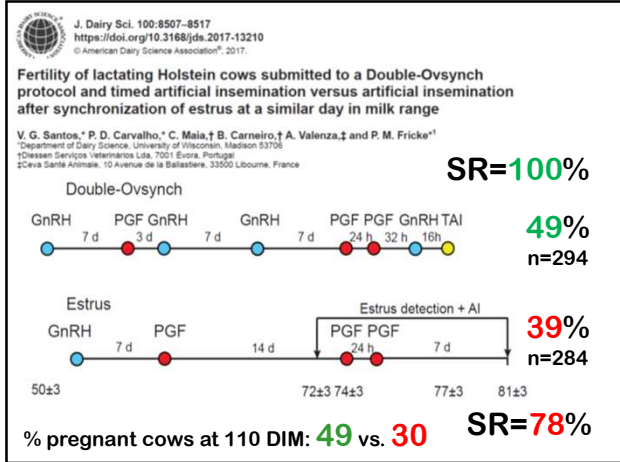
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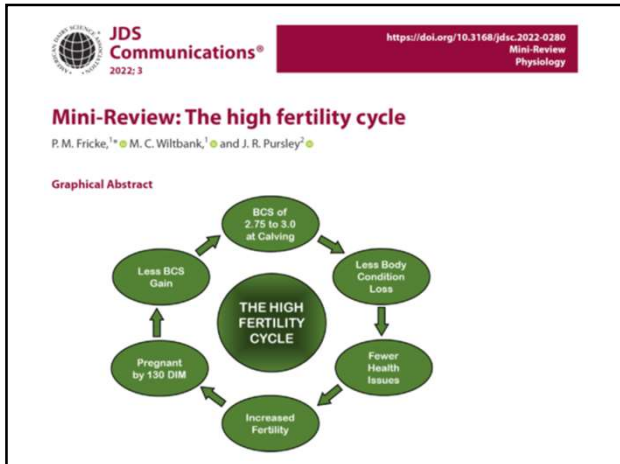
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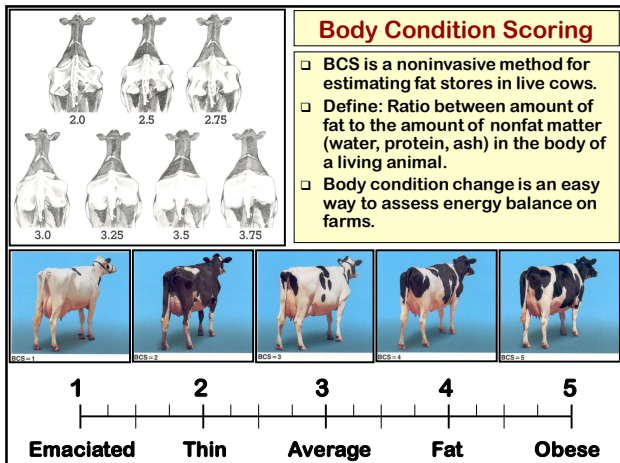
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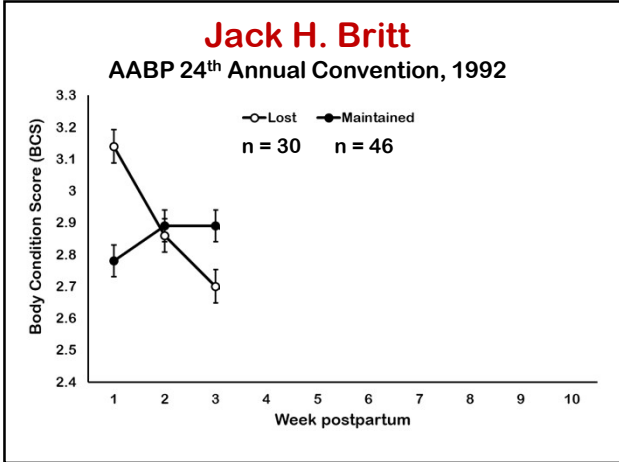
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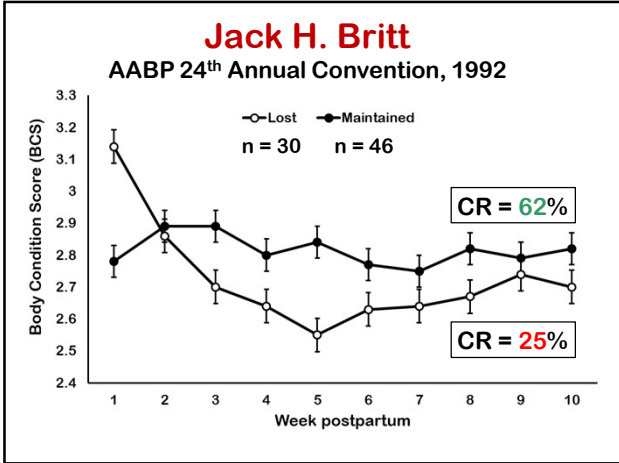
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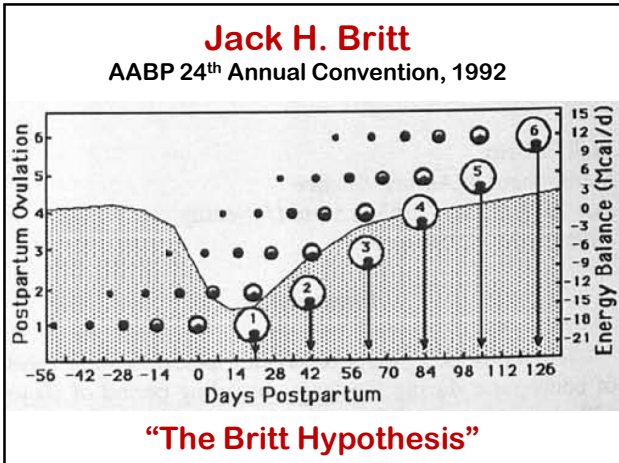
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Three Studies:

