

**National Organic Standards Board
Livestock Subcommittee
Petitioned Material Proposal
Glycolic Acid
February 20, 2018**

Summary of [Petition](#):

The NOSB received a petition to add glycolic acid for use as a component of pre- and post-milking teat dips to control mastitis at §205.603(a) Synthetic substances allowed for use in organic livestock production as disinfectants, sanitizer and medical treatment as applicable).

Summary of Review:

Specific Uses of the Substance:

Glycolic acid has been shown to be an effective post-milking teat disinfectant for dairy cows (Godden et al., 2016). Specifically, its petitioned use is as a component in a post-milking teat dip to aid in the prevention of bovine mastitis. Teat dips may contain emollients, excipients, and other allowed disinfectants. Because glycolic acid conditions the skin by exfoliating cracked skin layers, it removes potential hiding places for mastitis causing bacteria, e.g. *Staphylococcus aureus*.

In addition to its uses in skin care, glycolic acid is used in a broad range of applications. For example glycolic acid is used as a descaler for cutting through hard water salts, as a cleaning agent, as a liquid scour in laundry systems, as a copper and aluminum cleaner including boilers and heat exchangers, and as a dairy and CIP cleaner to dissolve casein as well as hard water deposits.

Glycolic acid is certified by the National Sanitation Foundation (NSF) for use in cleaning potable water wells. It is used widely to rehabilitate the flow efficiency of water wells by enabling water-soluble compounds (chelates) to be easily rinsed away with low corrosion to metal parts. Glycolic acid removes hard water scale (calcium, magnesium, manganese salts), various iron deposits and polysaccharide deposits. Glycolic acid biodegrades rapidly. It is a liquid with low toxicity, low odor, is non-flammable and has negligible fumes.

Approved Legal Uses of the Substance:

The first product containing glycolic acid as an active ingredient was registered by the U.S. Environmental Protection Agency (EPA) in 2001 as a disinfecting cleaner and a disinfectant/sanitizer for non-food contacting, hard non-porous surfaces in residential and public access premises. Since then, additional products have been registered with the EPA. There are no tolerances, exemptions from tolerances, or tolerance petitions for this antimicrobial pesticide. Glycolic acid is approved by FDA as an indirect food additive for use in food packaging adhesives (21 CFR 175.105).

Glycolic acid is considered by the FDA to be a human cosmetic that is safe for use by consumers if the concentration is 10 percent or less, the pH is 3.5 or greater and the formulation protects the skin from increased sun sensitivity or the package directions instruct the consumer to use daily protection from the sun (FDA, 2015). Teat dips and udder washes classified as drugs, may currently be marketed without a New Animal Drug Application (NADA) approval. However, the FDA has developed non-binding guidelines for teat antiseptic product development. The guidelines were assembled to inform the drug industry of the types of data that will demonstrate that a teat antiseptic product: 1) is safe for the cow,

2) is effective and 3) fulfills human food safety, manufacturing and environmental requirements. Products to be marketed must be manufactured according the Current Good Manufacturing Practice (cGMP) regulations (21 CFR Part 211) for pharmaceutical dosage forms under the approved NADA process (FDA, 2016).

The USDA does not regulate glycolic acid for application as a teat dip. However, the USDA regularly reports survey results for the dairy industry including statistics of use and recommendations for pre and post milking teat dips (USDA, 2016).

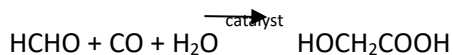
Action of the Substance:

Glycolic acid is mildly bactericidal. However, its effect on the hyperkeratinization of skin is significant. Hyperkeratinization is a primary event in many skin disorders. It is caused by dying and dead adherent skin cells trapped near a hair follicle in the layers of tightly bound living cells called corneocytes. Normally, the dead cells are sloughed off by the follicles in a process called desquamation, but in the case of hyperkeratinization the dead cells are stuck beneath the tightly bound corneocytes. Dry skin, in wintertime is particularly vulnerable to reduced desquamation and hyperkeratinization. Glycolic acid has a therapeutic effect on hyperkeratinization, and the cohesiveness of corneocytes (Scott and Ruey, 1984). One theory for the mechanism of action of glycolic acid is that it reduces the calcium ion concentration in the epidermis and removes calcium ions from the cell adhesions by chelation. The cell adhesions are thereby disrupted, resulting in desquamation (Wand, 1999).

