



Application Data Sheet

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KSHRASE[®] C

Application: Cheese and Enzyme Modified Cheese

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PRODUCT DESCRIPTION

KSHRASE[®] C is an animal lipase (triacylglycerol) produced from pregastric bovine (calf) tissue

BENEFITS

- Releases quickly cheese ripening flavours.
- Kosher. (in compliance with Cheese and Whey requirements)
- Consistent performance
- Cleaner taste
- No residual animal tissue
- No radiation applied during production of the enzyme
- Non GMO

ACTIVITY; FORMULATION AND RECOMMENDED DOSAGE

Activity: 16.5 LU per gram

Formulation: Granulated and standardized with salt (SodiumChloride). Check with your DSM account manager the available packing sizes.

Recommended dosage: The dosage of KSHRASE[®] C strongly depends on the type of application; the ripening time and the desired flavour profile.

For 1,000 lbs of cheese milk:

0.10 - 0.25 oz (mild flavor)

0.50 - 0.75 oz (medium flavor)

1.0 oz or higher (strong flavor)

For 1,000 liters of cheese milk:

7 - 16 grams (mild flavor)

32 - 48 grams (medium flavor)

63 grams or higher (strong flavor)

The recommended dosage for EMC is 5 to 10 times higher compared to cheesemilk.

It is recommended to start with low-medium dosage in small scale trials to determine the dosage that fits best to the desired taste and flavour profile, and then determine the optimal dosage.

WORKING MECHANISM AND FUNCTIONALITY

KSHRASE[®] C is able to hydrolyse and to esterify triglycerides. Under watery conditions like milk and cheese, hydrolysis will take place. Under such conditions the enzyme is called a lipase. In the absence of water KSHRASE[®] C is able to esterify the triglycerides and is then called an esterase.

The substrate for KSHRASE[®] C in milk and cheese is milk fat. Milk fat is a mixture of tri-glycerides, present as globules covered by a membrane in milk or as continuous fraction in ripened cheeses. A tri-glyceride contains a glycerol backbone with 3 fatty acids connected to it. See figure 1.

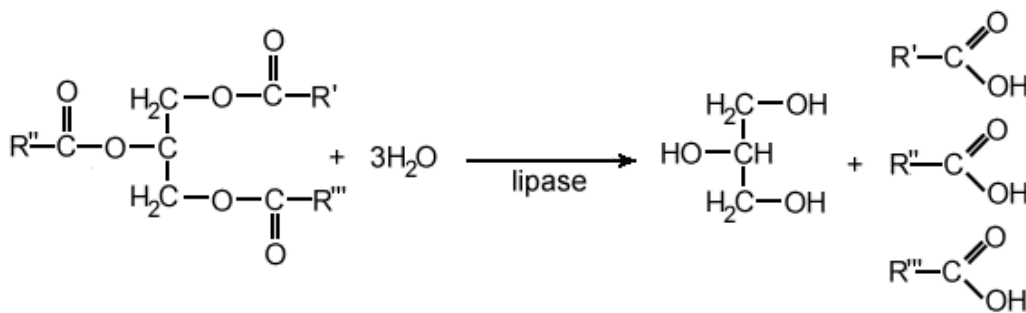
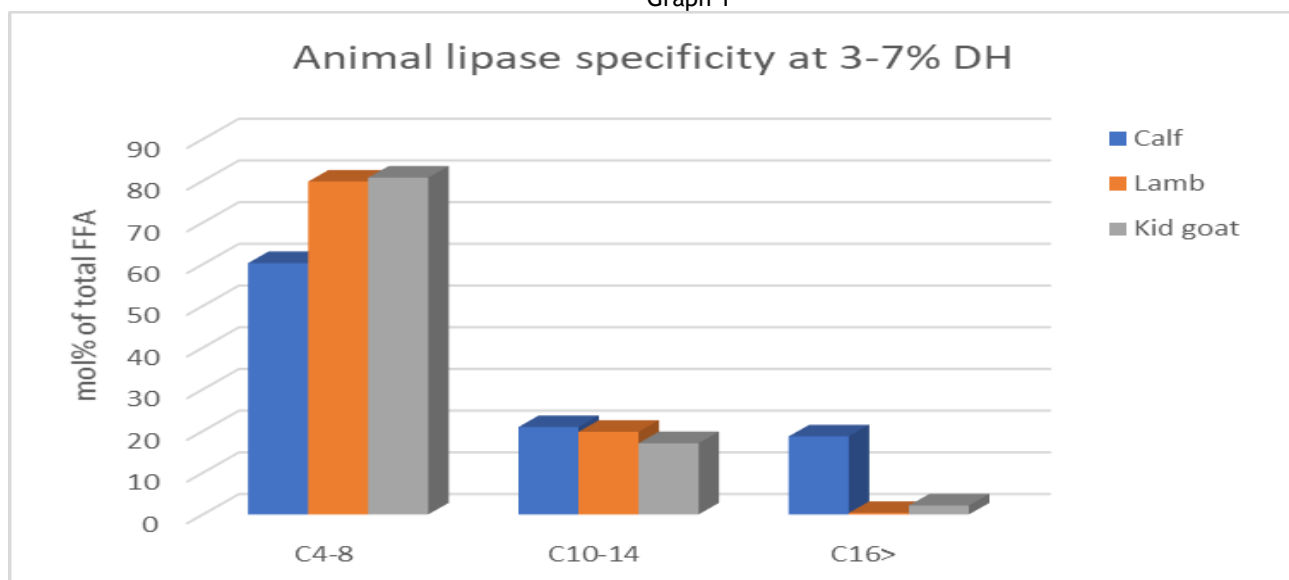