Relationships among changes in body condition score (BCS) and reproduction in lactating dairy cows

- **Carvalho et al., 2014**
J. Dairy Sci. 97:3666-3683
- **Barletta et al., 2017**
Theriogenology 104:30-36
- **Middleton et al., 2019**
J. Dairy Sci. 102:5577-5587



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 J. Dairy Sci. 97:3666-3683
<http://dx.doi.org/10.3168/jds.2013-7809>
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Relationships between fertility and postpartum changes in body condition and body weight in lactating dairy cows

P. D. Carvalho,* A. H. Souza,*¹ M. C. Amundson,* K. S. Hackbart,* M. J. Fuenzalida,* M. M. Herlihy,* H. Ayres,* A. R. Dresch,* L. M. Vieira,* J. N. Guenther,* R. R. Grummer,† P. M. Fricke,* R. D. Shaver,* and M. C. Wiltbank*²

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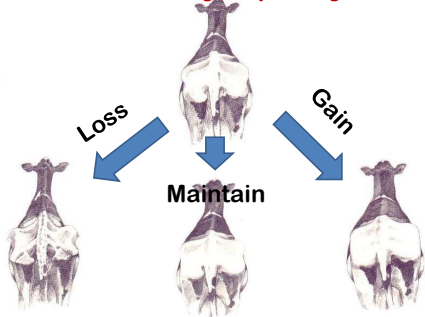
 

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Does Body Weight change early postpartum affect embryo quality?

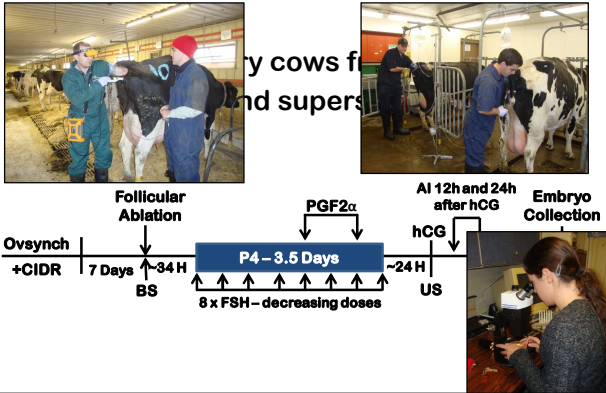
Calving
↓
21 DIM



Cows losing more BW early postpartum will have poor embryo quality

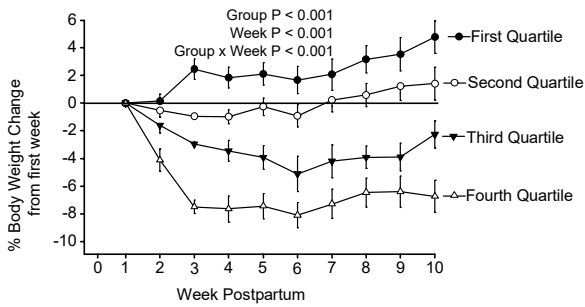
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Materials & Methods