Glycolic acid reduces cohesiveness in the lower, newly forming layers of corneocytes potentially by inhibition of an enzyme. Glycolic acid does not cause disaggregation of corneocytes of the mature upper layer corneocytes, which would result in damage to the skin. Loosening the corneocytes in the lower layers improves desquamation. Glycolic acid promotes a thinner lower corneocyte layer, which not only improves the skin surface smoothness because the dead cells can migrate to the follicles, but also to improves the flexibility of the lower corneocyte layers (aka corneum stratum). A thin stratum corneum bends more readily without cracking or fissuring than a thick stratum corneum. Glycolic acid improves desquamation even if the skin is dry (Scott and Ruey, 1984). Bacteria take advantage of hyperkeratinization by entering the skin through cracks and fissures and colonizing the dead cells. The action of routine glycolic acid use is to remove both entry and colonization sites for colonizing bacteria that may lead to mastitis.

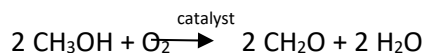
Manufacture:

Glycolic acid is a widely used industrial chemical with a large synthetic production footprint. It has commonly been produced by the Dupont process (hydratative carbonylation) from formaldehyde, carbon monoxide and water and in the presence of the catalyst sulfuric acid. The reaction is carried out at high pressure (300-700 bar) and temperature (200-250°C).



Catalysts such as hydrogen fluoride, hydrogen fluoride/boron trifluoride and strongly acidic (perfluorinated) ion exchangers were subsequently introduced in the Chevron and Mitsubishi processes that are effective at low CO pressure (100 bar). Exxon developed another catalytic method to obtain 70% glycolic acid at 150°C on a strongly acidic ion exchanger made from perfluorosulfonic acid resin (Weisserme and Arpe, 2003).

Formaldehyde is a naturally occurring substance. It is the smallest aldehyde. Formaldehyde is produced industrially by the catalytic oxidation of methanol. The most common catalysts are silver metal or a mixture of metal oxides. In the commonly used Formox process, methanol and oxygen react at ca. 250–400°C in presence of iron oxide in combination with molybdenum and/or vanadium to produce formaldehyde according to the chemical equation:



A silver-based catalytic process operates at a higher temperature, about 650 °C. Two chemical reactions on it simultaneously produce formaldehyde: that shown above and the dehydrogenation reaction:



In principle, formaldehyde could be generated by oxidation of methane, but this route is not industrially viable because the methanol is more easily oxidized than methane (Reuss et al., 2000).

Category 1: Classification

1. Substance is for: **Livestock**
2. For HANDLING and LIVESTOCK use:
 - a. Is the substance **Agricultural** or **Non-Agricultural?**
 - b. If the substance is **Non-agricultural**, is the substance **Non-synthetic** or **Synthetic?**

All glycolic acid commercially available today is made by one of three processes:

- a) High temperature/High pressure continuous flow route practiced by The Chemours Company (formerly DuPont). This is the dominant form of glycolic acid production globally. Formaldehyde and carbon monoxide are the raw materials.
- b) Neutralization and reacidification of monochloroacetic acid (MCA). This is small batch conversions of MCA to glycolic acid with chlorinated organic and salt impurities. MCA is made from chlorine gas and acetic acid. Sodium hydroxide neutralizes the MCA and HCl reacidifies the product to glycolic acid.
- c) Enzymatic conversion of glycolonitrile to glycolic acid. Glycolonitrile is made from hydrogen cyanide and formaldehyde and has a similar impurity profile as the high temperature and pressure route of manufacture.

All of these processes would be considered synthetic routes of manufacture. No “natural” source of glycolic acid is viable.

3. For **LIVESTOCK**:

This product would be listed at §205.603 Livestock Production-Synthetic. Glycolic Acid is a synthetic substance in that it is manufactured using a chemical process.

Category 2: Adverse Impacts

1. What is the potential for the substance to have detrimental chemical interactions with other materials used in organic farming systems? [§6518(m)(1)]

Over the counter non-wipe post-milking dairy teat dips containing three percent glycolic acid (e.g. Ocean Blue Barrier®) are also likely to contain 5% glycerol, 5% sorbitol, xanthan gum, povidone k30, c9-11 Pareth-8, FD&C Blue No. 1, sodium hydroxide, water and sodium C14-16 olefin sulfonate. Package instructions do not suggest the use of one post-milking teat dip with another. The glycolic acid used for this formulation may be technical grade. Glycerin, an emollient, does not enhance the absorption of glycolic acid into the skin (Andersen, 1998). Sodium hydroxide is added to raise the pH of the teat dip. Low pH is a potential source of skin irritation when using glycolic acid to treat skin (FDA, 2015). Other ingredients used in teat dips include additional emollients, surfactants, colorants and plasticizers that permit adherence and identification of treated skin. Although there is general acceptance for the use of post milking teat dips, no advantage has been described for the use of multiple teat dip products in the same application (The National Mastitis Council, 2017).

