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PROLAEIS™ FACTS

- **New research shows that even at very low concentrations, the unique medium-chain monoglycerides found in Prolaeis can inactivate wild-type African Swine Fever Virus (ASFV/Armenia 07) and prevent infection of porcine macrophages, the primary target of ASFV in pigs.**
- **Our published research[1] demonstrates that Prolaeis inactivates ASFV in feed in as little as 30 minutes.**
- **In that same research, Prolaeis was shown to disrupt the protein capsid which surrounds and protects the DNA of ASFV, thereby preventing infection of target cells.**

Figure 1. Effect of Prolaeis on ASF Armenia/07

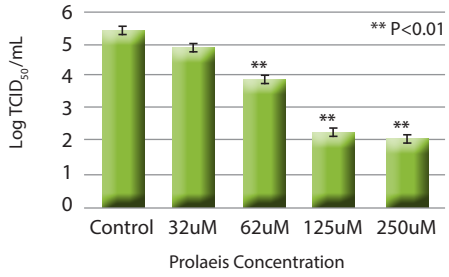
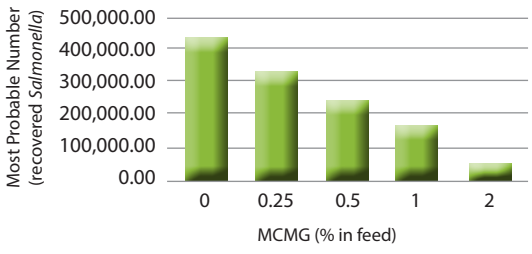


Figure 2. Effect of Prolaeis on *Salmonella* in feed



Product Description:

Prolaeis is a highly refined form of medium-chain monoglycerides (MCMG) which are known to be effective at disrupting the membranes of various microbial and viral pathogens. As a broad spectrum mitigant, Prolaeis is 20X more potent than medium-chain fatty acids at reducing the load of infective pathogens. Even in a PRRS virus challenge model, the monoglycerides in Prolaeis were effective at eliminating clinical disease and maintaining growth performance compared to the infected control animals. In addition, Prolaeis has anti-inflammatory activity which can prevent the diversion of nutrients to fuel inflammation, maintaining their availability for more productive uses such as growth, lactation or gestation.

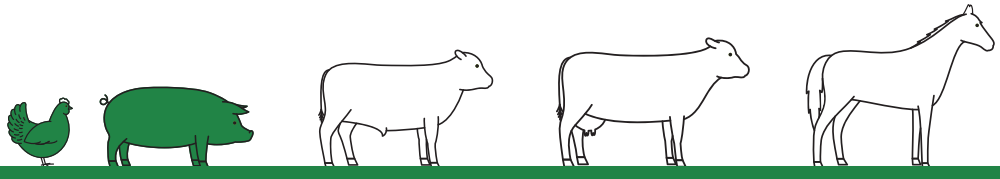
Modes of Action:

The monoglycerides in Prolaeis are well-documented throughout the scientific literature to have high levels of antiviral, antimicrobial and anti-inflammatory activity.

In simple, single lipid-membraned viruses, like Porcine Epidemic Diarrhea Virus (PEDV) and Porcine Reproductive and Respiratory Syndrome Virus (PRRSV), Prolaeis produced 5 to 6 log reductions in viable virus, respectively. In a more complex, double lipid-membraned virus, even with a tough protein capsid, like ASFV, Prolaeis resulted in an over 3 log reduction in infective wild-type ASFV/Armenia 07. These results are due to disruptions of the lipid membrane which either directly inactivates the virus or prevents fusion and entry of the virus to the target host cells.

As an antimicrobial, MCMG can be bacteriostatic by destabilizing membrane-bound enzyme systems involved in energy metabolism, replication and receptor functions or bactericidal by completely lysing the membrane, resulting in bacterial death. While MCMG are primarily active against gram-positive bacteria, we have demonstrated a dose-responsiveness to MCMG by *Salmonella* in feed, resulting in a 90% reduction in *Salmonella* recovery from feed.

Lastly, as an anti-inflammatory agent, MCMG downregulates NFκβ, a key regulatory enzyme involved in stimulating inflammation, even after an LPS challenge. This activity will serve to protect gut integrity during a pathogen infection or a stressor such as weaning or transport.



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PROLAEIS™

Product Description: Prolaeis is a 100% natural supply of medium-chain monoglycerides which we have demonstrated to have significant antiviral, antimicrobial and anti-inflammatory activity. It is safe for use in all phases of swine and poultry production.

- **Ingredients:**
  Vegetable oil
- **Purpose:**
  Prolaeis is to be used as a supplement to complete diets for all phases of swine and poultry production.
- **Suggested Feeding Directions:**
  Follow the directions provided by your nutritional consultant, or:

Swine:	
Nursery	2 to 4.5 lbs./ton (1 to 2.25 kg/tonne)
Gestation	2.5 to 5 lbs./ton (1.25 to 2.5 kg/tonne)
Lactation	4 to 7 lbs./ton (2 to 3.5 kg/tonne)
Growers	2 lbs./ton (1 kg/tonne)
Finishers	2 to 4 lbs./ton (1 to 2 kg/tonne)

Poultry:	
Broilers & Turkeys	
Starter	2 lbs./ton (1 kg/tonne)
Grower/Finisher	1.5 to 3 lbs./ton (.75 to 1.5 kg/tonne)
Layer Feeds	
Pullets	2 lbs./ton (1 kg/tonne)
Layers	1.5 to 3 lbs./ton (.75 to 1.5 kg/tonne)
Breeders	1.5 to 3 lbs./ton (.75 to 1.5 kg/tonne)

Guaranteed Analysis:	
Total Fatty Acids (Minimum)	98%
Free Fatty Acids (Maximum)	1%
Unsaponifiable Matter (Maximum)	1%
Insoluble Impurities (Maximum)	1%
Moisture (Maximum)	1%

Prolaeis can help control viral load and keep your animals healthy.

Visit naturalbiologics.com today.

[1]Jackman, J.A., A. Hakobyan, H. Zakaryan and C.C. Elrod. Inhibition of African swine fever virus in liquid and feed by medium-chain fatty acids and glycerol monolaurate. J Animal Sci Biotechnol 2020, 11:114 https://doi.org/10.1186/s40104-020-00517-3