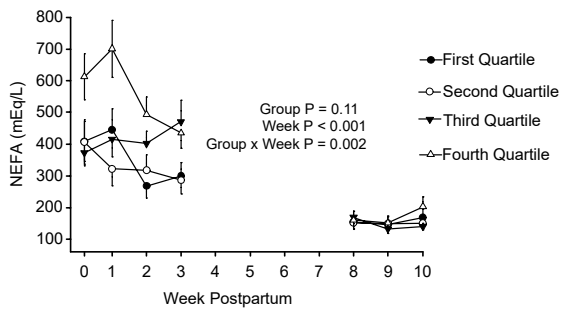
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% Body weight change



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NEFA concentrations

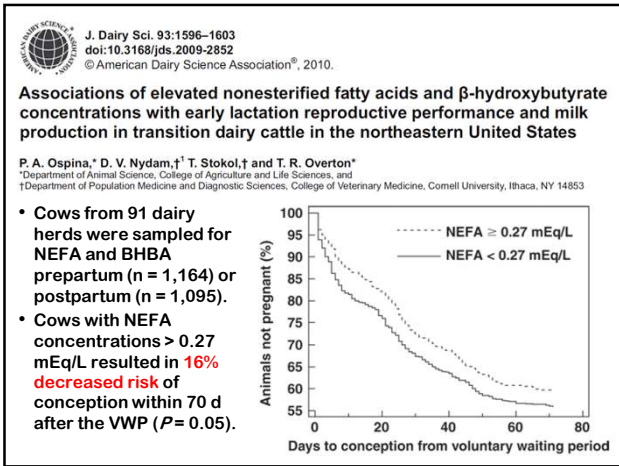


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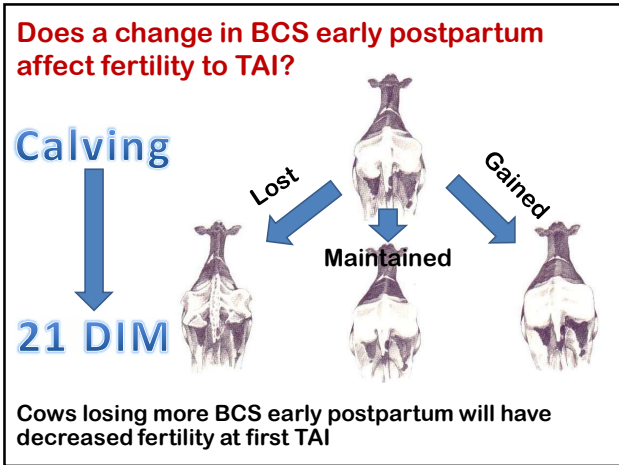
Embryo Characteristics

	Quartile				P-value
	Fourth Q Lost +	Third Q Lost	Second Q Maintain	First Q Gain	
CL (no.)	18.4 ± 2.6	18.4 ± 1.7	19.0 ± 1.7	16.0 ± 2.0	0.67
Fertilized embryos (%)	76.9 ± 7.1	77.0 ± 6.6	77.6 ± 7.6	78.4 ± 7.1	0.99
Quality 1 & 2 embryos (%)	38.0 ± 8.7	61.3 ± 8.2	60.6 ± 9.4	63.4 ± 8.6	0.14
Degenerate embryos (%)	35.2 ± 8.5 ^a	12.6 ± 4.6 ^b	14.5 ± 6.3 ^b	9.6 ± 3.7 ^b	0.02
Qual 1 & 2 of Fertilized (%)	48.4 ± 9.5 ^a	78.3 ± 6.6 ^b	72.6 ± 9.5 ^b	77.7 ± 7.4 ^b	0.05
Degenerate of Fertilized (%)	46.9 ± 9.6 ^{a,A}	17.4 ± 6.4 ^{b,B}	24.8 ± 9.3 ^{ab,A}	16.2 ± 7.0 ^{b,B}	0.04