2. What is 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? [§6518(m)(2)]

In an early report, undiluted glycolic acid administered to rabbits was shown to cause acid-like burns to their skin and eyes (Carpenter and Smyth, 1946). Fifty and 70% Glycolic Acid applied to the backs of mini pigs for 15 minutes caused epidermal necrosis, inflammatory infiltrate and for 70% Glycolic Acid dermal necrosis after one day (Andersen, 1998). Reproductive, gastrointestinal, developmental and renal toxicity in rats, cats and guinea pigs have also been demonstrated with oral administration of high doses (70-100%) of glycolic acid (NIOSH, 2017). Glycolic acid is known to cause enhanced sensitivity to UV light. Short-term application of 10% glycolic acid sensitizes the skin to UV light. However, this photosensitivity is reversed within a week of terminating treatments (Kaidbey et al., 2003). Glycolic acid is an important metabolite of ethylene glycol. Increased glycolic acid in the blood correlates directly with acute ethylene glycol toxicity and renal failure (Hewlett et al., 1986). Glycolic acid has been widely studied because it is used in health products and cosmetics. However, many of the conclusions of these studies have been equivocal or even contradictory. Varying or unreported conditions, parameters and criteria such as the concentration and grade of glycolic acid used and duration of exposure have made it difficult to assess and compare them. The primary areas of concern for glycolic acid however, are its dermal irritation potential and its potential to increase sensitivity to sunlight. Both of these factors result from glycolic acid's ability to partially remove the stratum corneum layer of skin. Generally, for leave on products, glycolic acid concentrations not greater than 10% at pH no less than 3.0 will not produce unacceptable irritation. Glycolic acid does increase sensitivity to sunlight which should be considered in treatment (Andersen, 1998).

In six studies presented by the US Environmental Protection Agency, glycolic acid was noted to be slightly toxic to bluegill sunfish (Effective Concentration (EC)₅₀=93 ppm), and practically non-toxic to bobwhite quail (Lethal Concentration (LC)₅₀>5000 ppm), Mallard duck (LC₅₀>5000 ppm), fathead minnow (LC₅₀=164 ppm) and daphnia (EC₅₀=141 ppm). In this same review, glycolic acid was noted to be only slightly toxic to mammals with an LC 50 of 1938 ppm (EPA, 2011).

Glycolic acid as glycolate is an important intermediary molecule in plant photorespiration, but in excess it is toxic and can inhibit photosynthesis (Ogren, 2003; Dellero et al., 2016). The degree of inhibition and

toxicity both depend on the particular species and variety of affected plant. In maize, for example, the accumulation of glycolate provokes the inhibition of ribulose bisphosphate carboxylase (RUBISCO) and the subsequent decrease in CO₂ assimilation (Gonzalez-Moro et al., 1997). Because it can inhibit photorespiration glycolic acid may be algistatic for some algal species, e.g. *Selenastrum capricornutum*, but since CO₂ absorption pathways may vary between algal species, e.g. *Chlorella* spp., the appearance of toxicity is likely to be dependent upon glycolic acid concentration (EPA, 2011; Fogg and Nalewajko, 1963; Raven et al., 2012).

3. Describe the probability of environmental contamination during manufacture, use, misuse or disposal of such substance? [§6518(m)(3)]

Most of the glycolic acid is manufactured at a chemical production plant in Belle, West Virginia. This chemical plant is located in the Kanawha Valley which is known for its many chemical manufacturing facilities. There have not been any major spills or accidents at this plant since 2010, when the release of phosgene gas into the atmosphere caused the death of an employee. The State of West Virginia provided the plant operator with a permit to operate and produce glycolic acid in 2015 (West Virginia Department of Environmental Protection, 2015). The permit expires in 2020 and permits respectively maxima of 1.9, 15.5, 15.2 8.14 and 5.85 tons/year of formaldehyde, methanol, formic acid, carbon monoxide and NO_x to be released to the atmosphere from the plant's thermal oxidizer.

