

Research Bulletin

Arm & Hammer Animal Nutrition

Cows fed MEGALAC®-R saw improved ovarian activity, reduced incidence of clinical and subclinical endometritis, and increased cumulative pregnancies

A research review generated from a controlled study by the University of Arizona: The Effects of Dietary Linoleic and Linolenic Acids on Reproductive Performance in Holstein Cows

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KEY POINTS

- Cows supplemented with MEGALAC-R resumed cyclicity earlier postpartum and experienced fewer instances of clinical and subclinical endometritis and other uterine abnormalities compared to cows fed MEGALAC.®
- Positive reproductive outcomes following MEGALAC-R supplementation included fewer days to first service, lower services per conception and fewer days open.
- More importantly, cumulative pregnancies were higher by 30 percentage points through 175 days in milk compared to cows fed MEGALAC.

INTRODUCTION

Nutrition is believed to have a significant impact on reproductive performance, although the precise mechanisms are not yet fully understood. However, research continues to prove essential fatty acids (EFAs) have a positive impact on reproductive performance when adequately and properly supplied to the cow.

Essential Fatty Acid Function

EFAs perform several significant biological functions that impact reproduction, including:

- Influencing normal cellular functions
- Alleviating postpartum negative energy balance
- Serving as precursors to eicosanoids and steroid hormones, both of which play key roles in reproductive and immune function
- Aiding in the stimulation and/or inhibition of other reproductive hormones

Because cows can not produce EFAs on their own, they must be supplied in the diet. Studies¹ have shown that feedstuffs high in linoleic and linolenic acids are

biohydrogenated in the rumen, rendering them into nonessential fatty acids. To overcome biohydrogenation, EFAs must bypass the rumen and target the small intestine, which can be accomplished by feeding ruminally inert fats, such as MEGALAC and MEGALAC-R.

Essential Fatty Acids Review

A 2006 University of Arizona study² confirmed the effectiveness of MEGALAC-R in improving reproduction with:

- More ovulatory cycles by 60 DIM
- Fewer uterine abnormalities and infections
- Earlier resumption of cyclicity by 30 DIM
- Improved cumulative pregnancies by 7.4 percent at 126 DIM

This research summary focuses on a more recent University of Arizona study which was designed to reinforce earlier findings while focusing specifically on ovarian size and function, uterine health and reproductive efficiency.

STUDY OVERVIEW

Holstein cows were fed either a control (MEGALAC) or treatment (MEGALAC-R) diet 21 days prepartum through 60 DIM. Both pre- and postpartum diets were identical with the exception of the supplemental inert fat source (MEGALAC or MEGALAC-R). Cows were blocked for parity and previous milk production, or by PTA for heifers, and randomly assigned to the control or treatment group.

Cows were fed twice daily and milked 2X/d for the complete lactation.

Feeding Ratio and Ration Formulation

Prepartum, both control and treatment cows were fed the appropriate supplemental inert fat at a rate of 0.114 kg/d (.25 lb./d). Postpartum, both groups were fed 0.226 kg/d (.5 lb./d) of the properly assigned bypass fat (as reflected in Table 1). At 60 DIM cows were removed from both treatments and commingled in a breeding pen. Cows were bred off of observed heats by the herdsmen.

TABLE 1	Supplemental inert fat feeding rate	
	Control	MEGALAC-R
21 day prepartum (cow/day)	.25 lbs.	.25 lbs.
Postpartum (cow/day)	.5 lbs.	.5 lbs.

Ovarian Activity

The study collected ovarian data via ultrasound, and categorized the results as follows:

- **Category 1:** Ovaries show little to no activity and no follicles larger than 3mm.
- **Category 2:** Ovaries had several follicles and at least one follicle between 3–5mm.
- **Category 3:** Has at least one ovulatory-size follicle or the presence of a CH or CL that was not associated with the previous pregnancy (Category 3 is ideal).
- **Inactive:** Ovaries without follicular or luteal activity.

Researchers also monitored days open, days to first service and services per conception to determine the treatment effectiveness.

Uterine Health

At 20 and 30 DIM, cows were ultrasounded to evaluate follicular and luteal activity. Uterine cytology swabs were completed at 30 DIM to determine the presence of metritis. Blood samples were taken at 10, 20 and 30 DIM for PGFM (a metabolite for PGF₂), an indicator of postpartum uterine recovery.

Uterine health data were collected through the event analysis function of DHI-Plus® and entered by the herdsperson or herd veterinarian. The herd veterinarian treated cows based upon rectal examination of the reproductive tract. Uterine health data were analyzed using Chi-square analysis.

RESULTS

Table 2 shows the ovarian activity at 20 and 30 DIM. A significant difference was detected at 20 DIM for percentage of ovaries classified as category 3 (more ovulatory follicles), an indication of return to normal ovarian activity.

