



Evaluation of SALMATE® as a Source of EPA and DHA for Ruminant Animals July 2004

Background

It has been demonstrated that providing omega 3 fatty acids to ruminants can improve reproductive performance in dairy cows (Petit et al., 2001). Provision of small amounts of higher chain length fatty acids such as eicosapentaenoic acid (EPA, C20:5n-3) and docosahexanoic acid (DHA., C22:6n-3) are particularly beneficial, as the shorter chain fatty acids must compete with omega 6 fatty acids for enzymes that assist in the conversion of these fatty acids to prostaglandins (Petit, 2003). Furthermore, milk and meat from ruminant animals contain very low levels of EPA and DHA, and the availability of these fatty acids postruminally has been recognized as a means of increasing levels (Gulatia et al., 2003; Offer et al., 1999).

While this is the case, the problem with providing fish oil can be problematic. First, rumen saturation of EPA and DHA is extensive. Reports from both in vivo (Chikunya et al., 2004; Doreau and Chilliard, 1997, Offer et al., 1999; Whitlock et al., 2002) and in vitro (AbuGhazaleh and Jenkins, 2004a and 2004b) studies show that the large part of DHA and EPA in unprotected fish oil is saturated in the rumen. Second, unprotected fish oil can interfere with rumen production. Doreau and Chilliard (1997) showed that higher levels of fish oil given to dairy cows (> 300ml) resulted in lower dry matter intakes and reduce total milk fat synthesis.

These studies were conducted to evaluate the extent of protection afforded to fish oil higher fatty acids when encompassed in the dry fat matrix.

Study Number 1

In sacco evaluation of DRY FAT

Five-gram samples (8) of SALmate® were weighed into Dacron bags, and 4 bags were placed in the rumens of each of two lactating dairy cows. Bags were removed after 24 hours.

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Because of the small particle size, the low melting point and the need to thoroughly wash the Dacron bags, representative post incubation samples could not be recovered.

Study Number 2

In vitro evaluation of SALMATE®

Six 250 Erlenmeyer flasks, containing 30 ml of strained rumen fluid and 30 ml of McDougall's buffer solution were maintained at 37 degrees under anaerobic conditions. Treatments were:

1. 250 mg starch
2. 250 mg SALMATE®

While samples were being stirred on a magnetic stirrer under CO₂, aliquots were removed from each flask at time zero and after 24 hours. Samples were freeze-dried, methylated, and fatty acid methyl esters were removed with hexane. A GLC was used to obtain fatty acid profiles. C13:0 was added as an internal standard. Fatty acids found in the starch –only cultures were used to determine background fatty acids.

It was determined that the SALmate® partially protected DHA and EPA from rumen saturation. Of the original EPA placed in the flask, 61.1% remained intact. With DHA 75.3% survived the 24 hour incubation. These levels are considerably higher than those reported for unprotected fish oil, where most of the EPA and DHA are saturated (Chikunya et al., 2004; Doreau and Chilliard, 1997).

Benefits adding SALMATE ®

Oils, especially fish oils with high levels of polyunsaturated fatty acids (PUFAs), are very susceptible to oxidation. In addition, the quality of the oil is also very important to insure that there is no rancidity (require very low peroxide values) otherwise the smell and/or taste can have a negative effect upon feed intake. Some users have tried to add the straight fish oil to feeds just before feeding, but this becomes more and more difficult if feeds are sent to many different locations. Minor increases in rancidity can quickly reduce feed intake and

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lower overall performance, as well as having the essential fatty acids (EPA and DHA) damaged.

SALMATE® allows the user to benefit in the following ways:

- i) very high quality fish oil from a regular source is always used, insuring low peroxide values, and high EPA and DHA levels;
- ii) high level of Natural Antioxidant is added to the fish oil to improve stability;
- iii) encapsulating the oil in a specific starch matrix affords high degree of stability to the oil;
- iv) product is free flowing and easy to handle;
- v) animals' feed intake has not been negatively affected.

References

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