



**Reproduction starts with
MEGALAC-R®**

**Omega-3 & Omega-6
Essential Fatty Acids**

MEGALAC®-R
MEGA REPRODUCTION

Discussion Today

- Omega-3 & Omega-6 Essential Fatty Acids (EFAs) (linolenic & linoleic) supplementation
- MEGALAC-R[®] research
- New data from University of Arizona
- Using MEGALAC-R as a management tool



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What is MEGALAC-R?

- MEGALAC-R:
 - A concentrated energy source
 - Contains the two EFAs, Omega-3 and Omega-6
 - Crucial to production of reproductive hormones

For improved reproduction!



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Essential Fatty Acids—EFAs

- EFAs are essential to all biological functions
- Cows cannot naturally produce EFAs—must get them from diet
- Omega-3 and Omega-6 EFAs are crucial for reproduction

**MEGALAC-R has the highest levels
of *both* Omega-3 and Omega-6**



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Building Blocks of Repro

- **Omega-3 (18:3 linolenic)**
 - Aids production of prostaglandins
 - Fosters embryonic survival
 - Balances function of Omega-6
- **Omega-6 (18:2 linoleic)**
 - Aids production of prostaglandins
 - Promotes ovulation and sperm capacitation
 - Aids oviduct contraction
 - Maintains embryo implantation



Sources of EFAs

Roasted soybeans,
whole cottonseed, flaxseed

Breaks down
in rumen
(biohydrogenates)

Most do not reach
the intestine
for absorption

Calcium salts
of fish oils
(DHA & EPA)

Have been shown to
reduce feed intake,
milk production and
components

Calcium salts of
EFAs (Omega-3
and Omega-6)

The only EFAs
proven in research
to improve
reproduction

MEGALAC-R



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How Much Omega-6?

- Cows secrete 64g Omega-6 per day in milk

100 lbs/day @ 3.5% fat and 4% Omega-6 =
0.14 lbs/day Omega-6 (64g/day)

- Since other cells in the body are being replaced, additional Omega-6 is required



Omega-6 from Typical Diets?

