

Trends in Dairy Calf Nutrition

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LAND O LAKES
ANIMAL MILK PRODUCTS CO.

Our objective: **Do what's right for the calf** by continuing to lead the industry towards improving the health, performance and profitability of raising calves and heifers.



Special Thanks to:

Dr. Mike Van Amburgh (Cornell)

Dr. Don Sockett (Wisconsin Veterinary Diagnostic Lab)

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CURRENT CALF MILK REPLACER RESEARCH EFFORT

- ❖ Moderate Health
 - ❖ 24 Trials per Year
 - ❖ 6 Groups
 - ❖ 1668 Calves
- ❖ High Health
 - ❖ 3-5 Trials per Year
 - ❖ 300+ Calves
 - ❖ Heifers & Bulls





- ### Past Goals
- ❖ Keep them alive
 - ❖ Minimize Treated Calves
 - ❖ Get them to weaning as fast as possible
 - ❖ Growth???

- ### Improving Calf Health
- ❖ Reduce Failure of Passive Transfer (FPT): Gram negative sepsis
 - ❖ Does fixing this stop all calf health issues?
 - ❖ Why Not?

- ### Improving Calf Health
- ❖ Higher plane of nutrition at right temp.
 - ❖ Consistent milk/milk replacer
 - ❖ High quality water
 - ❖ Free Choice & mixing
 - ❖ Electrolytes
 - ❖ Cleaning water

Improving Calf Health

- ❖ Proper Cleaning & Sanitation
 - ❖ Anything that touches calf - especially hands & feet of people
 - ❖ Chlorine dioxide - breaks down biofilms & kills crypto
- ❖ Dry, Well Ventilated Calf Housing
 - ❖ Better options for people & calf

What is a Higher Plane of Nutrition?

❖ Is this enough? **Temperature °F** **32**

100 lb. Bodyweight

Dry Matter	1.5
Qts/day	6.0
Qts/fdg (2X)	3.0
Qts/fdg (3X)	2.0
Qts./fdg (2X) at 15% Solids	2.3

Other than Temperature - What Else Impacts Energy & Protein Needs?

- ❖ Short of bedding one day
- ❖ Out of grain/water for a short time
- ❖ Changes in weather
- ❖ Scours - even minor cases
- ❖ Respiratory disease - even minor cases
- ❖ Moderate infections increase energetic needs by 150 to 200%

* Lochmiller, R. L. and Deerenberg, C. 2000. Trade-offs in evolutionary immunology: just what is the cost of immunity? - Oikos 88: 87-98.

Rate of Gain at Different Stress (scours, draft, poor bedding, etc.) Levels.

Assumptions

Temperature °F

100 lb. Bodyweight	Temperature °F	Rate Of Gain		
		No Add'l Stress	Low level of Added Stress	Moderate Added Stress
Dry Matter	1.5			
Qts/day	6.0			
Qts./fdg (2X)	3.0	Maintenance		
Qts./fdg (3X)	2.0	Needs Increase	0%	25%
Qts./fdg (2X) at 15% Solids	2.3	Daily Gain Lb.	0.68	0.14
				Wt. Loss

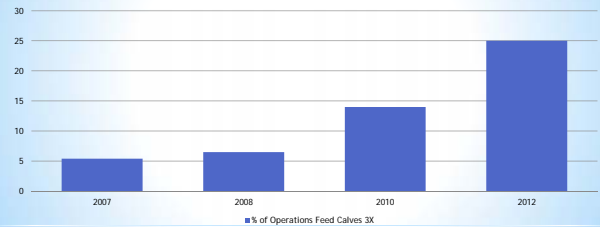
And this is with what appears to be a "good" plane of nutrition!!!

So should I just add Fat?

- ❖ Typically added fats are 7% protein and 60% fat
 - ❖ It is not a balanced diet!
 - ❖ Will quickly be short of protein
 - ❖ Shorter, fatter calves - poorer feed efficiency
 - ❖ Fat adds to total solids, causes mixing and cleaning problems
 - ❖ Fat is not quickly nor efficiently utilized by the calf!
 - ❖ Fat above 20% of diet dry matter hinders starter intake
- ❖ Best option is to feed more milk/milk replacer!!

Feeding 3X Daily

% of Operations Feed Calves 3X



❖ Coincidence or trend? Trying to do what is best for the calf!

- ❖ 2007 - DCHA data 5.4%
- ❖ 2008 - Personal research - 6.5%
- ❖ 2010 - EP research - 14%
- ❖ 2012 - DMM - 25% + 36% Considering

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Consider an automated calf feeding system?