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% of cows, BCS at calving and 21 DIM

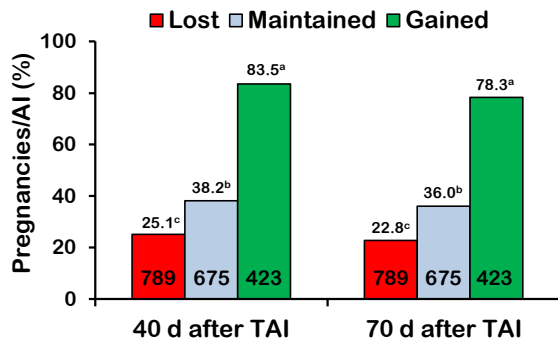
	BCS Change			P-Value
	Lost	Maintained	Gained	
% cows	42 (789/1887)	36 (675/1887)	22 (423/1887)	-
% Primi.	47 (373/789)	53 (356/675)	55 (233/423)	0.02
BCS at calving	2.93±0.01 ^a	2.89±0.02 ^{ab}	2.85±0.02 ^b	0.005
BCS at 21 DIM	2.64±0.01 ^c	2.89±0.02 ^b	3.10±0.02 ^a	<0.001
BCS Δ	-0.29	0.0	+0.25	
ECM (kg/d) [†]	30.9±0.4	31.5±0.4	28.7±0.4	0.3

[†]From calving to 21DIM

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P/AI to Double-Ovsynch

BCS change: P < 0.001 BCS change: P < 0.001
 Parity: P < 0.001 Parity: P < 0.001



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Case Study Extreme Example

A nutritionist called me about a 450-cow dairy with severe repro problems

- 21-d Pregnancy Rate: 8%
 - <20% = poor
 - 21% to 25% = OK with room for improvement
 - 26% to 30% = excellent
 - >30% = outstanding
- 21-d Service Rate: 33%
 - Goal: >60%
- Conception Rate: 39% overall
 - No sexed semen used in lactating cows
 - CR is difficult to benchmark; many factors are involved
 - Goal: 45% to 55%

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Far-Off Dry Cows



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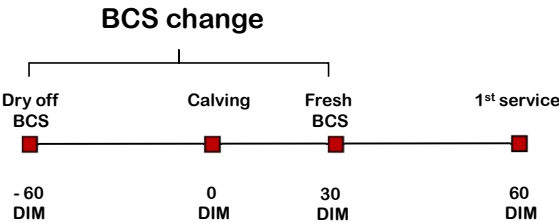
Early Lactation Cows



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Unpublished Analysis

Megan Lauber, MS student



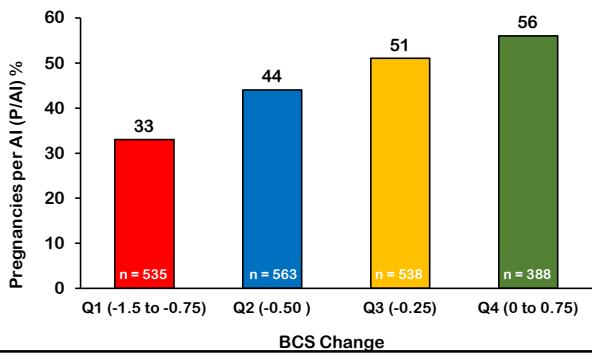
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Demographics by BCS change

	BCS Change from Dry off to 30 DIM			
	Q1 n = 608	Q2 n = 672	Q3 n = 650	Q4 n = 449
BCS Change	-1.5 to -0.75	- 0.50	-0.25	0 to 0.75
BCS Change (Mean ± SEM)	-0.84 ± 0.01	-0.50 ± 0	-0.25 ± 0	0.04 ± 0.01
Parity (Mean ± SEM)	3.47 ± 0.06	3.07 ± 0.05	2.86 ± 0.5	2.73 ± 0.06
Week 8 Milk (lbs)	117	117	113	108
1 st F:P Ratio (Mean ± SEM)	1.30 ± 0.02	1.25 ± 0.01	1.21 ± 0.01	1.19 ± 0.01

