

ROKI LTD PREBIOTIC RUMIFOS™

ENHANCING LIVESTOCK HEALTH AND PERFORMANCE WITH PREBIOTICS

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What is Rumifos™

Rumifos™ is a cereal based, domestically manufactured prebiotic for boosting livestock digestion, immunity and productivity through supporting and enhancing gut flora. Utilizing stem cell technology, it uniquely contributes to sustainable agriculture by helping minimize antibiotic use, reduce methane emissions and optimize available feed inputs.

Rigorous research, including in vitro and in vivo trials, has proven Rumifos™ positive impact on weight gain, increased milk yield, milk composition and overall health based on no increase in feed intake.

Rumifos™ increases milk yield by approximately 10-15% and live-weight gain of cattle by 10-20%¹.

¹ Increases average 10% on a minimal input system, further gains depend on additional environmental control e.g. use in tandem with other inputs such as mineral licks, vitamins, optimal water consumption and feed management.

Introduction

The demand for preparations of natural origin including biologically active substances has grown. Optimizing the production potential of livestock through optimized gut flora through the use of pre-and pro-biotics² has become an important part of global livestock production, since the 2006 EU ban on antibiotic growth promoters in animal feed. Stabilized gut flora increases immunity, digestibility, better nutrient availability and absorption and enhanced production in terms of live weight gain and milk production. Additionally, there is a need to develop products environmentally friendly in their design, manufacture and production and in the support they can give to livestock farmers who are struggling to maintain production output under the adverse effects of climate change.

The Development of Rumifos™

In 2010, in line with the phase out of antibiotics as growth promoters in the EU, Roki Ltd the leading veterinary inputs supplier company in Georgia, developed a new vision of sustainably increasing livestock productivity based on the promotion and use of prebiotics. Prebiotics are naturally occurring food components and serve to support a healthy microbiome. Gut health affects an animal's overall productivity. Poor gut health can lead to less nutrient absorption, energy losses, gut integrity damage and dysbiosis. The company therefore created the prebiotic Rumifos™, a domestically manufactured product for improving livestock digestion, immunity and productivity through optimizing gut flora.

Rumifos™ Composition and Manufacture

Rumifos™ is produced using stem cell technology derived from *Triticum durum* (wheat), *Avena sativa* (oat), *Hordeum vulgare* (barley) and *Zea mays* (maize). Production is based on dry distillation in a modified medium and by selective mixing of different fractions. Rumifos™ is trademarked. The trademark is owned by the Bio-rational Technological Research Centre (BrTRC) who are owned by Biotecsi Ltd, a branch of Roki Ltd.

Rumifos™ as a Solution for Addressing Climate Change

Climate change is leading to more prolonged and extreme heat and drought, sudden drops in temperature and extreme cold, reducing the availability and quality of pasture and other feed and considerably increasing environmental stress on livestock. Results include weakened immune systems, decreased intake, appetite, and digestive efficiency which makes animals more susceptible to parasitic infestation and other infections such as mastitis which can lead to increased use of antibiotics. Ultimately milk yield and live weight gain are reduced. Farmers lack knowledge of how they can cope with these negative impacts on their production systems. Rumifos™ uniquely contributes to sustainable agriculture by supporting the immune and digestive systems of livestock, helping minimize antibiotic use, maximize use of feed inputs and reduce methane emissions as well as minimizing CO₂ emissions by being produced domestically.

² Prebiotics are carbohydrates that cannot be digested by the body's enzymes and therefore act as a fermentable substrate for the intestinal microbiota. They are used to positively influence the intestinal flora by promoting the good microorganisms in the intestinal tract such as lactobacilli and *bifidobacteria*. Probiotics are "live microorganisms which when administered in adequate amounts confer a health benefit on the host". Undesirable microorganisms are suppressed with the use of lactic acid bacteria, live yeasts, or bacillus spores, promoting the natural balance in the intestines or rumen. *Synbiotics* are combinations of probiotics and prebiotics that stabilize and balance the animal's microbiota. The simultaneous application of probiotic bacteria and prebiotic yeast cell walls leads to synergistic effects in the digestive tract of the animal. WHO/FAO (2001)

Design Manufacture and Process

Sustainable husbandry

The livestock industry's interest in prebiotics and probiotics grew enormously in response to the 2006 ban on antibiotic growth promoters in the EU, Rumifos™ is an effective alternative:

Antibiotic Reduction

it strengthens animal resilience against diseases, reducing antibiotic use.

Domestic Production and Plant-Based Composition

Rumifos™ is a domestically produced prebiotic, derived from stem cells of Triticum durum (wheat), Avena sativa (oat), Hordeum vulgare (barley), and Zea mays (maize).