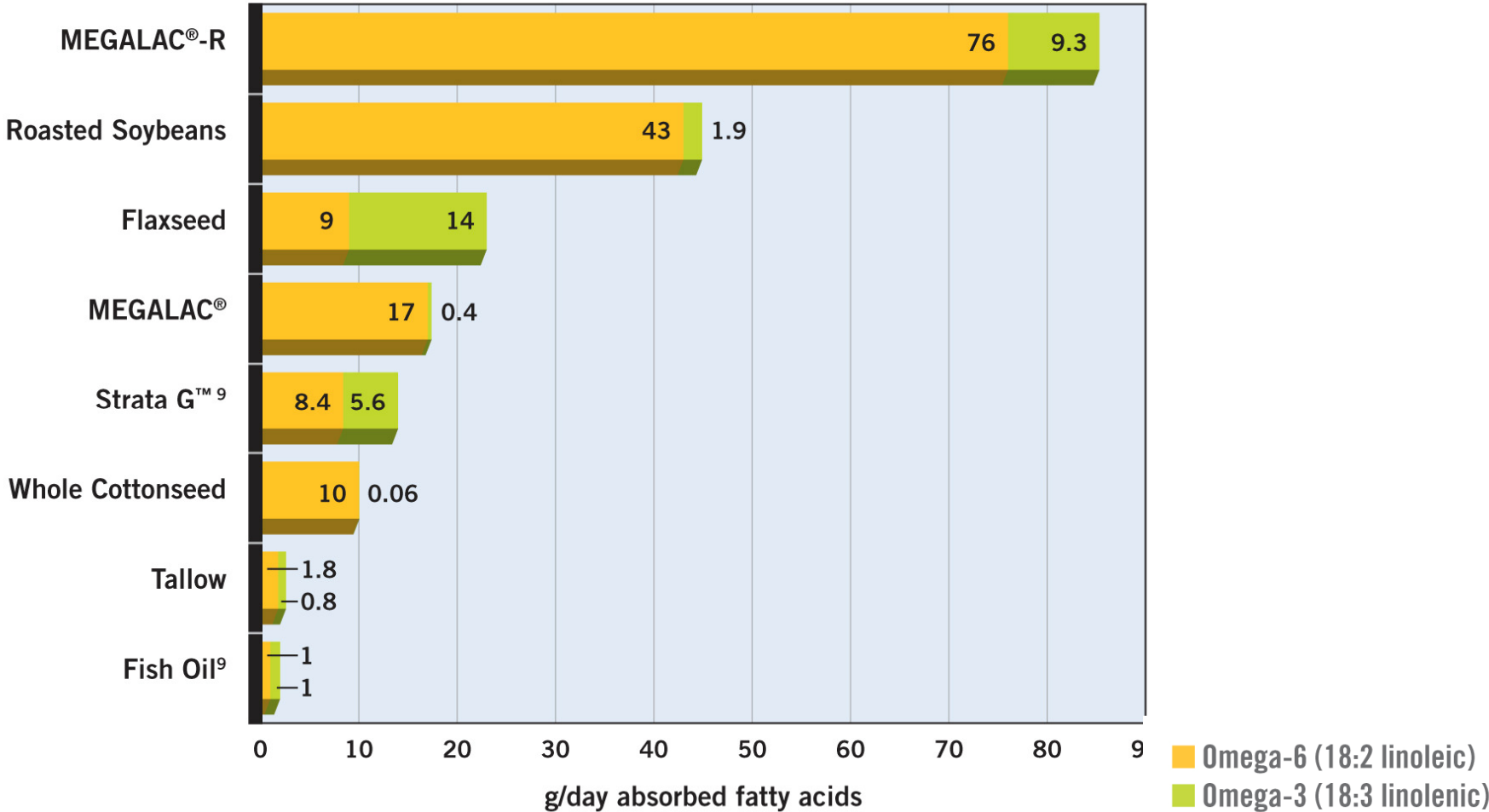
Using the CPM fat sub-model simulating 12 rations:

- DMI ranging from 48.5 to 63.9 lbs/day
- Ingredients:
 - Alfalfa, Corn Silage (30:70 to 70:30)
 - SBM (2.2 – 7.7 lbs/day)
 - Corn (13.2 – 19.8 lbs/day)
 - Fish meal (0 – 2.2 lbs/day)
 - MEGALAC (0 – 2.2 lbs/day)
- Duodenal appearance of Omega-6 ranged from 39 to 63 g/day vs. 64 g/day secreted

Even with high intakes, she can't get enough Omega-6



Sources of Omega-3 & -6



Exploratory Research

- Comparing calcium salts of Omega-3 & Omega-6 to fish oil calcium salts and to nonessential fatty acids:
 - **Only Omega-3 & Omega-6**
 - Increased prostaglandin receptors in uterus and on ovaries
 - Kept progesterone levels high through the end of the cycle

Staples and Thatcher. 2002. J. Dairy Sci.



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Better Reproduction Performance

- Four trials including more than 5,000 cows
 - Cumulative pregnancies **increased up to 19.1%**
 - When MEGALAC-R was removed from the ration, the number of pregnancies dropped by as much as 25%

Study	Control	MEGALAC-R
Trial #1 – MEGALAC-R pre and post vs MEGALAC		
Number of animals enrolled (bred)	552	591
Number pregnant by 120 DIM	196	250
Trial #2 – MEGALAC-R pre and post vs. Tallow post		
Number of animals enrolled (bred)	1268	1285
Number pregnant by 150 DIM	794	852

Study	Control	MEGALAC-R
Trial #3 – MEGALAC-R post vs. MEGALAC		
Number of animals enrolled (bred)	287	332
Number pregnant by 180 DIM	203	240
Trial #4 – MEGALAC-R pre and post vs. Tallow post		
Number of animals enrolled (bred)	403	427
Number pregnant by 170 DIM	205	221