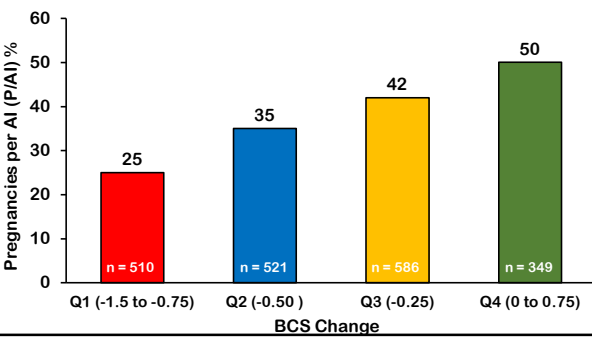
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Pregnancy outcomes, d 32

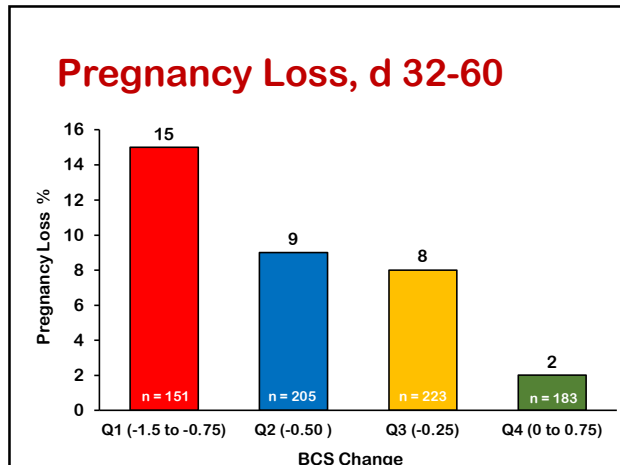


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Pregnancy outcomes, d 60



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Question:

How can we get cows to gain or maintain BCS after calving?

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Theriogenology 104 (2017) 30–36

Contents lists available at ScienceDirect

Theriogenology

journal homepage: www.theriojournal.com

Association of changes among body condition score during the transition period with NEFA and BHBA concentrations, milk production, fertility, and health of Holstein cows

R.V. Barletta^{a,*}, M. Maturana Filho^b, P.D. Carvalho^c, T.A. Del Valle^b, A.S. Netto^b, F.P. Renno^b, R.D. Mingoti^b, J.R. Gandra^b, G.B. Mourão^c, P.M. Fricke^d, R. Sartori^e, E.H. Madureira^b, M.C. Wiltbank^a

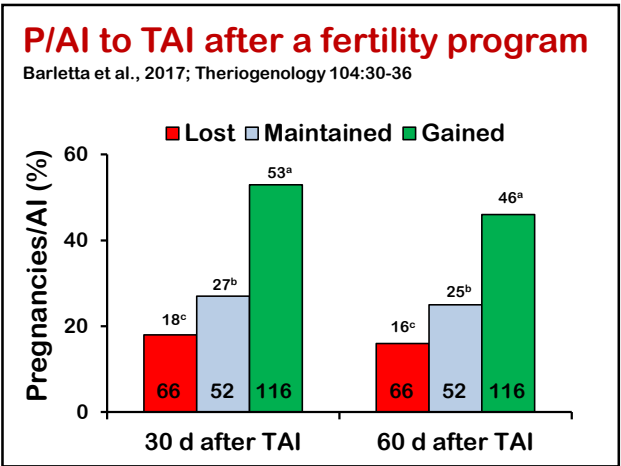
^a Department of Dairy Science, University of Wisconsin-Madison, Madison, 53706, USA
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^d College of Agricultural Sciences, Federal University of Dourados, Dourados, 79804-970, Brazil

