



Bioactive phospholipids
to improve fat digestion

Maxily[®]

Antibacterials & Digestive Aid





Getting the maximum from today's high-density diets is key to optimize performance

Meeting the nutritional needs of intensive animal production is a challenge.

The use of supplemental fats and oils in animal diets as an energy source in intensive production is common practice. However, the **high energy** provided in modern, high performance diets is **not in balance** with the **physiological excretion of bile salts and lipase** in the animal intestine at each growth stage, with several consequences.

The natural process of fat digestion

Fats added to the diet enter the gastro-intestinal tract as part of the digesta in large coagulated particles. Bile salts excreted from the gall bladder enable initially the emulsification of these fat particles into smaller molecules in order to facilitate absorption by the intestine.

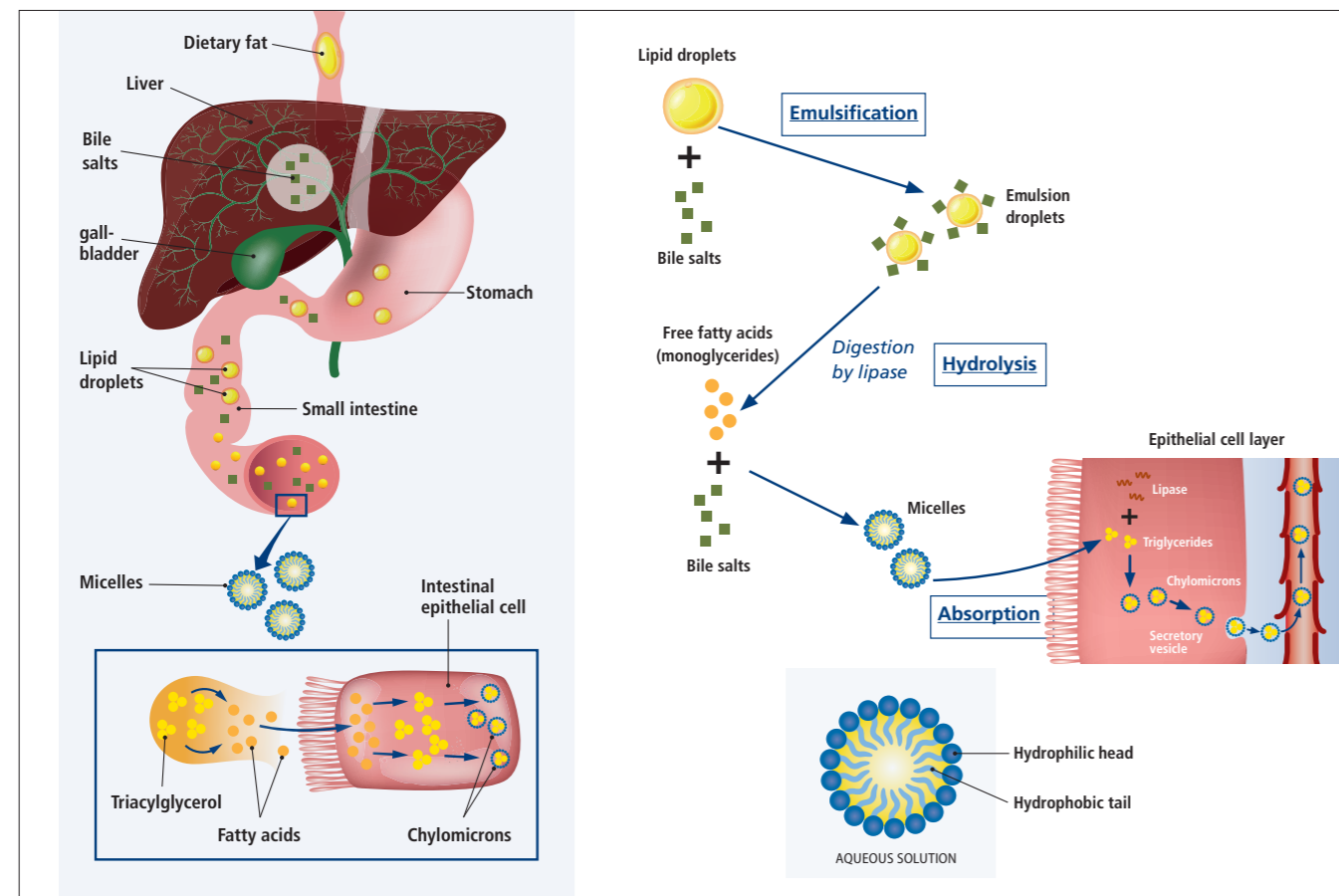
Decreasing the size of the fat globules results in the increase of the available surface area for the downstream action of the lipolytic enzyme, lipase. The role of lipases is to enzymatically digest lipid molecules (triglycerides) into a monoglyceride and two free fatty acids. However, inherently, fatty acids generated from lipase hydrolysis are water-insoluble, making their transportation through the unstirred water layer overlying the surface of the intestine impossible. Absorption of these molecules is facilitated by the formation of micelles – a process naturally mediated by amphipathic molecules such as bile salts and phospholipids.