TABLE 2	Ovarian activity as recorded by transrectal ultrasonography at 20 DIM and 30 DIM			
	20 DIM		30 DIM	
	Control	MEGALAC-R	Control	MEGALAC-R
Category 1 (%)	37.8	38.4	31.8	10.0
Category 2 (%)	39.2	28.3	38.6	40.0
Category 3 (%)	12.2 ^a	23.3 ^b	27.3	43.3
Inactive (%)	10.8	5.0	2.3	6.7

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

Chart 1 displays the percentage of cows diagnosed with clinical and subclinical endometritis at 30 DIM via polymorphonuclear (PMN) white blood cell count. Nineteen percent of the MEGALAC-R-fed group was diagnosed with endometritis while 56 percent of the MEGALAC-fed group was diagnosed with endometritis.

CHART 1 Reduced incidence of clinical and subclinical endometritis by 30 DIM

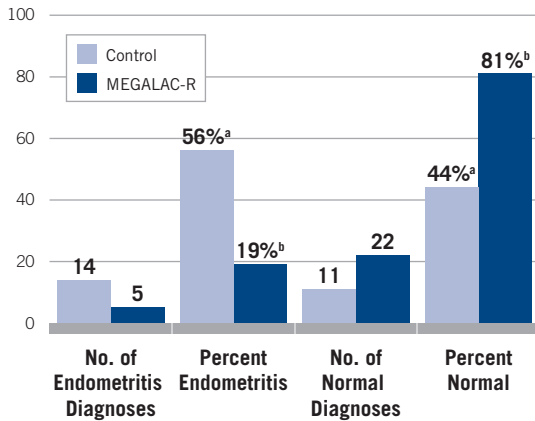
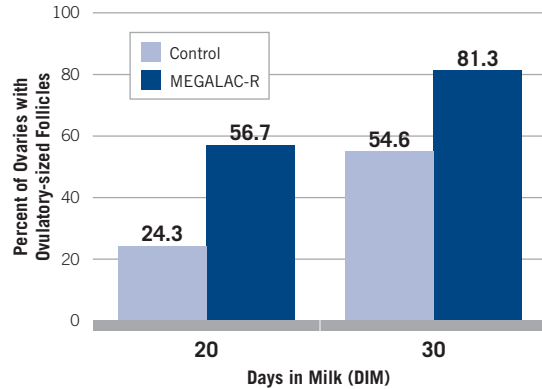


CHART 2 Ovarian activity verified via ultrasonography

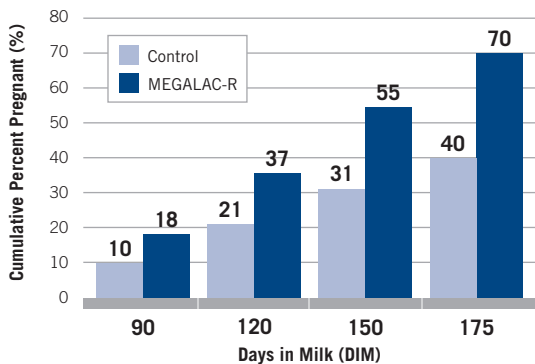


^{a,b} Superscripts differing within category indicate significant difference ($P < 0.05$).
 Effect of supplemental EFA on the number of cows classified as metritic based upon having 15 percent or more of polymorphonuclear leukocytes in the total somatic cell counts *in utero*.

Cows Fed MEGALAC-R Experienced the Following Improvements:

- Improved uterine health (as reflected in Chart 1)
- Earlier return to cyclicity via a higher percentage of ovulatory-sized follicles (as reflected in Chart 2)

CHART 3 Cumulative pregnancies by 175 DIM



Cumulative Pregnancies

Chart 3 reflects the improvement in percent of cows pregnant by 90, 120, 150 and 175 DIM. 70 percent of cows supplemented with MEGALAC-R were confirmed pregnant by 175 DIM, which was significantly higher than the control group, where only 40 percent were pregnant.

TABLE 3 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 ($P < 0.05$).

Additional Reproductive Findings

Table 3 confirms that cows in the treatment group had fewer days to first service, services per conception and days open, which were all significantly different when compared to the control group.

ECONOMIC ANALYSIS

With the additional number of pregnancies gained from feeding MEGALAC-R, coupled with improved reproductive health, the return more than exceeded the additional supplemental specialty bypass fat costs compared to the control group.

DISCUSSION

The results of this trial clearly demonstrate that cows supplemented with MEGALAC-R:

- Resumed cyclicity earlier postpartum
- Were treated for fewer uterine abnormalities
- Had significant improvements in reproductive outcomes compared to control cows
- Experienced improved economics and profitability

The study confirmed the necessity and effectiveness of Omega-3 and Omega-6 essential fatty acids, found in MEGALAC-R.

For additional information on enhancing reproduction through proper on-farm nutrition, contact your Arm & Hammer Animal Nutrition representative, your nutritionist, call 1-800-526-3563 or visit www.ahdairy.com.

REFERENCES

- 1 Staples CR, Burke JM, Thatcher WW. Influence of supplemental fats on reproductive tissues and performance of lactating cows. *J Dairy Sci* 1998;81:856-871.
- 2 Jones B, Fish RD, Martin A, Duff GC, Ax RL. Effects of Supplemental Linoleic and Linolenic Acids on Reproduction in Holstein Cows. *Prof Anim Sci* 2008;24:500-505.



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