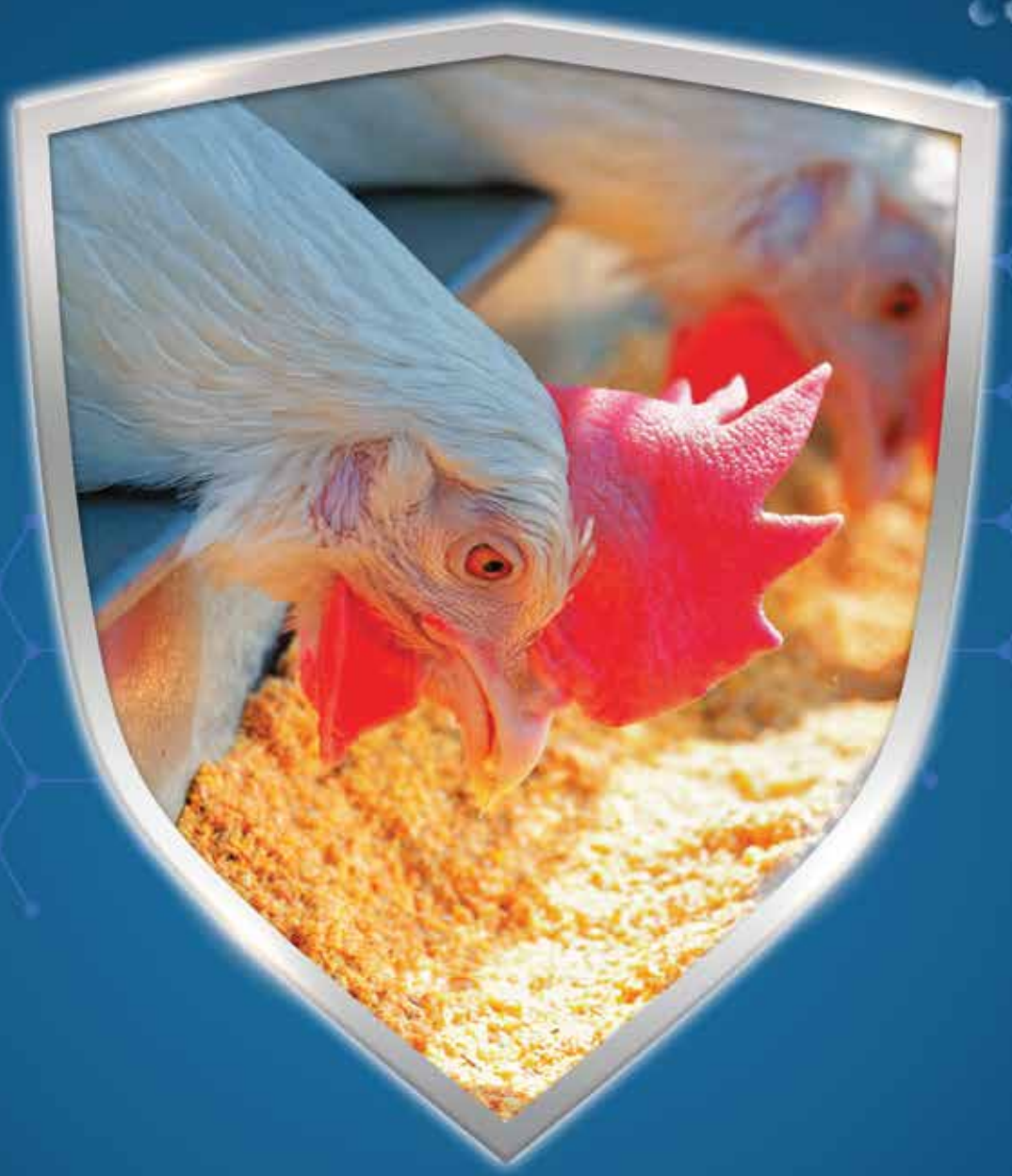
ROSSARI®
making you more competitive



MSG GUARD

Effective pathogen control
& growth promotion

MSG Guard

MSG guard comprises α-monoglycerides of short chain fatty acids (SCFA) and medium chain fatty acids (MCFA), and selected Sophorolipids as micro-ingredients. Feeding this solution to poultry, stimulates gut development, reduces health problems and improves animal performance.

The Challenge

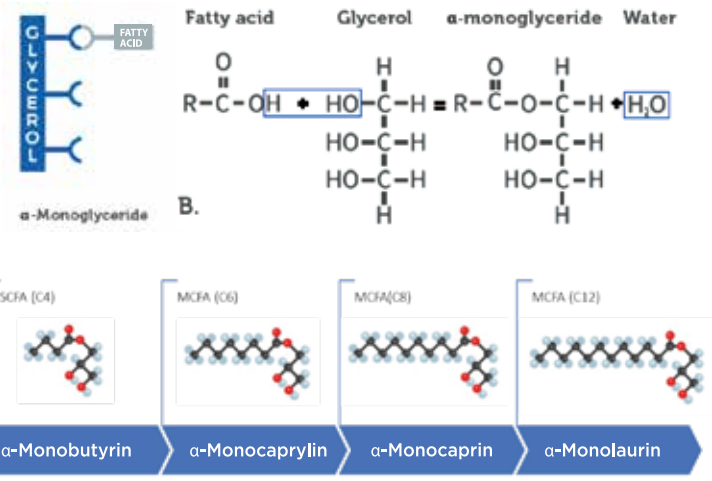
Major issues faced in the current animal farming operations are efficient and sustainable animal production. Moreover, farmers have to deal with animal welfare regulation, restriction of production, animal health is an important parameter and this is largely determined by gut health and the control of pathogenic pressure. The challenge in modern animal production is to develop non-antibiotic feed farming operations that promote animal health in general and gut health in particular in order to improve animal performance.