The challenges

All animals, and in particular young animals, exhibit **limited natural levels** of both lipase and bile salt production necessary to meet the today's increased nutrient uptake and absorption through diet. Therefore, animals exhibit limited capacity for **complete nutrient digestion**.

This often leads to:

- Overload of the liver
- Triggering the animal's immune response
- Reduced animal performance and thus, profitability.



Schematic representation of fat digestion

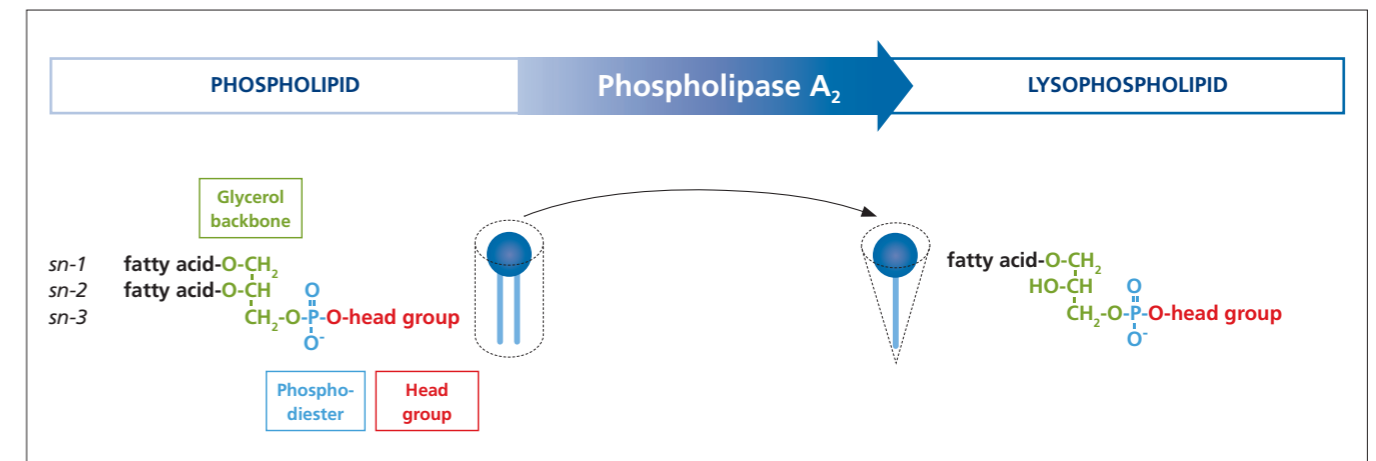
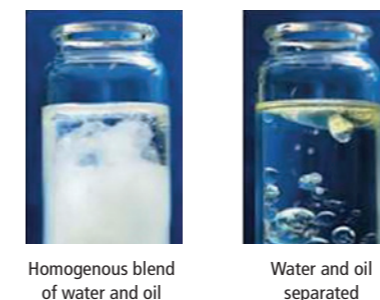
Maxilys®
Provides an optimal combination of enzymatically bioactive emulsifiers, designed for enhanced digestibility and advanced nutrient absorption by the animal

Maxilys® supplementation can significantly improve breakdown and digestion of nutrients due to its bioactive content, by **improving nutrient absorption provided from feed**. Maxilys® releases 'feed-related stress' from intensively reared animals and **increases profitability**.

