

NOVEMUL®:

Powerful mixture of feed emulsifiers, specially designed to improve fat digestion and ME level from fat and RM

In livestock diets, fats and oils are very important sources of energy which are usually added to increase the energy concentration in the diet and improve performance. Approximately 90% of the fat is present in the diet under the form of triglycerides.

During digestion, the triglycerides are enzymatically hydrolysed by pancreatic lipase. In a large fat globule, only the surface lipids are exposed to lipase. As triglycerides are not water soluble, they need to be emulsified before the lipase can have an optimal effect. In this step of the digestion, bile, which is produced by the liver and stored in the gallbladder, will act as emulsifier through the bile acids, resulting in an emulsification of the dietary fat, finally leading to a high accessibility of fat for the enzymatic hydrolysis. Within the bile, bile salts as well as phospholipids are responsible for the emulsification properties.



Fig. 1: Fat breakdown in the small intestine.

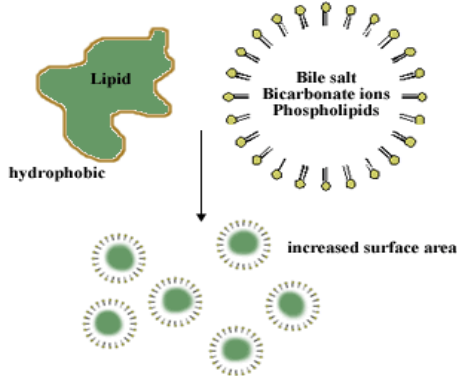


Fig 2: Emulsification during fat diaestion.

As end product of triglyceride hydrolysis, glycerol and water soluble short chain fatty acids can be rapidly absorbed by diffusion while water insoluble 2-monoglycerides and long chain fatty acids can only be transported via micelles. Also for the formation of micelles, bile intervenes again as emulsification agent.

The process of fat emulsification is the most important step in achieving the maximum metabolizable energy (ME) value from the added fat source. However, secretion of bile and lipase in young chick is always insufficient to get an optimum emulsification and this often results in depressed ME value of the fat added to the diet. To assure that these added fats are absorbed efficiently by the bird's digestive system one should add emulsifiers.

INNOVAD offers a range of different emulsifier which will suit any possible application within modern animal rearing based on:

- **Lecithin:** A vegetal source, rich in phospholipids, mainly origination from soya or sunflower
- **Enzymatically hydrolysed lecithin:** Originates from the lecithin, but differs by the fact that one fatty acid has been enzymatically removed in order to increase the HLB-value (hydrophobic – lyophobic balance).
- **Glyceryl polyethyleneglycol ricinoleate (E 484):** Vegetable oil, chemically reacted with ethylene oxide

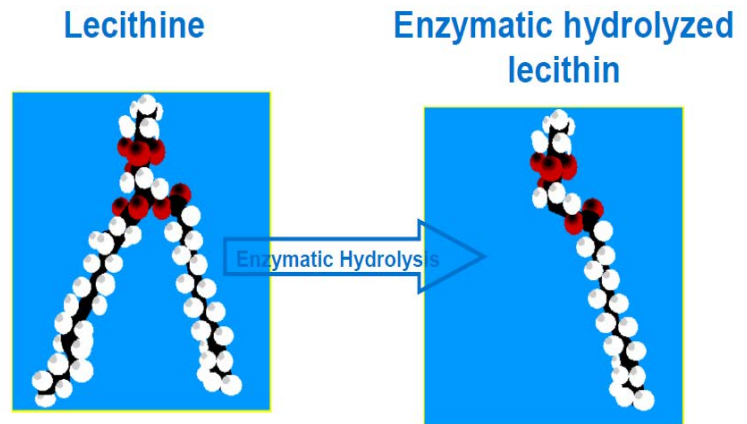


Fig. 2: Enzymatic hydrolysis of lecithin

| Emulsifier | Concentration (% on fat) | Max. velocity of hydrolysis by lipase (60% tallow, 25% lard, 15% coconut oil) ($\mu\text{m FA/mg/min}$). | HLB value |
|---------------------|--------------------------|--|-----------|
| Standard lecithin | 2 | 0.2 | 3-4 |
| Hydrolysed Lecithin | 2 | 5.11 | 8-9 |
| E 484 | 1 | 0.6 | 13 |

Features and benefits of dietary emulsifiers:

- Support digestive functionality in young animals.
- Improves total nutrient digestibility of high concentrated diets
- Increases technical performance parameters (FCR – ADG)
- Can improve output as well as texture

| Name | Dose recommendations (kg/ton) |
|-----------------------|---|
| NOVEMUL® | Pigs: 0.5-1 kg/ton Poultry: 0.5-1 kg/ton |
| NOVEMUL® S | Pigs: 0.25-0.5 kg/ton Poultry: 0.25-0.5 kg/ton Aquaculture: 0.75-1 kg/ton |
| NOVEMUL® EXTRA | Pigs: 0.5 – 1 kg/ton Poultry: 0.5-1 kg/ton |