Alpha Monoglycerides of SCFA and MCFA

MSG guard comprises α-monoglycerides that are composed of a fatty acid linked to the sn1-position of glycerol via an ester bond and are known for their strong antimicrobial effects.

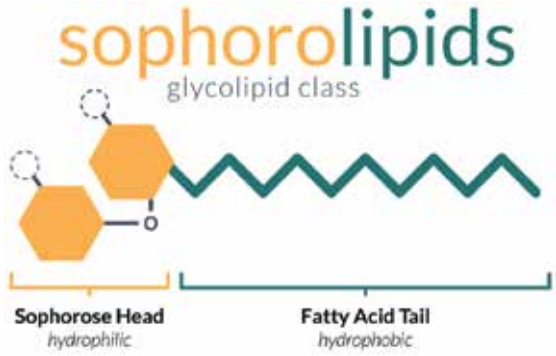
(A) Esterification reaction of a fatty acid and glycerol to form an α -monoglyceride

A distinction can be made between α-monoglycerides of short chain fatty acids (SCFA) and α-monoglycerides of medium chain fatty acids (MCFA), which have different characteristics. α-monoglycerides of SCFA such as α-monobutyrin, are mainly active against gram negative bacteria. In contrast, α-monoglycerides of MCFA like α-monocaprylin, α-monocaprin and α-monolaurin are more efficient against gram positive bacteria. In addition, scientific literature is suggesting α-monoglycerides of MCFA, and more particularly α-monolaurin, have antiviral properties.



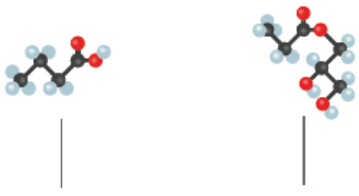
Sophorolipids

Sophorolipids are a class of glycolipids produced by certain yeast strains and are reported for its potent antimicrobial action against several poultry pathogens, such as Salmonella, E. coli, and L.monocytogenes etc. Structurally sophorolipid comprises a sophorose hydrophilic moiety linked to a fatty acid chain, being produced as a mixture of lactonic and acidic forms, highlighting the lactonic, which possesses better biocidal activity.



Benefits

- The strong covalent bond of α-monoglycerides results in multiple benefits compared to free fatty acids. α-monoglycerides are pH independent and consequently do not dissociate. They are non-volatile, non-corrosive and heat stable during feed processing.
- Furthermore, α-monoglycerides have a neutral taste and odor, but more important, research has shown that α-monoglycerides have a much stronger antimicrobial effect compared to their corresponding free fatty acids.
- Moreover, α-monoglycerides and sophorolipids are amphiphilic compounds possessing both lipophilic (fat-loving) properties, due to their fatty acid tail and hydrophilic (water-loving) properties, due to their hydrophilic backbone (glycerol). This makes α-monoglycerides and sophorolipids self-emulsifying in water.
- Consequently, they are active in four different environments: water, feed, stomach, and the intestinal tract.



	Organic acids	α-Monoglycerides
pH-independent	-	✓
Non-Corrosive	-	✓
Non-Volatile	-	✓
Heart Stable	-	✓
Neutral Taste Odor	-	✓
Antimicrobial	✓	✓✓
Non-GMO	✓	✓
Liquid & Dry	✓	✓

Broad Spectrum Antibacterial Activity

Sophorolipids along with α-monoglycerides have a much stronger antibacterial effect compared to their corresponding free fatty acids. Depending on the chain length of the fatty acid, they have also antiviral properties. MIC values of several fatty acids and their corresponding α-monoglycerides are given.

Minimum Inhibitory Concentration (MIC) of butyric acid, and α-monobutyrin, on gram negative bacteria at pH 4 and 7. NA = not applicable.

