Putting the Transition Period into Perspective

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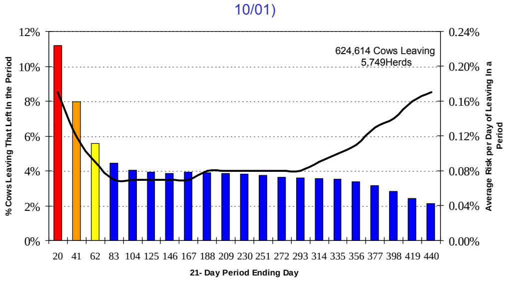
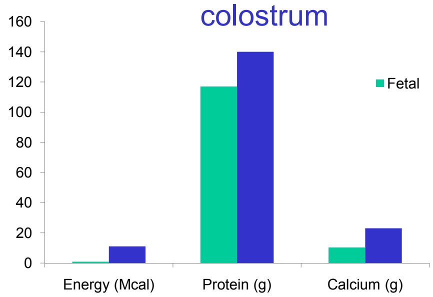
Beating a Dead Horse!

When Cows Leave Leave the Herd During a 5-Year Period in MN DHIA (10/96 – 10/01)



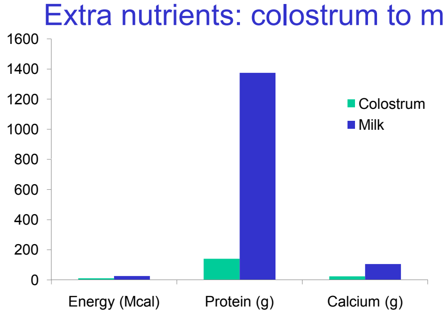
Source: 2002, Steve Stewart, DVM, Dipl.-ABVP, Univ. of Minnesota, College of Vet. Med.

Extra nutrients: pregnancy to colostrum



Daily fetal demands end of gestation vs colostrum of 22#

Extra nutrients: colostrum to milk



Colostrum production of 22# vs milk production of 65# on day 4

The Transition Period: The Final Frontier?

Drackley 1999 J Dairy Sci 82:2259

Percentage of cows by producer-identified health problems

Health problem	Incidence rate (% of cows)
Clinical mastitis	16.5
Lameness	14.0
Retained placenta	7.8
Dystocia, metritis	3.8
Milk fever	4.9
Displaced abomasum	3.5
Ketosis*	3.7

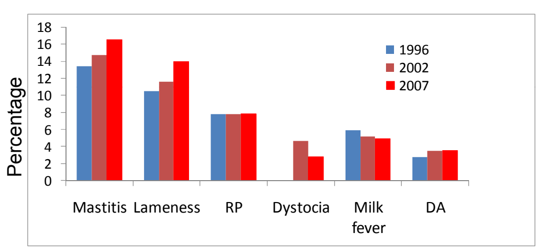
NAHMS, 2007 *From Jordan and Fourdraine, 1993

Percentage of cows without various health problems

Health problem	Incidence rate (% of cows)
Clinical mastitis	83.5
Lameness	86.0
Retained placenta	92.2
Dystocia, metritis	97.2
Milk fever	95.1
Displaced abomasum	96.5
Ketosis*	96.3

NAHMS, 2007 *From Jordan and Fourdraine, 1993

Change in health problems 1996 to 2007



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54.2%

NAHMS, 2007 *From Jordan and Fourdraine, 1993

Relationships to other health problems

- Milk fever
  - Ketosis: 23.6x
  - 3+dystocia: 7.2x
  - RP: 4x
  - Mastitis: 5.4x
- DA
  - Ketosis: 53.5x
- Dystocia
  - RP: 12x
  - Metritis: 4.9x
- RP
  - Ketosis:16.4x
  - Metritis: 5.7x

Curtis et al., 1985 J Dairy Sci
Gröhn et al., 1989 J Dairy Sci

Is energy balance important?

- Thought to affect reproductive program, herd health program and POSILAC response
- Negative energy balance associated with:
  - Peripartum disorders
  - Immunosuppression
  - Increased times to first ovulation

Species Differences

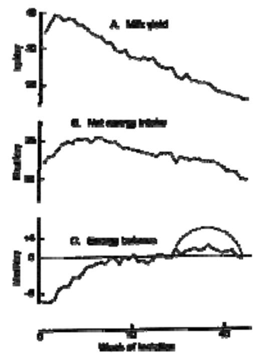
- Humans and rodents have minimal negative energy balance – few body reserves
- True seals, bears and baleen whales have prolonged period of negative energy balance – extensive reserves

Why Do They Do This?