Improved Reproduction and More

Improved Reproductive Success

- Earlier cycles and larger, higher-quality embryos
- Enhances visible signs of heat
- Improves uterine health and pregnancy maintenance

More Cows Pregnant

- More cows pregnant by 126 DIM
- Cumulative pregnancy improved by up to 19%
- 21-day pregnancy rate increased by up to 5 points



U of AZ Reproductive Trial #1

Herd Profile:

- Commercial dairy, Coolidge, AZ
- Herd size = 2,003 cows
- Milk = 21,771 lb/cow/lactation
- Milk = 75.9 lb/day
- First service = 75 DIM
- Services per conception = 2.6
- Days open = 152



Typical, high production commercial Arizona dairy



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U of AZ Reproductive Trial #1

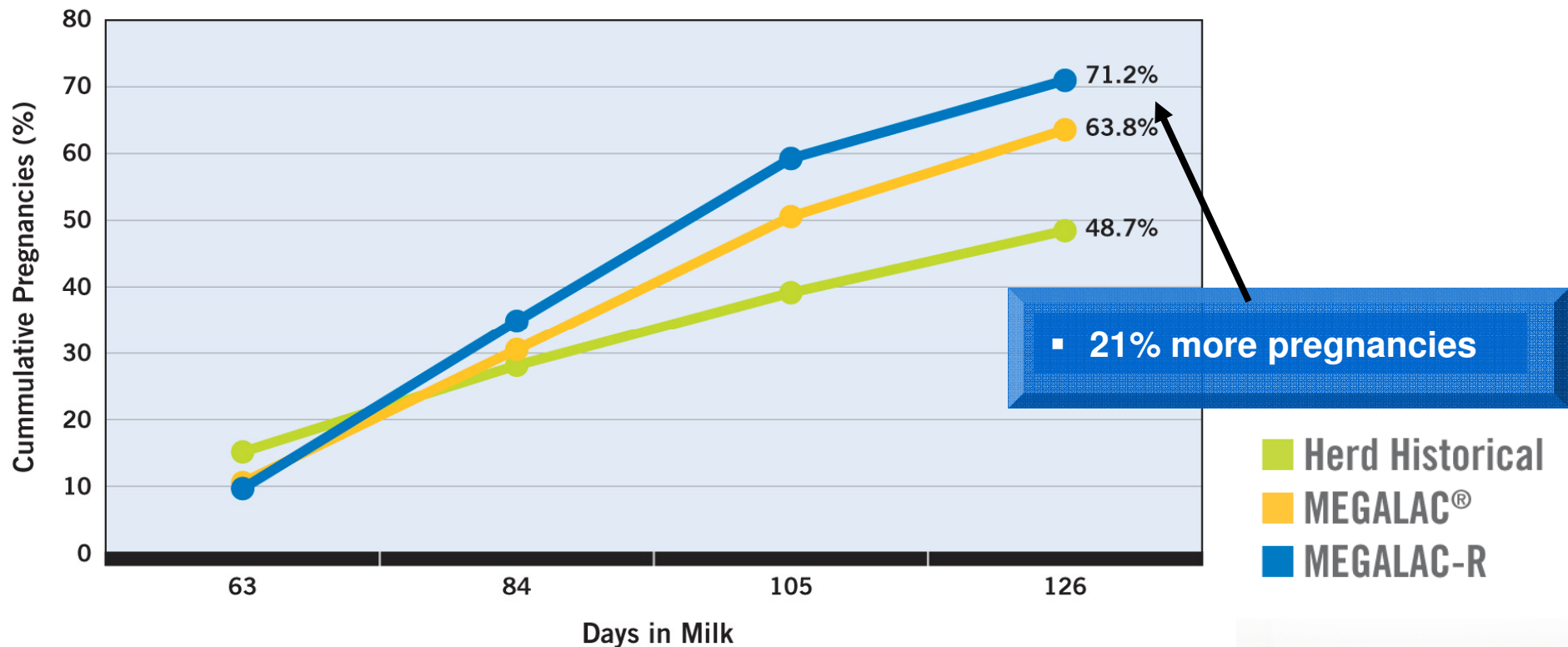
Ration:

- 21 days prepartum
 - All cows fed 0.25 lb/d MEGALAC
- Parturition to 150DIM
 - Cows fed either 0.35 lb/d of MEGALAC or MEGALAC-R
 - Rations balanced to equalize caloric intakes at energy level stipulated by the nutritionist



Better Reproductive Performance

- Cows fed MEGALAC-R show higher cumulative pregnancies



% Ovulations by 30 DIM

- MEGALAC-R fed cows resumed cyclicity earlier postpartum

	Control	MEGALAC [®] -R	Chi-square
Ovulations by 30DIM	17/63	28/57	
% Ovulations	27^a	49^b	10.31 ($P \leq 0.005$)
Mean DIM at ultrasound	24.9	24.0	

▪ 81% more ovulations

^{a,b} significantly different



Number of Estrous Cycles by 60 DIM

	Control n=18	MEGALAC-R n=17	P-value
Overall [P] (ng/ml)	7.4	6.2	≤ 0.195 (NS)
Number of Cycles	2.0	2.76	≤ 0.031
Range in number cycles	0 – 3	1 – 5	
95 % C.I. for number cycles	1.52 - 2.48	2.27 - 3.26	

▪ 38% more estrus cycles



-Jones et al. (2006, M.S. Thesis)

Cows Treated with Prostaglandin

Trait	Control	MEGALAC-R
Number treated 1 st case	421/1312	186/708
% treated 1st case	32.1^a	26.3^b
Number retreated	90/421	19/186
% retreated	21.4^a	10.2^b
Total treatments	511/1312	205/708
Total % treatments	38.9^a	29.0^b

a,b significantly different $P < .01$

Jones et al. (2006, M.S. Thesis)

- 50% Fewer Retreatments
- 25% Improvement Overall



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Health Benefits

Cows fed MEGALAC-R also experienced significant health benefits:

- Fewer post calving disorders
- Fewer DAs
- Fewer milk fevers
- Fewer abortions

Event	No. of Head		% Difference
	Control ¹⁴	MEGALAC-R	
Milk Fever	15	6	-60%
DAs	44	31	-29.5%



More Than Reproduction

- Better overall immune function
- Reduces metabolic disorders
- No milk fat depression
- Maintains milk production and milk quality



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U of AZ Reproductive Trial #2

- Large commercial Arizona dairy
- Study Conducted 8/01/2007 to 10/15/2007
- Multiparous Holstein cows were randomly sorted into two groups and fed either control (MEGALAC) or treatment (MEGALAC-R) diet:

	Supplemental inert fat feeding rate	
	Control	MEGALAC-R
21 day prepartum (cow/day)	.25 lbs.	.25 lbs.
Postpartum (cow/day)	.5 lbs.	.5 lbs.

- Diets fed 14 days prepartum through 60 DIM (twice daily)



Improved Uterine Health

Ration	Endometritis ^a		Normal		Total	<i>P</i> = ^b
	N	%	N	%		
CONTROL	14	56	11	44	25	0.005
MEGALAC-R	5	18.5	22	81.5	27	

^a Slides with a ratio of 15 percent or greater polymorphonuclear leucocytes to uterine somatic cells were predetermined to be indicative of uterine infection.

^b As determined by Chi Square analysis.

* Samples obtained through transcervical uterine cytological swab, transferred to glass slides, fixed in methanol, prepared with Giemsa staining and read at 40X magnification by stereo microscopy.