Emulsification properties of lecithins

Lecithins are mainly used as **emulsifiers**. They are mixtures or fractions of phospholipids obtained from animal or vegetable sources by physical processes. Lecithins are surface active, exhibiting both **hydrophilic** and **hydrophobic** properties that enable them to form stable blends of components that otherwise do not mix adequately or have the tendency to separate.

The main characteristics of soybean-based lecithins are derived from the unique properties of phospholipids.



Schematic representation of the enzymatic hydrolysis of phospholipids

The role of lysophospholipids

Phospholipids are biosurfactants naturally known to enhance the absorption of oils, fats and fat-soluble vitamins within diet. However, enzymatic **hydrolysis of phospholipids results in the formation of lysophospholipids**, which exert **enhanced bioactive surfactant and nutrient absorption** properties than their parent phospholipids.

Lysophospholipids exert superior emulsification properties by:

- Reducing interfacial tension and **improved oil-in-water emulsions**.
- Forming nutrient-dense aggregates, known as micelles, faster due to a **higher critical micelle concentration (CMC)** compared to their parent phospholipids. The higher the CMC the better the emulsification and subsequently absorption of nutrients.
- Forming **smaller micelles** in the small intestine thus, providing higher surface area for lipase activity.

Lysophospholipids enhance the absorption of nutrients by:

- Improving digestion of fats
- Altering the physiology of cell membranes by:
 - Increasing cell membrane fluidity
 - Modifying cell membrane structure
 - Modifying cell membrane porosity

These mechanisms result in **increased** passive and active **transport of nutrients across the enterocytes** and thus, **increased nutrient digestibility, metabolic energy and animal growth**.

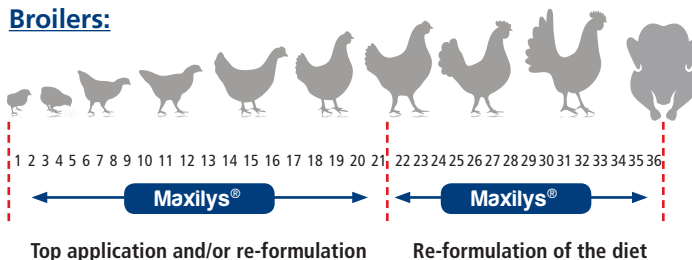


Dosage and application



Poultry:

Broilers:



Starter: 500g/MT of feed

Grower/Finisher: 250-500 g/MT of feed

Energy value: 80 kcal/100g of **Maxilys®** for a formula with minimum 5% total fat, of which minimum 2% is added fat. The maximum energy sparing effect is limited to 240 kcal or 300 g/MT of **Maxilys®**.

Benefits:

- Reduced abdominal fat deposition
- Improved meat quality by reducing unsaturated fat deposition
- Reduced feed cost and diet optimization

Layers:

100-150 g/MT of feed

Benefits:

- Less abdominal fat deposition
- Higher egg quality
- Improved physiological functions



Swine:

Piglets: 500 g/MT of feed

Fatteners/Sows : 250-500 g/MT of feed

Benefits:

- Improved piglet body weight during weaning
- Support of sows during milk production
- Improved carcass quality
- Reduced fat deposition
- Improved fats distribution within body mass



Aquaculture:

Marine Species: 1-2 kg/MT of feed

Crustaceans: 1-3 kg/MT of feed

Fresh water: 200-600 g/MT of feed

Benefits:

- Improved fat digestion
- Improved FCR
- Immune system support

Factors influencing lipid digestion

Diet-related factors:

- Degree of saturation and chain length of fatty acids
- Rancidity and oxidation
- Lipid inclusion level
- Moisture, impurities and unsaponifiable
- Dietary calcium levels
- Non-starch polysaccharides (NSP)
- Processing of the diet

Animal-related factors :

- Age
- Gender
- Microbiota

Benefits of Maxilys®

- Improved digestion and absorption of nutrients
- Weight gain and improved Feed Conversion Ratio (FCR)
- Improved growth during all stages of animal development
- Reduced inflammation and stress
- Support of liver and general health
- Profitability
- Improved pellet durability and quality



Innovad nv/sa

Sales & Customer Services : Cogels Osylei 33, 2600 Berchem, BELGIUM

Production & Laboratory : Postbaan 69, 2910 Essen, BELGIUM

Tel. +32(0) 3 667 16 55

www.innovad-global.com

info@innovad-global.com