Figure 1. Hydrolysis of a tri-glyceride into glycerol and free fatty acids

The perceived flavour of a FFA is very much depending on the length of the R(est)-group of the FFA. In regular cheese ripening only a part of the FFA are released from the glycerol backbone. Which FFA are released depends strongly on the type of Lipase that is used. In graph 1 the FFA release of different animal lipase is compared. Therefore, although the activity of different enzymes can be the same, the flavour profile in the application can be very different.

Graph 1





pH profile

KSHRASE[®] C is very active in milk and cheese because of the broad pH range that goes all the way from pH 5.5 to 7.5.

Temperature profile

KSHRASE[®] C is active at the temperatures of regular cheese production and ripening, but its optimum temperature is at 30-40°C / 86-104°F. At curd cooking temperature of 50°C / 122°F KSHRASE[®] C is still active.

Regular pasteurization will inactivate the enzymatic activity to large extend. However, customers need to validate whether their final product specifications are met

Activation and inhibition

The activity of KSHRASE[®] C can be influenced by several ions such as Zn²⁺, Co²⁺; Fe²⁺, Mg²⁺, and Ca²⁺. The natural variations in milk will not cause any differences in activity of KSHRASE[®] C.

APPLICATION

Cheese

KSHRASE[®] C is recommended for Romano, Provolone, Parmesan and other sharp and piquant varieties of Italian cheeses. The enzyme is also suitable for use in the manufacture of Feta, Manchego and mould ripened cheeses like Blue cheese.

EMC

Another important application of KSHRASE[®] C is Enzyme Modified Cheese (EMC). Usually KSHRASE[®] C is used in combination with proteases to get an intense cheese-flavor.

Dissolving the granulates

KSHRASE[®] C must be dispersed in 10 to 20 parts of cool, chlorine free water. In situations with no chlorine free water available, alternatively 5% milk can be added to the water before dispersion of KSHRASE[®] C. After a soaking-time of 10 minutes in water, the enzyme solution can be added to the milk (Cheese application) or cheese-slurry (EMC-application). Make sure to mix the enzyme in the milk properly before rennet is added.



ALTERNATIVES

KSHRASE® C can be used by its own or in combination with other DSM lipases.

SAFE HANDLING

A Safety Data Sheet (SDS) is supplied with all products. For details on safe handling of enzymes please see the SDS.

TECHNICAL SERVICE

DSM: a leading dairy player

DSM is the dairy industry's leading supplier, catering to the needs of multinational companies as well as small local producers. We are dedicated to supplying solutions, not just products. We work closely with our customers to help them overcome specific market challenges. To achieve this, we combine years of experience with a dedication to innovation and the best technical support possible. We apply this approach to all dairy markets, including cheese, milk, fermented milk products and whey processing.

DSM services include:

- Technical in house know-how to support application development.
- Tailor made training possibilities.
- Technical Service.

For more information, please contact your local sales representative or send an e-mail to info.food@dsm.com

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