BCS change from 21 days before calving to 21 days after calving

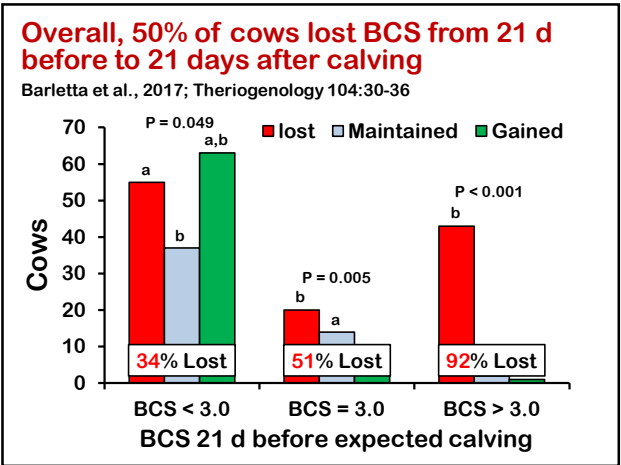
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Effect of BCS Change on Health Events			
Barletta et al., 2017; Theriogenology 104:30-36.			
Event	Lost	Maintained	Gained
	50% (116/234)	22% (52/234)	28% (66/234)
Metritis	23%	21%	20%
Mastitis	29% ^b	17% ^{a,b}	17% ^a
Ketosis	27%	19%	15%
Pneumonia	15%	12%	9%
>1 Event	63% ^b	46% ^a	39% ^a

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Question:

How can we get cows to gain or maintain BCS after calving?

Answer:

Avoid calving over-conditioned cows!

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Question:

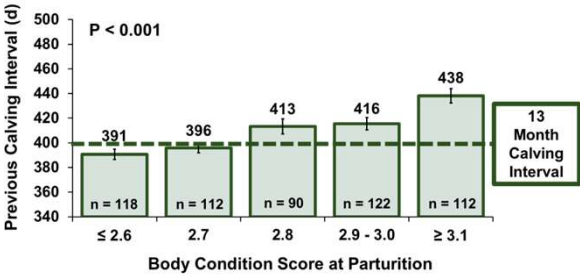
How can we avoid calving over-conditioned cows?



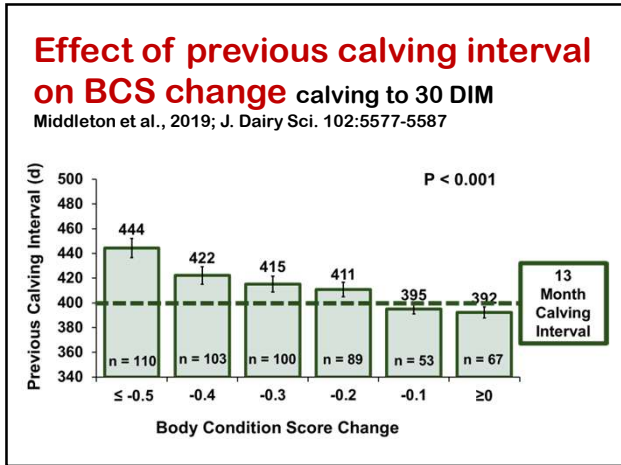
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Effect of previous calving interval on BCS at calving

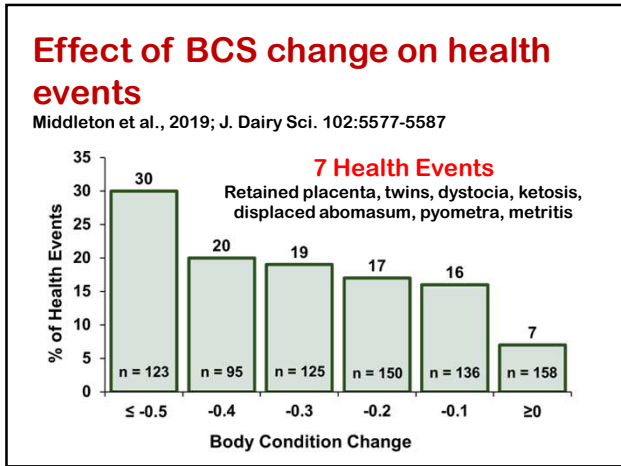
Middleton et al., 2019; J. Dairy Sci. 102:5577-5587