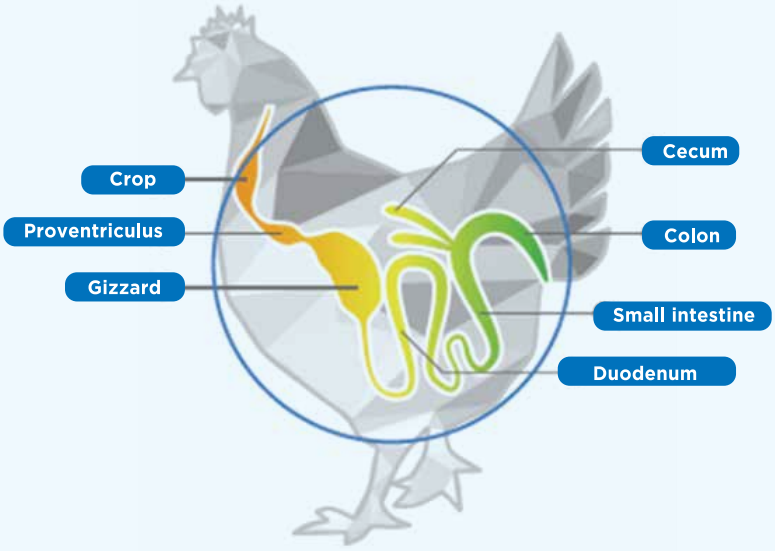
	pH	S. Typhimurium	S. Choleraesuis	E.coli 0 157
Butyric acid	4.5	2.00%	4.00%	4.00%
α-Monobutyrin	4.5	0.06%	0.12%	0.12%
Butyric acid	7	NA	NA	NA
α-Monobutyrin	7	0.06%	0.12%	0.12%

Minimum Inhibitory Concentration (MIC) test of capric acid and lauric acid and their corresponding -monoglycerides on gram positive bacteria.

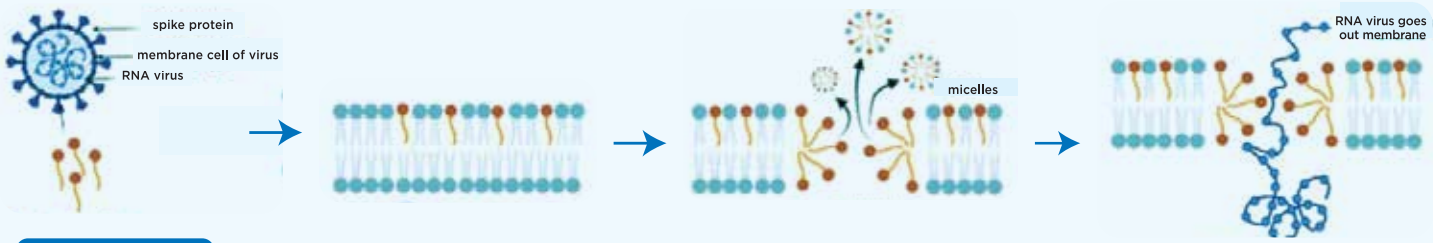
	Streptococcus group A	Streptococcus beta-hemolytic non-A	S. aureus	S. epidermidis	Micrococci
Capric acid	1.45	2.9	2.9	2.9	2.9
α-Monobutyrin	0.1	0.2	1.0	1.0	0.1
Lauric acid	0.062	0.249	2.49	2.49	0.624
α-Monobutyrin	0.09	0.09	0.09	0.09	0.09

Mechanism of Action

For optimal gut health and performance, it is important that these additives are also active in the intestinal environment. As α-monoglycerides and sophorolipids are stable and pH independent molecules, they are active in the entire gastro-intestinal tract. The mode of action of α-monoglycerides of SCFA and α-monoglycerides of MCFA are different.



Alpha-monoglycerides of SCFA have mainly an antimicrobial activity against gram negative bacteria. The α- monoglycerides of SCFA are recognized as glycerol and passively transported through membrane channels. Inside the bacteria, the fatty acids are released which lowers the internal pH of the bacteria. Simultaneously, the protein channels are also blocked leading to bactericidal action.
In contrast, Alpha-monoglycerides of MCFA not only have antimicrobial activity against gram positive bacteria, but also have antiviral properties. Due to the amphiphilic nature of these α- monoglycerides they form micelles, which provide them ability to get incorporated into the lipid membrane of these microorganisms, thereby altering the permeability. Alpha-monoglycerides of MCFA may even disrupt the cell membrane of these bacteria and the fat envelop of viruses which makes the pathogen leaky. Furthermore, gram positive bacteria and fat enveloped viruses can not properly adhere to, and invade, a host cell without an intact membrane.



MSG guard effectively inhibit the pathogenic pressure exerted by pathogenic gram-positive bacteria and fat-enveloped viruses (e.g. Newcastle disease (ND), infectious bronchitis (IB), avian influenza (AI).

MSG Guard

Composition

MSG guard comprises an optimal combination of alpha-monoglycerides of SCFA, MCFA and Sophorolipids as follows:

- Glycerides of butyric acid (alpha-monobutyrin)
- Glycerides of Caprylic acids (alpha-monocaprylin)
- Glycerides of Capric acid (alpha-monocaprin)
- Glycerides of Lauric acids (alpha-monolaurin)
- Sophorolipids

Product Specifications

- Available in powder form
- Heat stable and non-corrosive
- Neutral taste and odour
- **Pack size:** Available in 25Kg HDPE Drum

Recommended inclusion levels

Recommended dosage	Broilers/Layers/Breeders
Preventive application	500-700g/ton
High risk condition	1000-1500 g/ton

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