Ovarian Activity

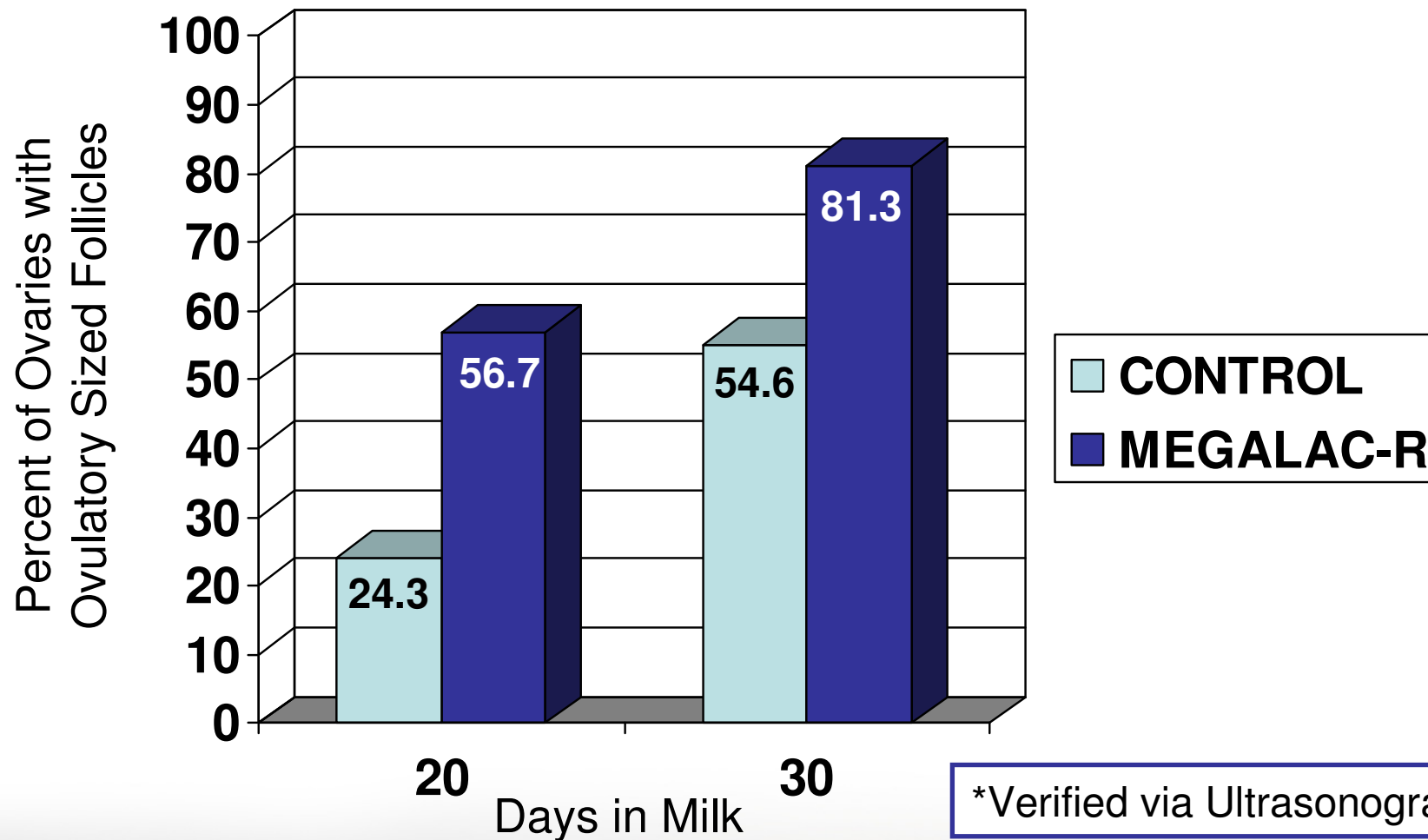
Ovarian Activity: Category 3 Ovaries

- 30 DIM:
 - CONTROL: 24.3%
 - MEGALAC-R: 56.7%
 - ($P=.0314$)
- 60 DIM:
 - CONTROL: 54.6%
 - MEGALAC-R: 81.3%
 - ($P=.2546$, not significant)

Both groups were cycling at the same rate by 60 DIM, but the MEGALAC-R group cycled earlier & showed more cycles prior to the end of the VWP (60 DIM).