The US EPA has not received any guideline environmental fate studies on glycolic acid, and has not required studies to be done. Since a toxicological concern has not been identified, the US EPA believes that, based on the currently registered use pattern of glycolic acid for household use as a disinfectant/sanitizer for hard non-porous surfaces in homes, guideline environmental fate or ecological effects studies are not necessary (EPA, 2011).

Various synthetic processes are available for preparing glycolic acid. Contaminants potentially found in downstream products are formaldehyde and monochloroacetic acid which are the starting materials. Residual reagents include sodium chloride, formic acid, methoxyacetic acid which are byproducts from the synthesis process. These impurities must be controlled for safety and the physical and chemical characteristics of the product (Liedtka, 2016). Glycolic Acid is available as a technical grade 70% solution and as higher purity grade solutions of 70% (Glypure 70) and 99% (Glypure 99) (Chemours, 2015). Because of the amount of impurities, technical-grade Glycolic Acid is not used in personal care applications (Andersen, 1998, Table 2). The US FDA found no concerns about the physical and chemical characterization when potential impurities, such as formaldehyde are controlled at acceptable levels. Glycolic acid is a well-characterized small molecule that is likely to be stable under ordinary storage conditions (Liedtka, 2016).

4. Discuss the effect of the substance on human health. [§6517 (c)(1)(A)(i); §6517 (c)(2)(A)(i); §6518(m)(4)].

Labels for products containing 3% glycolic acid for use as a pre- and post-milking teat dip indicate only that the substance can cause eye irritation ([MSDS, OceanBlu Barrier, deLaval](#)). Glycolic acid at different concentrations is used for a number of human medical procedures as a keratolytic agent. Glycolic acid at 57-70% is corrosive to the skin and eyes. Ingestion of substantial amounts at this concentration may result in kidney failure (PubChem, 2017). Glycolic acid in cosmetic products used by the general public may cause skin and eye irritation when present at high concentrations and low pH values. In addition, manufacturers, importers and suppliers of consumer products should inform consumers that the use of

skin exfoliant cosmetic products may result in an enhanced sensitivity to sunburn, and that use of sunscreen protection is advised (NICNAS, 2000).

Occupational exposure to glycolic acid may occur through inhalation and dermal contact with this compound at workplaces where glycolic acid is produced or used. Monitoring and use data indicate that the general population may be exposed to glycolic acid via inhalation of ambient air, ingestion of food and dermal contact with consumer products containing glycolic acid (NCBI, 2017).

5. Discuss any effects the substance may have 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. [§6518(m)(5)]

The chemomechanic action of alphahydroxy acids (AHAs) in exfoliation is to reduce calcium ion concentration in the epidermis and remove calcium ions from the cell adhesions by chelation causing disruption in cell adhesions and desquamation. Glycolic acid can also suppress melanin formation by inhibition of tyrosinase activity. Intraperitoneal administration of 1000 mg/kg glycolic acid inhibits oxygen consumption and glucose metabolism in rat liver and myocardium *in vivo*, but does not affect brain oxygen consumption. Glycolic acid in high concentrations (70% solution and pure) causes local effects typical of a strong acid, such as dermal and eye irritation. In a 3-week dermal toxicity study in hairless guinea pigs, erythema and/or flaking of the skin were noted at 5% and 10% concentrations of glycolic acid. Glycolic acid induced calculi formation in rats in a 4- to 12-week repeat dose oral toxicity which also disclosed increased renal oxalate and nephrotoxic effects have been observed. In a 2 week study in rats, respiratory tract irritation, hepatocellular degeneration and thymus atrophy were observed. Glycolic acid was negative for mutagenicity in the Ames test and the mouse lymphoma assay and not considered genotoxic. Glycolic acid was negative for clastogenicity in an *in vitro* chromosome aberration assay and an *in vivo* micronucleus assay in mice.

Carcinogenicity from glycolic acid exposure has not been demonstrated. Oral (gavage) doses of glycolic acid up to 600 mg/kg/day were administered to female rats during gestation days 7-21 – Maternal toxicity was seen at doses \geq 300 mg/kg/day – Developmental toxicity was also noted at doses \geq 300 mg/kg/day, including fetal weight reduction and increases in skeletal malformation (FDA, 2005). Glycolic acid post milking treatment can affect keratin dynamics (The National Mastitis Council, 2017). Glycolic acid is non-toxic in dogs up to 100 milligrams/kilogram, but nephrotoxic effects result from doses of 250 mg/kg, and fatality occurs if greater than 500 mg/kg is ingested. Glycolic acid is also nephrotoxic to cats (Krop and Gold, 1944).