Gut Health

Rumifos™ provides essential nutrition to beneficial bacteria in the gut. An optimized microbiome is crucial for nutrient absorption, energy utilization, overall animal productivity and improved immunity. Also, it reduces methane emissions in the ruminant digestive system.

Climate Change Adaptation for Livestock

Digestive Balance: Rumifos™ enhances absorption by balancing gut flora, countering climate-induced digestive challenges.

Increased Productivity: Rumifos™ increases milk yield by approximately 10-15% and live-weight gain of cattle by 10-20%. The benefits are higher when Rumifos™ is combined with other affordable Roki vet inputs.

Immunity Boost and Resilience: Rumifos™ strengthens immunity, to disease triggered by climate stress. By building resilience against climate-induced health issues, Rumifos contributes to the long-term well-being of livestock.

Innovation

Stem Cell Technology: The prebiotic's composition, derived from stem cells of cereal crops, not only contributes to its efficacy but also aligns with environmental sustainability: it is a natural, domestically produced, eco-friendly product without any chemicals or environmentally harmful additives.

Resource efficiency: Rigorous research, including in vitro and in vivo trials, has proven Rumifos™ positive impact on weight gain, increased milk yield, and overall health based on no increase in feed intake. It can improve productivity for no additional feed input.

Figure 1 How Rumifos™ Helps with Climate Adaptation

Proven Impact

In vitro and in vivo trials and field studies³ have been conducted to evaluate the efficacy of Rumifos™. Rumifos™ was proven to have beneficial effects on various aspects of gut health including modifications in gut physiology resulting in increases in increased feed utilization, absorption capacity and antioxidant activity as well as enhanced microflora of the gastrointestinal tract. Its effect on milk yield has been significant across various breeds ranging from 25% in Swiss Brown cows in Georgia to 4% in trials on Holsteins in the Ukraine. Based on field use in Georgia the company claims a 10% increase in milk yield depending on variables such as age, ration and water consumption as well as improvements in milk composition with increased fat and protein content. Live weight gain in local Georgian cattle is also 10% and has been proven to be of use as a growth-promoting agent in calves. User feedback from broader field use has indicated wider beneficial behavioral and health impacts such as decreased stress and improved general condition.

³ Since 2010, a comprehensive series of experiments, encompassing in vitro, in vivo and field trials were conducted. All experiments were carried out in accordance with the European Convention for the Protection of Vertebrate Animals Used for Experimental and Other Scientific Purposes, adopted on 18 March 1986.

Table 1 Research into the Efficacy of Rumifos™

	Experiment Title and Date	Rationale/Hypothesis	Methodology	Result
1	Influence of Food-Additive Rumifos™ on Fattening of Bull Calves (2012)	To see the effect of Rumifos™ on live weight gain in local Caucasus Brown cattle through the regulation of gastrointestinal microflora	One control and one treatment group of five Caucasus Brown each. Same ration, bran, maize, hay, apple peel, and lentils addition of 1mg/25kg/day dosage of Rumifos™ in the ration. The experiment lasted for eight months.	Monthly weight gain in the treatment group of 51.8kg or 1,727 grams /day and in the control group increased by 29.5% or 987 grams/day. Adding Rumifos™ to the ration results in a weight gain in bull calves fed the same ration.
2	Influence of Food-Additive Rumifos™ on Increasing Milk Yield (2013)	To see the effect of biologically active substances in Rumifos™ on milk yield that increase the quality of absorption, fermentation, and hormonal processes and strengthen guts	One control and one treatment group of six Swiss Brown cows each. Identical ration, grass, dry brewers' grain, and barley addition of 1mg/25kg/day dosage of Rumifos™ in the ration. The experiment lasted for one month.	In the treatment group milk yield increased by 25%, while in the control group it remained the same.
3	Productivity of Milking Cows When Feeding Rumifos™ (2015)	To see the effect of biologically active substances in Rumifos™ on milk yield, quality of absorption, fermentation, and hormonal processes.	One control and one treatment group of ten Ukrainian Holsteins. 122 days, 1mg/25kg/live weight was given as part of wheat bran-based mixed feed.	In the treatment group milk yield increased by 3.8%, milk fat by 11.3% and a decrease in feed consumption/1kg weight gain was detected.
4	The Effect of the Feed-Additive Rumifos™ on the Structure of the Digestive Organs of Young Cattle (2015)	The administration of Rumifos™ at standard dosage will improve the capacity of the digestive tract to absorb nutrients.	Control and treatment groups of ten Ukrainian red and whites each. Administration of 1 ml per 25kg of live weight in the treatment group. By bacteriological examination of clinical signs and fecal mass.	Significant increase in the thickness of the rumen wall by 16.9% with a decrease in the thickness of the abomasum wall by 9.3% due to a reduction in the thickness of the mucosa which indicates an increase in absorption capacity.
5	Study of the Efficiency of Prebiotic Rumifos™ in the Treatment of Sheep Gastrointestinal Diseases (2016)	Rumifos™ in combination with the antibiotic Enrofloxacin treats symptoms and restores microflora more effectively than Enrofloxacin used on its own or with no treatment at all for gastroenteritis, dyspepsia, diarrhea and dysentery.	Treatment group 1, 2.5% solution of Enrofloxacin and Rumifos™ in standard dosage. Treatment group 2, 5% solution of Enrofloxacin for 10-15 days. Control group no treatment. 100 each.	Treatment groups improved in 2-3 days and gut microflora was restored in 10 days. Treatment efficacy 97.5. The control group pathologies remained.
6	The Influence of Rumifos™ on the Quantitative Composition of Lactic Acid Bacteria in the Large Intestine of Laboratory Animals (2016)	The normal microflora of the gastrointestinal tract is the basis for establishing an immunological barrier in the body. Rumifos™ tested on laboratory rats aimed at restoring the body's microbiota, including the intestines.	In vivo: the studies were carried out on laboratory animals, white albino rats under standard vivarium conditions. 1ml/25kg/live weight was given	The number of lactobacilli and bifidobacterial was increased by 4.1% and 5.5%