Ovarian Activity by 30 DIM*



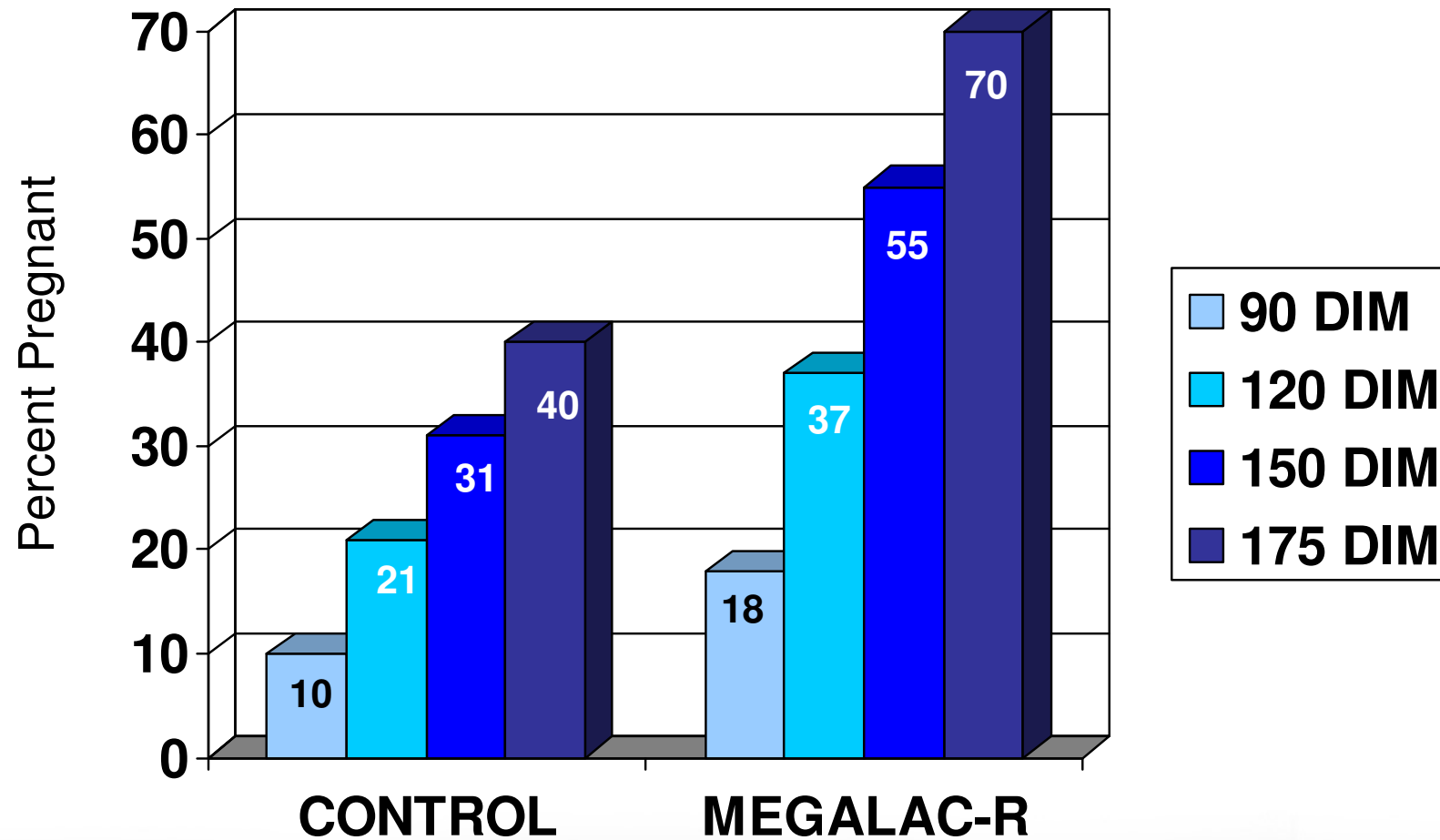
Improved Reproductive Efficiency

	Treatment in relation to average days open, days to first service and services per conception	
Measurement	Control	MEGALAC-R
Days to first service	79.1 ^a	72.7 ^b
Services per conception	2.8 ^a	2.1 ^b
Days open	117.3 ^a	101.0 ^b

^{a,b} Superscripts differing within row indicate significant difference ($P < 0.05$).