Glycolic acid is found in the fruit, leaf, stem and root portions of all plants. Glycolic acid is found naturally in extractable amounts in sugar cane and sugar beets (Thangaevelu, 2010; Stark et al., 1950). It is also excreted naturally by several algal species (Tolbert and Zill, 1956). Commonly consumed fruits and vegetables are reported to contain from 0.45-7.4 milligrams glycolic acid per 100 grams fresh wet weight. Tea, coffee, fruit juice and other beverages derived from plant sources may contain 5-7 mg glycolic acid per 100 mL. Foods of animal origin are generally low in glycolic acid, with milk and beef reported to contain 0.06-0.12 mg per 100 g (NICNAS, 2000). It is readily biodegradable in soil and water.

6. Are there any adverse impacts on biodiversity? (§205.200)

Glycolic acid is found in ruminant blood. Studies have shown that it is incorporated into casein, fat and lactose of milk (Peters et al., 1971).

There have not been any reports of adverse environmental events related to glycolic acid release. Approximately 0.15 ml of glycolic acid (3%) is used per udder quarter in a post milking test dip (Matti and Tinnis, 2015). Glycolic acid at a concentration of 70% is approved for use as an acid non-food cleaning agent for removal of rust, corrosion, scale or other deposits that are not readily removed by alkaline cleaners in dairies.

Glycolic acid is a significant industrial chemical (EPA, 2011). If released to air at an extrapolated vapor pressure of 0.02 mm Hg at 25 °C, glycolic acid will exist solely as a vapor. Vapor-phase glycolic acid will be degraded in the atmosphere by reaction with photochemically-produced hydroxyl radicals; the half-life for this reaction in air is estimated to be 3.4 days. Glycolic acid does not contain chromophores that absorb at wavelengths >290 nm and, therefore, is not expected to be susceptible to direct photolysis by sunlight. If released into soil, glycolic acid is expected to have very high mobility based upon an estimated Koc of 0.14. Koc is a measure of the tendency of a chemical to bind to soils, corrected for soil organic carbon content. The pKa of glycolic acid is 3.6, indicating that this compound will exist almost entirely in anion form in the environment and anions generally do not adsorb more strongly to soils containing organic carbon and clay than their neutral counterparts. Volatilization of glycolic acid from moist soil surfaces is not expected to be an important fate process because the compound exists as an anion and ions do not volatilize. Glycolic acid is not expected to volatilize from dry soil surfaces based upon its vapor pressure. Tests for inherent biodegradability showed 86% of the theoretical BOD was reached in 2 weeks. This indicates that biodegradation is an important environmental fate process in soil and water. If released into water, glycolic acid is not expected to adsorb to suspended solids and sediment based upon the estimated low Koc. A pKa of 3.6 indicates glycolic acid will exist almost entirely in the anion form at pH values of 5 to 9 and, therefore, volatilization from water surfaces is not expected to be an important fate process. An estimated BCF of 3 suggests the potential for bioconcentration in aquatic organisms is low. Hydrolysis is not expected to be an important environmental fate process since this compound lacks functional groups that hydrolyze under environmental conditions.

Category 3: Alternatives/Compatibility

1. Are there alternatives to using the substance? Evaluate alternative practices as well as non-synthetic and synthetic available materials. [§6518(m)(6)]

The pathogens that cause mastitis inhabit many locations throughout the dairy cow environment and infect multiple tissues in the udder. As a result, effective prevention and treatments for mastitis in the organic dairy can range from surface sanitation to parenteral administration of homeopathic medicines, but each alone may not be 100% effective. Thus, there are many possible substances that may serve in place of glycolic acid. Glycolic acid represents a unique approach to bovine teat health, inasmuch as the net effect is to prevent hyperkeratosis, although there is additionally some microbiocidal activity associated with its application.

Vitamin A is similar to glycolic acid in its action, however; the subset of skin cells that are affected are not the same (Scott and Ruey, 1984). Thus, vitamins and minerals to supplement nutrition such as vitamin, selenium, copper, zinc, vitamin A and β -carotene are important to both bolster both cellular and humoral immune response and to maintain skin and udder health (Heinrichs et al., 2009). Low blood plasma concentrations of vitamin A and β -carotene are directly associated with the severity of mastitis in cows (Chew et al., 1982).

