

Encapsulation- Protected Plant Extracts

Feeding “raw” plant extracts to ruminants provides minimal benefit as the rumen environment quickly denatures the volatile compounds within a matter of minutes after feeding. Active ingredients in **CINNAGAR** are encapsulated using a patent-pending technique. When the plant extracts in **CINNAGAR** are being consumed, they are slowly released into the rumen to have a positive effect on the microbial flora over a longer period of time. The encapsulation process also protects the product against the evaporation of the volatile plant extracts during storage, feed processing and while in the feed bunk.

CINNAGAR In Practice

Results from Vigortone field trials with three herds totaling 346 cows from Minnesota, Pennsylvania and Wisconsin showed:

- 3.5 lb more milk
- Milk components unchanged
- Feed efficiency improved 5 - 7%

Studies in Italy and Switzerland showed:

- 2 lb and 3.9 lb milk increase



Available In
2 Concentration Levels



CINNAGAR 3
(3 grams/lb)

CINNAGAR 30
(30 grams/lb)

Suggested feeding rate of **CINNAGAR**:

| | CINNAGAR 3 lb/hd/d | CINNAGAR 30 lb/hd/d |
|----------------------|------------------------------|-------------------------------|
| Lactating Dairy Cows | 0.100 | 0.0100 |
| Beef Cows | 0.067 | 0.0067 |



800/553-1712
www.vigortone.com

Want **More Milk?**



Increase Milk Production
with



**Lactation studies with
CINNAGAR have shown:**

- *Increased Milk Production*
(3 - 3.5 lb/cow/day)
- *No Loss in Milk Components*
- *Improve Feed Efficiency*
(5% - 7%)





Essential For An Optimal Fermentation

The unique microbial ecosystem of the rumen allows cattle, sheep and goats to utilize feed materials that have no value to other animals. However, this comes at a cost with the production of waste products such as ammonia. Reducing the production of this waste product is a unique way to improve rumen efficiency. Recent studies have identified plant extracts that have this ability. The two most potent, derived from garlic and cinnamon, are the ingredients of **CINNAGAR**. A novel encapsulation technology allows us to deliver these ingredients into the rumen to improve their performance of ruminant livestock.

Plant Extracts

Plant extracts are natural volatile compounds obtained from plant products. They are either extracted by steam water distillation or by enzymatic activity followed by steam water distillation. Plant extracts contain active components that give the oils their properties. Currently, about 2,600 molecules have been identified in plant extracts, and some of these have been

shown to favorably influence rumen fermentation. Plant extracts from garlic and cinnamon have been found to be very effective in enhancing rumen activity.

Benefits Of Garlic

In laboratory studies, garlic oil, as used in **CINNAGAR**, changed the microbial community in the rumen. This led to lower acetate production and higher propionate and butyrate production in the VFA profile which is energetically favorable to the cow. (Table 1). This is also favorable to both milk yield and protein synthesis.

Table 1. Effects of Garlic Oil on a 17-hr In-Vitro Batch Culture Rumen Microbial Fermentation.

| VFAs, mol/100 mol | Treatments | |
|--------------------------|-------------------|--------------------|
| | Control | Garlic Oil |
| Acetate | 61.2 ^a | 54.3 ^{ab} |
| Propionate | 22.6 ^a | 25.8 ^b |
| Butyrate | 12.5 ^a | 16.5 ^b |
| Acetate:Propionate Ratio | 2.7 ^a | 2.1 ^b |

^{ab} Means in the same row with different superscripts differ (P<0.05) JDS 88:4393

Benefits Of Cinnamon

Cinnamon slows down the breakdown of peptides and amino acids through its interaction with certain bacterial species, notably *Prevotella*. This results in an increased availability of peptides and amino acids, which stimulate the growth of many important rumen bacteria. The production of ammonia, a waste product and pollutant, is reduced. The net result is an increase in the synthesis of microbial protein (Table 2) and a reduction in the concentration of urea nitrogen in blood and milk.

Table 2. Effect of Cinnamaldehyde on Concentrations of N Fractions (mg/100 ml) in Duel Flow Continuous Fermentators

| N Fraction | Treatments | |
|----------------|-------------------|-------------------|
| | Control | Cinnamaldehyde |
| Large Peptides | 6.8 | 6.4 |
| Small Peptides | 1.9 | 2.5 |
| Ammonia N | 19.2 ^a | 16.0 ^b |

^{ab} Means in the same row with different superscripts differ (P<0.05) Busquet, et. al., 2005; JDS 88:2508