Cumulative Pregnancies by Treatment & DIM



Economic Benefits

U of AZ test herd experienced significantly improved profitability

- Comparing the MEGALAC-R group to the Control group:

	MEGALAC-R
Increased pregnancy rate by 2% based on .75 more cycles by 60 DIM	+ \$70.00
Minus additional feed costs (MEGALAC-R vs. MEGALAC®)	- \$7.87
Add in benefit of less metritis	+ \$24.89
MEGALAC-R additional profit per cow per year	\$87.02

Based on U of AZ Trial #1

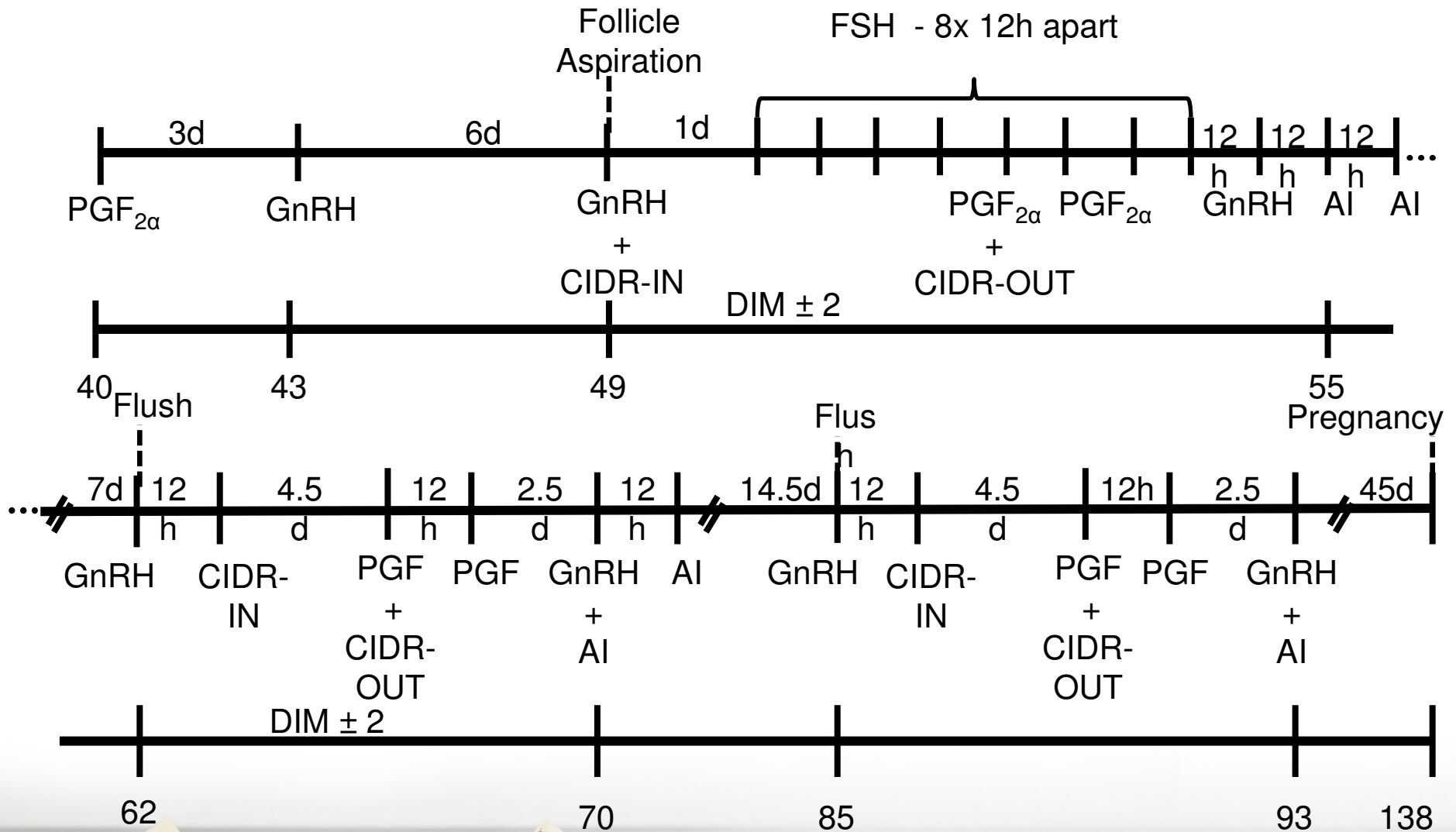


MEGALAC-R Florida – Cows

- Protocol
 - 76 cows (23 primi- and 53 multi-parous) assigned treatment at 60 d prepartum
 - Treatment feedings began at 21 d prepartum
 - **CONTROL (no added fat) n= 26**
 - **SFA (saturated fatty acids as EB100) n=25**
 - **EFA (Essential fatty acids as MEGALAC-R) n=25**
 - Both fat fed groups were fed 1.7% added fatty acids pre-and 2% added fatty acids post-partum (% of Total DM)



Cows were under a microscope



PRODUCTION PERFORMANCE

	Treatment			Differences		
	Control	SFA	EFA	SFA - Con	EFA-Con	EFA - SFA
Milk, kg/d	31.7	31.8	34.1	0.1	2.4	2.3
3.5% FCM ² , kg/d	32.6	30.8	32.8	-1.8	0.2	2
ECM, ² kg/d	31.4	29.9	32	-1.5	0.6	2.1