7	Rumifos™ Antioxidant Potential Study (2017)	Antioxidants are compounds that inhibit oxidation, a chemical reaction that can produce free radicals. Autoxidation leads to the degradation of organic compounds, including living matter. A plant-based compound that boosts antioxidant activity is presumed to be of benefit to livestock.	In vitro: absorbance ability after addition of DPPH reagent.	High antioxidant activity varying between 70.8 – 78.83%
8	Modern Aspects of Standardization of the Biologically Active Substances in the Additive Feed Rumifos™ (2017)	For the standardization of additive feed Rumifos™, selection and validation of the physic-chemical method of analyses for the identification of bio active substances	Spectrophotometer in ultrasound areas. Gas chromatography with mass spectrometry.	More than 170 substances were revealed in the substances. Three groups were identified: Biopolonids, sugars and hetero-cycle mixtures.
9	Farmer User feedback (2017-18)	Farmer reports of benefits	Rumifos™ bought by farmers for use at recommended dosage. The feedback of 150 Roki Ltd customer farmers on impact on milk yield, live weight gain and other observable health and behavioral benefits.	Increased milk yield by 1.5 litres/cow/day (10%), improved fat content, live weight gain by 10%, including improved coat health, decreased stress and cows became calmer.

Bibliography

1. Mindiashvili, N. Chichakua, M. Zazashvili, N. (2012). *Influence of Food-Additive Rumifos on Fattening of Bull-Calves*.
2. Mindiashvili, N. Chichakua, M. Zazashvili, N. (2013). *Influence of Food-Additive Rumifos on Increasing Milk Yield*.
3. Medved, A. Kucheryavy, V. (2015). *Productivity of the Milking Herd of Cows when Feeding Rumifos*. Scientific and Practical Conference of Modern Technologies of Agricultural Production. Grodno, Belarus.
4. Kucheryavy, V. Medved, A. Povochnikov, A. Giorgadze, N. Mindyashvili, Sh. (2015). *The Effect of the Feed Additive Rumifos on the Structure of the Digestive Organs of Young Cattle*. Scientific Bulletin of the National University of Environmental Sciences of Ukraine.
5. Mindiashvili, N. Chichakua, M. Zazashvili, N., Chikaidze, M. (2016). *Study of the Efficacy of Prebiotic Rumifos in the Treatment of Sheep Dyspepsia*. International Scientific Conference Modern Technologies to Produce Environmentally Friendly Products for Sustainable Development of Agriculture. Tbilisi.
6. Kucheryavy, V. (2016). *The Influence of Rumifos on the Quantitative Composition of Lactic Acid Bacteria in the Large Intestine of Laboratory Animals*. International Scientific Conference of Modern Technologies to Produce Environmentally Friendly Products for Sustainable Development of Agriculture. Tbilisi.
7. Kunchulia, L. Zazashvili, N. Goderidze, N. Chichakua, M. Imnadze, N. (2017). *Rumifos Antioxidant Potential Study*. Tbilisi State Medical University.
8. Mindiashvili, N. Chichakua, M. Zazashvili, N. Kuchulia, L. Chikaidze, M. (2017). *Modern Aspects of Standardization of the Biologically Active Substances in the Additive Feed Rumifos*. Bio-rational Technological Research Centre (BrTRC), Tbilisi.
9. Roki Ltd.