- ❖ An efficient tool for delivering a higher plane of nutrition
- ❖ Land O'Lakes has 7 years of research on the feeders (>2100 calves)



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Body Condition

Evaluate energy reserves "fat storage".



Good

Body Condition

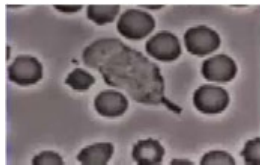


Poor

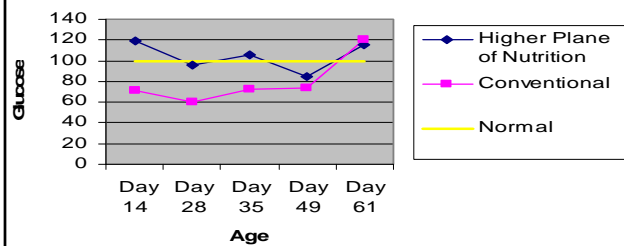
Ever heard someone say
"Look at my skinny baby!"

Fowler 2004

Phagocytosis



Serum Glucose mg/dL



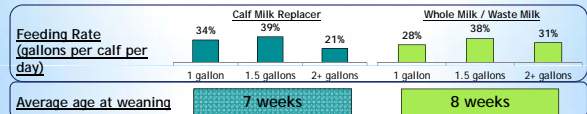
Ballou et al. 2015

❖ “These data also indicate that the innate leukocytes of Jersey calves fed a higher plane of nutrition are increased more rapidly after an oral challenge with a *Salmonella typhimurium*. The more active innate leukocyte responses likely reduced the incidence of systemic inflammation.”

Profiling CMR Users vs. Pasteurizer Users (all with 100+ calves)

▪ Compared to CMR Users, Pasteurizer Users are larger, use a higher feeding rate, and wean later.

# Calves Raised Annually	Calf Milk Replacer Users (n=294)	Pasteurizer Users (n=99)
Heifer Calves	Mean = 341 / Median=150	Mean=765 / Median=350
Bull Calves Raised for Beef	Mean = 116 / Median=50	Mean=172 / Median=25



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ADSA Full Potential

❖ Abstract 24 Brown at Guelph 8 better (19.6# bigger at 70 days) than 6 week weaning when feeding 2.6 lb/d CMR

❖ Abstract 619 Hammon German/Slovakia Title: Intensive milk feeding (vs. 1.65# CMR) in calves affects growth performance, metabolic and endocrine traits, but not rumen development. Better growth, no diff in starter intake.

Milk Yield Response to Increased Pre-weaning Milk or Milk Replacer Nutrient Supply

Study	Milk yield, lb
Foldager and Krohn, 1991	3,092 ¹
Bar-Peled et al., 1998	998 ¹
Foldager et al., 1997	1,143 ¹
Ballard et al., 2005 (@ 200 DIM)	1,543 ¹
Shamay et al., 2005	2,162 ¹
Rincker et al., 2006 (proj. 305@ 150 DIM)	1,100 ^{ns}
Drackley et al., 2007	1,841 ¹
Raith-Knight et al., 2009	1,582 ^{ns}
Terre et al., 2009	1,375 ^{ns}
Morrison et al., 2009	0 ^{ns}
Moallem et al., 2010	1,800 ¹
Soberon et al., 2011	1,216 ¹

Milk response is the difference between treatment milk yield minus control
¹ P < 0.05, ^{ns} P < 0.1, ^{ns} P > 0.1

Soberon & Van Amburgh 2013, JAS 91:706-712

Impact on Milk Production

- ❖ 11/12 University Trials show improved milk production (1000 to 3000 lb. more milk in 1st lactation) by providing a higher plane of nutrition in the first 8 weeks of life of the heifer.
- ❖ New Data:
 - ❖ Daniels LACTATION BIOLOGY SYMPOSIUM The long-term impact of epigenetics and maternal influence on the neonate through milk-borne factors and nutrient status 2013 JAS 91 673-675
 - ❖ Soberon LACTATION BIO SYM The effect of nutrient intake from milk or milk replacer of dairy calves on lactation milk yield as adults - A meta-analysis of current data 2013 JAS 91 706-712
 - ❖ Margerison The effect of increasing the nutrient and amino acid concentration on intake, growth, development, and lactation performance 2013 JDS 96 96 6539-6549
 - ❖ Piantoni Daniels Level of nutrient intake affects mammary gland gene expression profiles in preweaned calves 2012 JDS 95-2550-2561

Economic Comparison of Conventional vs. Intensive Heifer Rearing Systems (with new higher feed prices, \$175 calf, 7% interest, \$18 milk)

