

# Megalac® - a Global Success Story for the Use of Palm Oil in the Livestock Sector

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## INTRODUCTION

The advantage of energy dense fat supplements in lactation rations to enhance performance in modern dairy cows has been cited since the early 1930s but the detrimental effect on rumen fermentation, particularly fibre digestibility, required further research. Compared to triglycerides, free fatty acids, particularly unsaturated, have been shown to have increased digestibility in the small intestine, but depress ruminal microbial metabolism when provided in large enough quantities. Early studies in the 1970s by Galbraith and co-workers showed the formation of calcium soaps of *long chain fatty acids* (LCFA) and reversal of the anti-bacterial effects of LCFA. However, adding calcium to the diet did not completely reverse the inhibitory effect of unsaturated fatty acids because the fatty acids do not react completely in the aqueous medium. Palmquist and Jenkins (1982) demonstrated the digestibility of pre-formed calcium soaps of fatty acids, their beneficial effect on increased digestibility of all dietary components and increased energy for lactation (Palmquist, 1984). Volac International Ltd worked alongside Palmquist in the early 1980s to develop calcium soaps of palm fatty acid distillate (PFAD) as a commercial protected fat supplement for the ruminant industry.

## MATERIALS AND METHODS

Megalac® is a combination of fatty acids and calcium which are linked together by a chemical bond to form calcium soaps. It is produced by a unique process which is essentially an acid-base reaction between calcium and the fatty acids contained within PFAD, resulting in their

saponification. The end product is a dry free-flowing granule that can be included in *total mixed rations* (TMR) or compound feeds at any level providing excellent pellet quality. See *Table 1* for a typical chemical analysis of Megalac®.

Fatty acids from palm oil were the source of choice due to the reliability and consistency of the fatty acids profile. In addition, it was demonstrated by Sukhija and Palmquist (1990) that calcium soaps of PFAD were stable at the average and optimal rumen pH.

Therefore, in contrast to triglycerides or free fatty acids, they do not interfere with rumen metabolism by coating the fibrous material within the rumen, or inhibit the action of rumen bacteria at optimal rumen pH. In the acidic environment of the abomasum and proximal duodenum, the calcium dissociates from the fatty acids, ensuring their availability for digestion.

## RESULTS AND CONCLUSIONS

Extensive research over the past 20 years that Megalac® has been commercially available has shown superior digestibility of the LCFA from calcium soaps of palm oil. A recent review by Drackley (1999) calculates an average standardized digestibility of 95.9% for Megalac® at an inclusion rate of 3% dry matter intake (DMI) and current digestibility trial work by Weiss and Wyatt (2004) confirms this high digestibility (92.9%) for Megalac® when included at 3% DMI. One of the reasons for this enhanced digestibility is thought to be due to the increased delivery of oleic acid (C18:1) to the small intestine, which is believed to have a synergistic enhancement in absorption of

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TABLE 1. CHEMICAL ANALYSIS OF MEGALAC®

	%
Oil (Werner-Schmidt)	84
Protein	Nil
Fibre	Nil
Ash @ 850°C	12
Calcium	9
Moisture	5
Fatty Acid Profile	as % of total
C14:0	1.5
C16:0	48.0
C18:0	5.0
C18:1	36.0
C18:2	9.0
Calculated ME MJ/kg DM	33.25

other LCFA (Moate, 2004). More importantly the high measured value by Andrews and co-workers (1991) of net energy of lactation (NE<sub>L</sub>) for Megalac® is supported by data collated from over 30 research and on farm trials, which show an average milk yield increase of 2.3 cow<sup>-1</sup> day<sup>-1</sup> for Megalac® supplemented cows compared to non-fat supplemented lactating dairy cows (all references available on request). Enhanced reproductive performance in terms of reduced number of days open and increased conception rates to first service has also been observed for Megalac® supplemented cows (Staples, 1998). In conclusion, this well-researched, reliable and consistent feed ingredient is the ideal product to help meet the increasing demand for milk

production in the developing Asian market.

#### ACKNOWLEDGEMENT

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