Rumensin®
(monensin sodium)

More milk per pound of feed

Rumensin® is a trademark for Elanco’s brand of monensin sodium
Now Approved for Dairy Cows: Rumensin

- Delivers more milk per pound of feed for pennies per head per day
- Improves milk-production efficiency* throughout lactation and the dry period
- Meets U.S. Food and Drug Administration’s stringent standards for effectiveness and safety
- On average, returns 5:1 on your investment

*Production of marketable solids-corrected milk per unit of feed intake
Rumensin delivers more milk per pound of feed

The only FDA-approved feed ingredient for lactating and dry cows that increases milk-production efficiency by economically delivering more milk per pound of feed while maintaining the natural wholesomeness of milk.
What is production efficiency?

- An emerging metric of performance in the dairy industry

Production Efficiency = \frac{Output}{Input}
Milk-Production Efficiency

Practical calculation = \[ \frac{\text{Milk production (lbs/hd/day)}}{\text{Dry matter intake (lbs/hd/day)}} \]

FDA claim for Rumensin = \[ \frac{\text{Marketable solids-corrected milk}}{\text{Total NE_L intake (adjusted for body-weight change)}} \]

Bottom line = More milk per pound of feed
The Rumensin Label

- Increased milk-production efficiency
  - Increased production of marketable solids-corrected milk per unit of feed intake
  - More milk per pound of feed
- Dose range: 11 to 22 g/ton (dry matter basis)
- Feed throughout lactation and the dry period
- “You may notice”
Efficacy Data
How was this Claim Obtained?

- Nine trial sites
  - 6 in US
  - 3 in Canada

- 818 Holsteins
  - 290 Primiparous (35% 1st calf heifers)
  - 528 Multiparous (65% cows)

- Trial Length
  - 21 days before expected calving
  - Treatment continued through full lactation to 7 days post calving (all) or 200 DIM (3 sites)

- Levels of Rumensin
  - 0, 7, 15, or 22 g/ton
  - 100% DM basis
What Is Our Claim?

- Increased Milk Production Efficiency
  - Production of marketable solids-corrected milk per unit of feed intake
- What is this?
  - More milk per pound of feed
Rumensin delivers more milk per pound of feed

![Graph showing milk yield and dry matter intake across different stages of lactation (Far-Off Dry, Transition, Early, Mid, Late). The graph compares Rumensin and control groups, highlighting increased milk yield and dry matter intake with Rumensin.]
During transition and early lactation

- More milk per pound of feed
- No change in dry matter intake while cows are in negative energy balance
In mid- and late lactation

- More energy from every pound of feed
- Dry matter intake may decrease once energy balance has been achieved
During the dry period

- More efficient use of feed to maintain body condition
  - 0.7 lb/hd/day less dry matter at 11 g/ton, 15 g/ton
  - 1.7 lbs/hd/day less dry matter at 22 g/ton
Value throughout the lactation cycle

- Added energy before and after calving
- More energy when she needs it most
- Energy to sustain production and body condition
- Maintain production with less feed
- More efficient use of feed
Mode of Action
Rumensin Improves Rumen Fermentation

- Changes microbial populations in the rumen
- Promotes the growth of more efficient naturally-occurring bacteria
  - More efficient carbohydrate metabolism
  - From 2 to 4 percent more energy from feed
Monensin Mode of Action on Gram Positive Bacteria
Monensin Mode of Action on Gram Positive Bacteria
Monensin Mode of Action on Gram Positive Bacteria

Due to energy required to export excess H+, less energy is available for cellular growth and metabolism. Thus, G+ cell population decreases.

Energy (ATP) is required to export H+ out of cell.
How Does Rumensin Work in the Rumen?

20% C₃ DAY -7
GRAM +
RUMENSIN SENSITIVE
Ruminococcus
Methanobacterium
Lactobacillus
Butyrivibrio
Lachnospira
Streptococcus
Methanosarcina
Fibrobacter
FERMENTATION PRODUCTS
Acetate
Acetate, methane*
Lactate
Acetate, butyrate
Acetate
Lactate
Methane*
Acetate

GRAM -
RUMENSIN INSENSITIVE
Selenomonas
Bacteroides
Megasphaera
Veillonella
Succinimonas
Succinivibro
FERMENTATION PRODUCTS
Propionate
Acetate, propionate
Propionate, acetate
Propionate
Succinate
Succinate

29% C₃ DAY 14

Adapted from Dawson and Boling, 1983
Energy from Rumen Fermentation

- Within the rumen, feed carbohydrates are converted to glucose
- Rumen microorganisms change glucose to volatile fatty acids (VFAs) and waste products
- Usable energy derived from glucose varies significantly

*1 mole glucose yields 680 kcal
Rumensin – Methane Digesters

- Ruminal Effects of Rumensin for Methane
- Laboratory Experiments
- On Farm Usage
  - Mixed results
    - No problem
    - Slight reduction for 3-4 weeks
    - Shut down of methane production
Monensin Mode of Action

- Monensin alters rumen fermentation by selecting for gram negative microbial population that produces more propionate, less acetate and butyrate and less methane than untreated animals\(^1\)

- Studies have not been conducted to clinically prove a reduction in methane production with the use of monensin.
  - No claims for reduction in methane production are made by this presentation.

Monensin Mode of Action

- Ruminal methane production is reduced by 30% by monensin treatment.
  - Wedegaertner and Johnson: J. An. Sci. 57:168-177
  - Johnson and Johnson: J. An. Sci. 73:2483-2494

- Ruminal methanogens are not directly affected but bacteria providing precursors are affected
Batch Fermentation\(^1\)
- Manure from cattle fed 22 ppm
- Retention time of 9 days
- Methane production stopped after 9 days
- Delayed onset of methane production until 40 days
- Yields after 180 day similar to control
- No significant reduction in number of methanogenic bacteria

\(^1\)Varel and Hashimoto Appl. Environ. Microbiol.: 41:29-34
Varel and Hashimoto Studies

- **Continuous Fermentation**\(^1\)
  - Manure from cattle fed 29 ppm
  - Retention time of 20 days
  - Methane production stopped after 3 weeks
  - Yields after 180 day similar to control
  - No significant reduction in number of methanogenic bacteria
  - Suggested an extended acclimation period is necessary for microorganisms in methane-producing fermentors using waste from cow fed monensin

\(^1\)Varel and Hashimoto Appl. Environ. Microbiol.: 44:1415-1420
On Farm Experiences

- No Problem – Plug Flow system
  - Gradual introduction of Rumensin over one month period
    - Three steps to 14 g/ton
- Slight reduction – Plug Flow system
  - Introduced Rumensin at 11 g/ton
  - 50% reduction then recovery in 3-4 weeks
- Methane Production Stopped – Plug Flow system
  - Introduced Rumensin at 22 g/ton
  - Complete reduction of methane production
  - Recovery ?
Recommendations

- If have a methane digester
  - Introduce manure from Rumensin fed animals gradually
    - Start different pens on Rumensin
    - Introduce at lowest level (11 g/ton)