

Fat Feeding Facts 12.
High Palmitic Fed in Early Lactation

In *Fat Feeding Facts 8. Should We Feed Palmitic, Stearic, or both in Fat Supplements*, the roles of both stearic and palmitic and their complementary effects were addressed. The more recent advent of feeding high palmitic (>80%) fatty acid (FA) supplements has preceded critical and objective research. Many of the research studies with these palmitic fatty acid supplements (PA) have been done with mid-lactation cows fed for no more than 3-week periods with only the last period data statistically analyzed. Upon closer scrutiny, there are red flags. In most of these studies, milk fat % has increased from 0.1 to 0.3%. But, often dry matter intake (DMI) has decreased, and in some cases where NEFAs (non-esterified fatty acids) were measured, they have increased with the PA supplement. Granted, the level of these NEFAs was not like seen right after calving, but they indicate some body condition is being mobilized to maintain milk production in the face of lower DMI. Over time, the cow must be able to replenish body condition, especially in mid-lactation, or else her positive energy balance cannot fully replenish energy lost in early lactation. This means PA supplementation in early lactation is even more problematic than in mid-lactation.

The same research group which did most of the PA mid-lactation studies conducted an early lactation trial in 2 periods: non-fat supplemented control versus 1.5% PA supplemented treatment for the first 24 days of lactation (fresh period) followed by 42 days (peak period) in which both of the previous 2 treatment groups were split and fed either the control or PA treatment as used in the first 24 days.

First 24 days postpartum	Control	1.5% PA
DMI, lb/day	49.1	48.4
Milk, lb/day	103.9	107.1
% milk fat	4.48	4.89
4% FCM	114.9	124.6
Body weight change, lb	-4.16	-5.84
Body condition score	3.34	3.25
Energy balance, Mcal/day	-12.9	-14.2
Dry matter digestibility, %	63.5	66.5
Total FA digestibility, %	83.4	78.7
16-carbon FA digestibility, %	78.2	67.4
18-carbon FA digestibility, %	86.6	87.5
NEFAs, mmol/L	0.59	0.65

While DMI tended to be lower and milk production higher for PA versus control, significant differences ($P < 0.01$ to 0.07) were for higher % fat and 4% FCM, more body weight loss, lower body condition score, lower total and 16-carbon FA digestibilities, and greater NEFAs. This all adds up to a similar pattern as seen in mid-lactation trials---namely, cows mobilizing more body condition and being in more negative energy balance when PA supplementation occurred.

For the 42 days following this fresh period, cows which went from PA supplementation during the first 24 days to control or PA supplementation tended to eat less daily DM at 2.75 lb, produced about 3 lb more milk with a higher fat %, had lower body condition score, had lower 16-carbon FA digestibility, and had more negative energy balance, but with no difference in NEFA levels. Since the study used 52 multi-lactation cows, there were 26 cows per treatment in the fresh period, but only 13 cows per treatment in the peak days 15 to 67 lactation period. Fewer cows per treatment limits the ability in this latter period with one-half the cows per treatment to pick up a significant differences.

What was lacking in this study, but would have required more cows, was a 3rd treatment of a blend of palmitic and stearic FAs as this combination has consistently shown the most benefit in early

lactation cows. Furthermore, no first lactation cows were used in this study. Granted, that introduces more variability, but also first lactation cows are more limited in energy intake as their lower DMI, lesser negative energy balance, and further growth during that first lactation places even more value on enhanced energy intake—as long as the fat supplementation does not decrease DMI. A meta-analysis summary from 7 peer-reviewed studies utilizing PA supplementation was presented at the 2017 ADSA annual meeting. Average daily intake of PA was 1.23 lb which resulted in a DMI decrease of 1.19 lb. For comparison, PA intake in this study was 0.71 lb during the fresh period, and 1.00 lb during the peak period.

Similar results in this early lactation study as with mid-lactation trials further implicates high palmitic acid supplementation in reducing DMI, body condition, and overall energy balance. This is even more critical in early lactation.