Michael Overton, DVM,

MPVM



The University of Georgia

Elanco
KNOWLEDGE
SOLUTIONS



Denise Rich - thecharlist.com

Michael Overton, DVM, MPVM 2013

Summary of Results

Based on the current assumptions used in this model:

		Advantage
Feed costs	(\$61)	Conventional
Labor costs	\$29	Intensive
Health/ vet med	\$11	Intensive
Interest cost	\$10	Intensive
Reproductive culls	\$10	Intensive
Other costs	\$33	Intensive
Lost investment (dead calves)	\$12	Intensive
Calf investment cost	\$4	Intensive
Net Result - Savings:	\$47	Intensive

- Add in value of additional milk in 1st lactation of \$152 and the average advantage for **Intensive Rearing ~ \$199**

That's All Fine But...

- ❖ How do I get it done?
- ❖ What about the cost??



Will Future Milk Replacers be all-milk Protein?

- ❖ Not likely but will perform as good or better than all-milks at significantly lower cost!
- ❖ Will use less alternatives than they have in the past.
- ❖ Ask for the research!

CT 02-13, 11-13, 17-13, 05-14 & 08-14a

	Full Potential	Full Potential Protein Blend	P Value
Number Calves	142	141	
Avg. Period Gain, lbs.			
Week 1	5.78	5.23	-
Week 2	13.23	13.12	-
Week 3	12.30	12.95	-
Week 4	12.63	12.68	-
Week 5	12.40	12.81	-
Week 6	14.96	14.86	-
Week 7	11.63	12.87	0.08
Total Gain	82.93	84.52	-

The Effects of Supplementing Two Pasteurized Milk Balancer Products to Pasteurized Whole Milk on the Health and Growth of Dairy Calves

ADSA 2014 Abs. 336

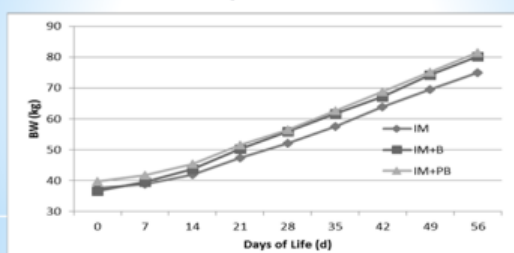
K. Glosson¹, B. Hopkins¹, S. Washburn¹, S. Davidson¹, G. Smith¹, T. Earleywine², and C. Ma¹

¹North Carolina State University, Raleigh
²Land O'Lakes Animal Milk Products, St. Paul, MN.



NC STATE UNIVERSITY

Figure 2. BW through the preweaning period



NC STATE UNIVERSITY

“Calves receiving supplemental **milk balancer products resulted in greater growth rates** with similar overall calf health. The similarity of calves receiving either of the two supplemental balancers in all growth measurements analyzed, combined with similar health data, indicates that there were **no adverse effects when using the more economical protein blend balancer** alternative over the all-milk balancer product.”



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What is this New Formulation System -Protein Blend?

- ❖ Utilizes a similar approach as is used in baby formulas
- ❖ Based on a blend of highly digestible proteins that complement each other

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Why Does it Work?

- WELL RESEARCHED!
- Still include technologies we always have such as;
 - Beta glucan – for immunity
 - FOS – for proper gut microbial growth
 - MOS – gut protection
 - Many other technologies – fatty acid formulation, etc.
- We make formulation adjustments to assure performance

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Summary - Trends

- Feeding More!
 - Calves need nearly 2 gallons of milk/milk replacer daily in 2 to 3 feedings to survive and thrive
- New Formulation Options of milk replacers.
 - need to be well researched
 - These options are the future of milk replacer

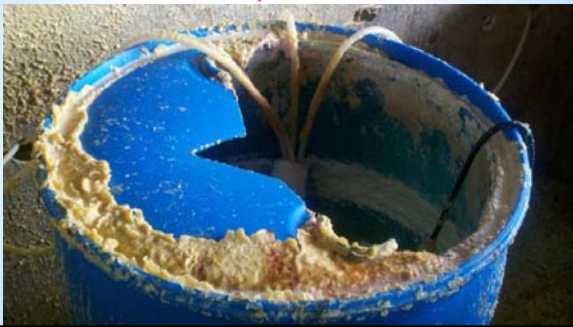
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Summary - Trends

- Water Quality Analyses
- Cleaning & Sanitation Protocols
- Enhancing Pasteurized Milk Nutrition with Powder/Technologies
- Better Housing Options

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He had balanced nutrition & perfect ventilation, however...



Do what's right for the calf by continuing to lead the industry towards improving the health, performance and profitability of raising calves and heifers.



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Thank You!



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