As part of their reproductive strategy for thermoregulatory maintenance of offspring

- Seals – land or ice platform on which to stay out of water
- Bears – protected den and continual maternal contact
- Baleen whales – whales born with little blubber and move to warm but otherwise uninhabitable waters

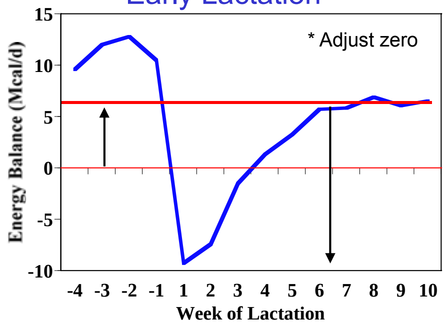
Oftedal, 1993



P. W. Moe Thesis (1965)
Cited by:

- Bauman & Currie, 1980, JDS
- Van Soest, 1982, In: Nutritional Ecology of the Ruminant

Energy Balance of Cows During Early Lactation



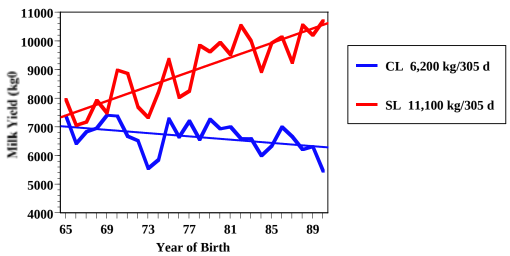
Simple Correlations Between Variables

	DMI	Milk yield	NEFA	BCS
EB	0.751 *<.0001*	0.051 *0.37*	-0.582 *<.0001*	-0.136 *0.017*
DMI		0.511 *<.0001*	-0.471 *<.0001*	-0.148 *0.009*
Milk yield			-0.297 *<.0001*	-0.327 *<.0001*
NEFA				0.258 *<.0001*

Does selection for more milk increase period of negative energy balance?

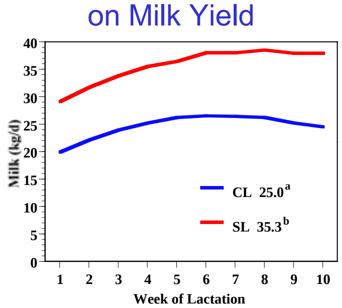
Dr. B. Crooker, Univ MN

Effect of Selected vs Control Cows on Milk Yield



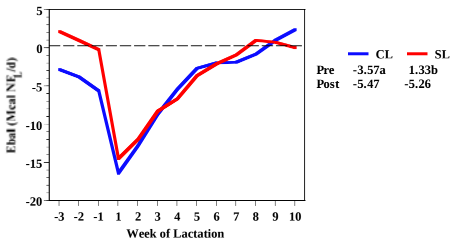
Weber & Crooker (1998) JDS 81 (Suppl. 1):378

Effect of Selected vs Control Cows on Milk Yield



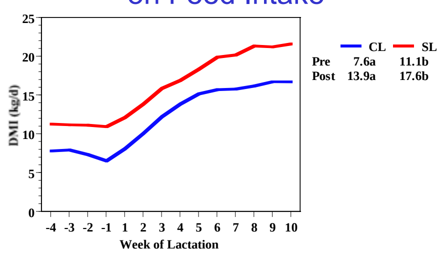
Weber & Crooker (1998) JDS 81 (Suppl. 1):378

Effect of Selected vs Control Cows on Energy Balance



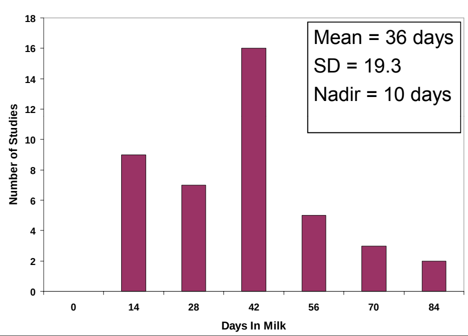
Weber & Crooker (1998) JDS 81 (Suppl. 1):378

Effect of Selected vs Control Cows on Feed Intake



Weber & Crooker (1998) JDS 81 (Suppl. 1):378

Summary of 42 Trials in 20 Published Studies Where Days to Positive Energy Balance Were Determined



