

# Glycerin

## Livestock

### Identification

**Chemical Names:** glycerol

**Other Names:** Glycerine, Glycerin, Glycerol, 1,2,3-Propanetriol

**CAS Numbers:** 56-81-5

**Other Codes:** none

### Recommendation

<b>Synthetic / Non-Synthetic:</b>	<b>National List:</b>	<b>Suggested Annotation:</b>
<i>Non-Synthetic (1) Synthetic (2)</i>	<i>Allowed (Consensus)</i>	<i>Glycerin, Allowed. Must be USP grade and produced through hydrolysis of fats and oils. For use as a livestock teat dip. (Consensus)</i>

### Characterization

**Composition:**

C<sub>8</sub>H<sub>8</sub>O<sub>2</sub>. Glycerine 99.7% and water.

**Properties:**

Glycerin is colorless or pale yellow liquid; odorless and syrupy; sweet and warm taste. It is hygroscopic and its solutions are neutral. Miscible with water and alcohol. Insoluble in chloroform, ether and in volatile oils.

**How Made:**

Glycerin is a by-product of the soap manufacturing process. Oldest method of manufacture is by hydrolysis of natural fats & oils (either animal or vegetable): heat, steam, and pressure “split” the glycerin from the oil. The glycerin is concentrated in multistage evaporators and refined. Purification is achieved through either an ion exchange process or a distillation system. It can be produced synthetically from propylene.

**Specific Uses:**

Glycerin has over 1,000 uses; however for purposes of this review, glycerin is used as an ingredient in teat dips. It is often described as an inert ingredient used in topical medications as a vehicle. In teat dips it prevents teat irritation and improves skin conditioning. Glycerin has some germicidal activity (Fox et al., 1990).

**Action:**

The means by which it inhibits bacterial growth is not entirely known. Serves as a humectant and emollient.

**Combinations:**

Iodine, chlorohexidine.

### Status

**OFPA**

Glycerin falls under section 6517(1)(B)(i) of the OFPA code that describes livestock medicines.

**Regulatory**

FDA-GRAS.

**Status among Certifiers**

The NOSB recommended that glycerin should be allowed in organic processing with the annotation that it be produced by hydrolysis of fats and oils. Sources produced from propylene were annotated as not allowed for use as non-organic ingredients.

**Historic Use**

Not developed for use in organic livestock production.

**International**

Livestock materials have not been addressed by Codex; IFOAM Basic Standards do not mention glycerine or other synthetics used as teat dips, but it does not appear to be prohibited.

**OFPA 2119(m) Criteria**

- (1) The potential of such substances for detrimental chemical interactions with other materials used in organic farming systems.

The reason glycerin is so widely used as a carrier for other medications is that it does not make detrimental chemical interactions with other substances. It stays inert without changing the properties of whatever it is used with. Furthermore, it also acts as an emollient, reducing moisture evaporation of the skin.

- (2) The toxicity and mode of action of the substance and of its breakdown products or any contaminants, and their persistence and areas of concentration in the environment.

Oral LD (in mice) = 31.5 g/kg

Glycerin breaks down to glucose which in turn readily breaks down in the environment to CO<sub>2</sub> and H<sub>2</sub>O. It has no problem with persistence or toxicity in the environment.

- (3) The probability of environmental contamination during manufacture, use, misuse or disposal of such substance.

Glycerin manufacturers must comply with all environmental and worker safety regulations. Glycerin readily breaks down to glucose that is easily metabolized upon use and disposal. No reports of industrial poisoning in the manufacture or use of glycerol.

- (4) The effect of the substance on human health.

Glycerin mist can act as an inhalation irritant. It is easily digested with the same metabolism as the carbohydrates.

- (5) The effects of the substance on biological and chemical interactions in the agroecosystem, including the physiological effects of the substance on soil organisms (including the salt index and solubility of the soil), crops and livestock.

As a postmilking teat dip alone, glycerin had a small beneficial effect on reducing colonization by *Staphylococcus aureus* (Fox, et al., 1990).

- (6) The alternatives to using the substance in terms of practices or other available materials.

Synthetic emollients such as isopropyl myristate, isopropyl palmitate, polypropylene glycol, other glycol derivatives, petroleum fractions, high molecular weight alcohol, allantoin and many others; synthetic glycerin from petrochemicals. Natural emollient alternatives are castor and vegetable oil.

Other milking management techniques to control mastitis that are considered alternatives to glycerin are the following:

- 1) Monitoring for mastitis.
- 2) Wiping or cleaning debris from teats.
- 3) Massaging each teat to loosen debris and stimulate milk letdown.
- 4) Wiping off the teat dip using individual cloths or paper towels.
- 5) Applying the milking unit without air admission and, at the end of milking, shutting off the vacuum, and removing the milking unit.

- 6) Isolate infected cows and cull cows that have repeat attacks.
  - 7) Examine and test all herd additions and treat clinical infections as they occur.
- (7) Its compatibility with a system of sustainable agriculture.

Glycerin is already approved for use in organic food processing as an allowed non-organic ingredient. Glycerin, if produced in the traditional manner, appears to be a harmless emollient and seems compatible with sustainable agriculture.

### Discussion

#### ***Condensed Reviewer Comments***

##### Reviewer 1

I agree with the proposed annotation that glycerin must be USP grade and produced by hydrolysis of fats and oils. But is it ever possible to truly know whether or not this is the case when it is simply listed as an ingredient in a product?

##### Reviewer 2

Glycerol can never be sorted or come into direct contact with strong oxidizers such as potassium chlorate or potassium permanganate because it may produce an explosion. Correct chemical name for glycerin is trihydroxypropane or glycerol. If only heat, steam or pressure split the ester bonds which liberate free glycerol from fat (i.e. triglycerides) then this is a hydrolysis reaction catalyzed by physical forces and is compatible with organic criteria. However, if glycerol is formed by the chemical reaction of sodium hydroxide, then glycerol is produced by a chemically catalyzed hydrolysis reaction and therefore may be considered synthetic.

##### Reviewer 3

Since it is already approved for use in organic food processing, I see no negative impact for use as a teat dip for livestock.

#### ***Conclusion***

Glycerin is a non-synthetic material as long as it is manufactured by the physical hydrolysis of fats and oils and, therefore, is not within the scope of the National List. However, two reviewers noted that glycerol production might involve a synthetic catalyst, sodium hydroxide and, therefore, may be considered synthetic. The recommendation from these two reviewers was that glycerin should be added to the National List with the annotation that it must be USP grade and must be produced by the hydrolysis of fats and oils.

### References

- 1) Fox, LK, M Gershman, DD Hancock, and CT Hutton. 1990. Fomites and reservoirs of *Staphylococcus aureus* intramammary infections: the effect of milking time hygiene practices. *Cornell Vet* 81:183.
- 2) Fox, LK and RJ Norell. 1994. *Staphylococcus aureus* colonization of teat skin as affected by postmilking teat treatment when exposed to cold and windy conditions. *J of Dairy Sci.* v. 77 p. 2281.
- 3) Goldberg, JJ, PA Murdough, AB Howard, PA Drechsler, JW Pankey, GA Ledbetter, DA Richards, and LL Day. 1994. Evaluation of a 1% iodophor postmilking teat sanitizer. *J of Dairy Sci.* v. 77 p. 740-747.
- 4) Henkel Corporation Emery Group. 1994. Uses of Glycerine. Technical bulletin.
- 5) Merk Veterinary Manual. 1998. 8<sup>th</sup> ed. pp. 1013-1015. National Publishing, Inc., Philadelphia, PA