SCM, ² kg/d	28.9	27.4	29.2	-1.5	0.3	1.8
Milk fat						
%	3.75	3.34	3.32	-0.41	-0.43	-0.02
Yield, kg/d	1.16	1.05	1.11	-0.11	-0.05	0.06
Milk true protein						
%	2.81	2.77	2.8	-0.04	-0.01	0.03
Yield, kg/d	0.87	0.87	0.94	0	0.07	0.07



INTAKE AND EFFICIENCY

	Treatment			Differences		
	Control	SFA	EFA	SFA - Con	EFA-Con	EFA - SFA
DMI, kg/d	18	19.3	18.1	1.3	0.1	-1.2
FE (milk/DMI)	1.83	1.7	1.95	-0.13	0.12	0.25
FE (ECM/DMI)	1.74	1.55	1.77	-0.20	0.02	0.22
FE (SCM/DMI)	1.61	1.42	1.61	-0.19	0.01	0.19
BWC, kg/d	-0.89	-0.63	-0.69	0.26	0.2	-0.06
BCS (1 to 5)	3.11	3.19	3.17	0.08	0.06	-0.02



Health and Reproduction Indicators

	Treatment			Differences		
	Control	SFA	EFA	SFA - Con	EFA-Con	EFA - SFA
	%					
Retained placenta	3.9	16	0	12.1	-3.9	-16
Fever, (>39.5 at 4, 7, and 12 DIM)	11.5	6.8	2.7	-4.7	-8.8	-4.1
Clinical Endometritis	53.9	56	44	2.1	-9.9	-12
Pregnant 1 st AI	44	36	54.2	-8	10.2	18.2



MEGALAC-R Feeding Rates

- Three weeks prepartum at .25 lbs. to .5 lbs. per day
- Postpartum through confirmed pregnancy at .75 lbs. to 1 lb. per day

Consult with your nutritional advisor to incorporate MEGALAC-R into your pre- and postfresh rations.



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