Correlations Between Energy Balance and Health Traits

	Loco	Lam	Dig	Repro	Mast
EB10-100	-.16†	-.21*	-.10	.04	.02
EB10-50	-.15†	-.21*	-.08	.02	-.03
EB10-20	-.02	-.20	.04	-.04	.03
MinEB	-.20**	-.30**	-.17*	.04	.04
Days(-)	.15†	.20*	.28**	.04	-.05

†P<0.10; *P<0.05; **P<0.01

Collard et al. (2000) J Dairy Sci 83:2683

Correlations Between Energy Balance and Reproductive Traits

	# Insem	DTFH
EB10-100	0.11	-0.04
EB10-50	0.11	-0.08
EB10-20	0.10	-0.05
MinEB	0.09	0.05
Days(-)	0.04	-0.05

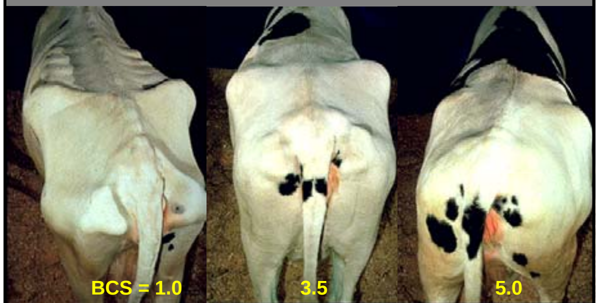
†P<0.10; *P<0.05; **P<0.01

Collard et al. (2000) J Dairy Sci 83:2683

Negative Energy Balance

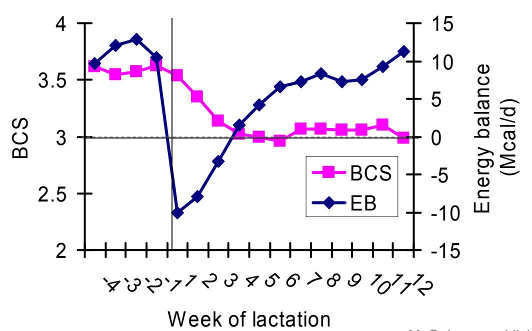
- Has little effect on immune system
- Is not related independently to effects on reproduction
  - Except time to nadir and ovulatory function
- Is associated with feet and leg problems and digestive problems

Which Cow is Thin?



Which Cow is in Negative Energy Balance?

Energy Balance versus Body Condition Score



McGuire, unpublished

Effect of BCS at dry off

	BCS		
Item	≤ 3.0	≥ 3.25	SEM
Milk, kg/d	42.9	41.2	0.9+
Days to 1st service	66.7	66.4	1.8
Days open	115	107	8
Services/conception	2.3	2.2	0.2

+P<0.12

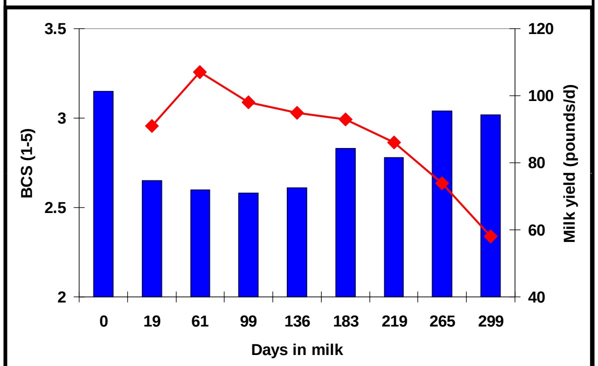
Contreras et al. JDS (2004) 87:517

Effect of BCS at dry off

	BCS	
Item	≤ 3.0	≥ 3.25
Ketosis	1.6	2.7
Metritis	1.1	0.0
RP	9.3	18.2
DA	2.2	1.8
Milk fever	2.7	4.5
Mastitis	5.5	5.5
Pneumonia	3.3	0.9