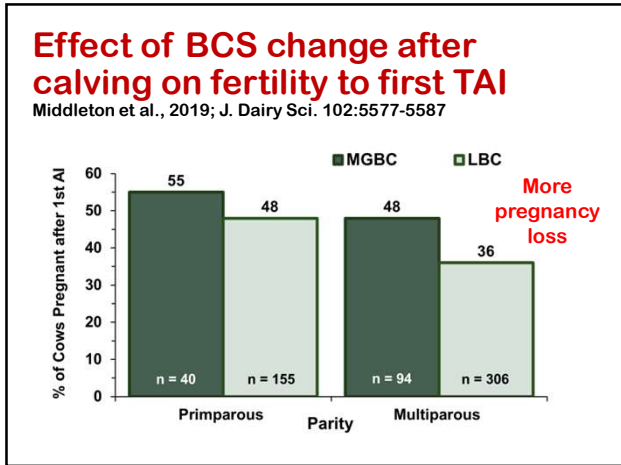
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J. Dairy Sci. 102:5577–5587
<https://doi.org/10.3168/jds.2018-15828>
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The high-fertility cycle: How timely pregnancies in one lactation may lead to less body condition loss, fewer health issues, greater fertility, and reduced early pregnancy losses in the next lactation

E. L. Middleton, T. Minela, and J. R. Pursley*
Department of Animal Science, Michigan State University, East Lansing 48824








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Re-think BCS targets

2001 BCS Recommendations:

Calving: 3.25 to 3.75
Early: 2.50 to 3.25
Mid: 2.75 to 3.25
Late: 3.00 to 3.50
Dry Off: 3.25 to 3.75

Too High!



12345

EmaciatedThinAverageFatObese

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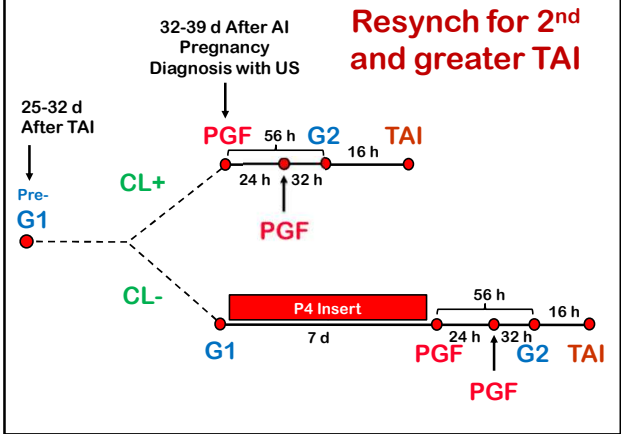
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Double-Ovsynch for first TAI

Sun	Mon	Tue	Wed	Thu	Fri	Sat
					GnRH	
					PGF	
	GnRH					
	GnRH					
	PGF	PGF	GnRH	TAI		

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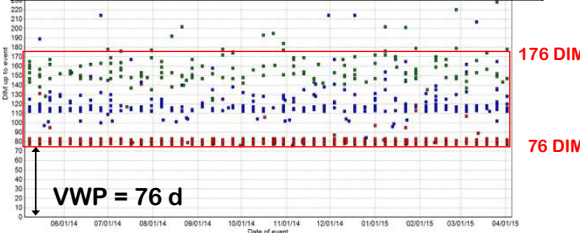
Resynch for 2nd and greater TAI



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TAI for First Three Inseminations

Parity	21-d Preg Rate	Service Rate	P/AI
All cows	31%	66%	50%
Primiparous	41%	70%	61%
Multiparous	29%	65%	47%



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BREDSUM By Times Bred
January, 2019 to January, 2020

	95% CI	%Conc	#Preg	#Open	Other	Abort	Total	%Tot	SPC
1 46-55	50	269	266	5	35	540	49	2.0	
2 47-58	53	153	137	4	13	294	27	1.9	
3 42-58	50	75	75	1	6	151	14	2.0	90% pregnant after 3 AI
4 34-57	46	31	37	1	2	69	6	2.2	
5 21-54	36	10	18	0	1	28	3	2.8	
6 -	62	10	6	0	0	16	1	1.6	
7 -	50	1	1	0	0	2	0	2.0	
8 -	100	1	0	0	0	1	0	1.0	
TOTALS	47-53	50	550	540	11	57	1101	100	2.0

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