Contreras et al. JDS (2004) 87:517

Commercial Herd in Washington

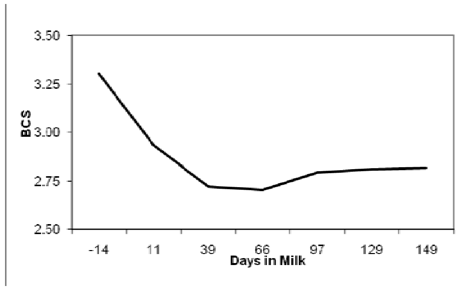


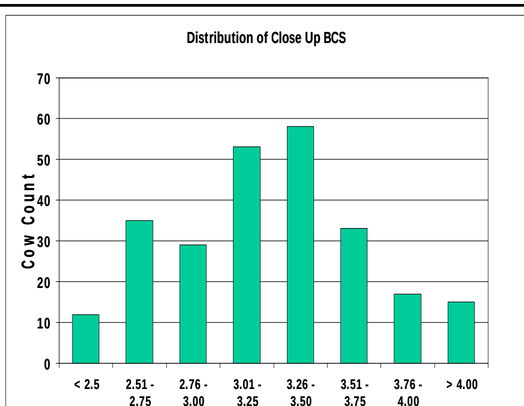
Theurer and McGuire, unpublished

Relationship between BCS and Production

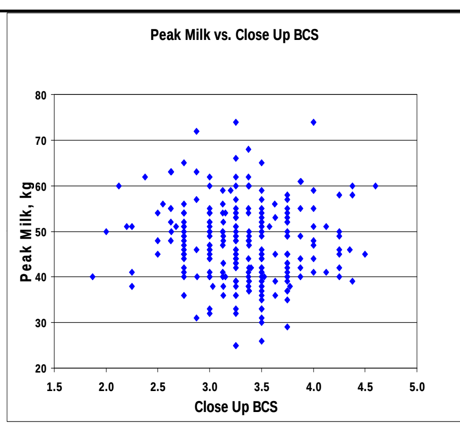
- 3 commercial herds in central Washington
- 252 cows
  - 27% 1st, 37% 2nd, and 36% 3rd or greater lactation
- BCS determined by 2 independent evaluators monthly starting 2 wk prepartum through 150 days in milk
- Milk yield and reproductive data from farm records (Dairy Comp 305)

Body condition score in dairy herds





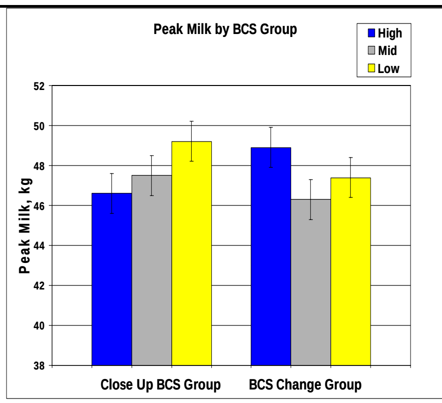
Theurer and McGuire, unpublished



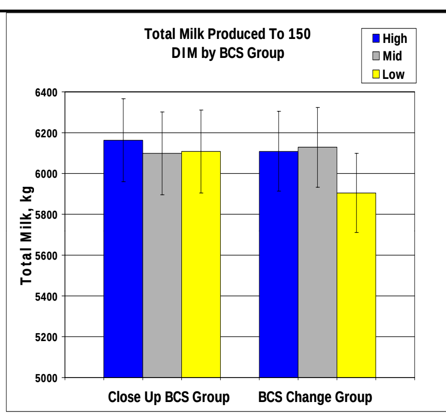
Theurer and McGuire, unpublished

Relationships between BCS and Production

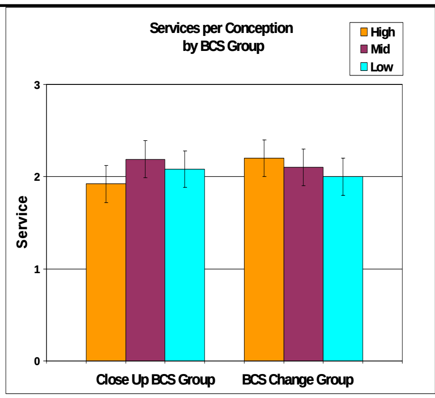
BCS Group	Close Up BCS	Change in BCS
High	> 3.5 (*n* = 65)	> 0.75 (*n* = 91)
Mid	3.0 to 3.5 (*n* = 110)	0.5 to 0.75 (*n* = 73)
Low	≤ 3.0 (*n* = 77)	≤ 0.5 (*n* = 88)



Theurer and McGuire, unpublished



Theurer and McGuire, unpublished



Theurer and McGuire, unpublished

Conclusions

- The rate of clinical transition problems are declining.
  - Some suggest subclinical are even more important.
- Energy balance is reached before breeding starts.
- Single body condition scores are not predictive of energy balance and multiple scores have considerable lag.

Conclusions

- Cows can use body reserves to supplement energy needs without a significant cost to productivity.
- DMI is THE critical factor in minimizing duration of negative energy balance.
- Selection for milk production results in cows that partition more nutrients to milk.