Homeopathic pharmacies can provide pre-prepared remedies for mastitis in dairy cows. Udder liniments containing mint or anti-inflammatory agents are often used as support therapy with homeopathy (Hovi and Roderick, 1998). More examples include Belladonna for acute postpartum mastitis; Aconitum for

routine treatment for all acute cases, particularly those that develop rapidly after exposure to cold dry wind; *Apis Mellifica* is indicated for first calving, heifers with edema of and around the udder; *Bryonia Alba* is indicated for swollen and very hard udders; *Arnica Montana* for mastitis resulting from udder injuries; *Belia Perennis* for deeper injuries (e.g., neglected milkers); *Phytolacca* for clinical and chronic cases with sour, coagulated milk, small clots at mid-lactation; *Urtica Ulens* for clinical cases where edema forms plaques sometimes up to perineum; mixtures of Sulphur, Silica and Carbo Vegetabilis for clinical and subclinical cases; *Hepar Sulphuris* to aid suppuration and cleaning of udder in summer mastitis cases; *Silicea* for summer mastitis cases with purulent abscess and *Ipeca* for treating internal bleeding that produces pink or bloody milk (MacLeod, 1981). Homeopathic remedies used to treat mastitis also include: *Belladonna*, *Lachesis*, *Vipera Reddi*, *Conium maculatum* + *Plumbum iodatum*, *Phytolacca*, *Bryon* and *Silicea* (Quiquandon, 1982). Homeopathic remedies are not regulated for efficacy and quality as are veterinary drugs, therapies and medications. Furthermore, some research indicates that homeopathic approaches are not effective therapies for bovine mastitis (Ebert et al., 2017).

Currently only iodine (§205.603(a)(13) and §205.603(b)(3)), chlorhexidine §205.603(a)(6), glycerin §205.603(a)(11), and hydrogen peroxide §205.603(a)(12), are allowed to be used in organic dairy production for mastitis prevention and therapy. Teat dips containing the disinfectants iodine and chlorhexidine are effective in reducing intra-mammary infections (Enger et al., 2016). Iodine is effective as a pre- and post-milking teat dip or spray, however, small increases in milk iodide concentration can be expected with its use. Where sprays usually produce a larger increase than dip cup preparations (French et al., 2016). Chlorine materials (§205.603(a)(7)) and phosphoric acid (§205.603(a)(19)) are allowed for sanitizing equipment and facilities. Vaccines, anti-inflammatory drugs (e.g., aspirin and flunixin), electrolytes, and furosemide (with double the milk withholding period) can also be used for the treatment of clinical mastitis (Ruegg, 2014).

Post-milking teat disinfectants need to be persistent and effective in killing bacteria. They must also leave teats in good condition. Preservation of healthy teat skin is essential for maintaining its natural defense against infection because sore, dry, cracked teats may harbor mastitis-causing pathogens (Hogan et al., 1990; National Mastitis Council, 2017). Barrier type teat disinfectants have been developed to extend the germicidal properties of the disinfectant after the cow leaves the milking parlor. These products contain components that can provide a protective film and seal the teat from mastitis-causing bacteria (Lago et al., 2016). Glycerin is a humectant that is allowed for use as a skin conditioner in teat dips. Aloe is a naturally derived products with skin healing properties that may also be included in teat dips (Fox et al., 2006).

Teat irritation can be caused by interaction between teat dip and management or environmental factors in a herd. Teat dips may promote chapping during extremely cold weather especially with windy conditions. Emollients are incorporated such as glycerin or lanolin to minimize irritation and condition skin, however, the germicidal effectiveness of the teat dip may be diminished with too much emollient (Pankey, 1984). Emollients and humectants do not affect bacterial colonization of the skin (Rasmussen and Larsen, 1998).

2. **For Livestock substances, and Nonsynthetic substances used in Handling:** In balancing the responses to the criteria above, is the substance compatible with a system of sustainable agriculture? [§6518(m)(7)]

Yes, but it is unclear if this substance is needed in organic agriculture as alternatives exist. Therefore, the Subcommittee would like to pose the following questions:

1. Are there alternatives available for pre-and post-milking teat dips?
2. Is this product used in rotation with currently allowed pre-and post-milking teat dips?
3. Do alternatives work to control mastitis?

Classification Motion:

Motion to classify glycolic acid as synthetic
Motion by: Ashley Swaffar
Seconded by: Harriet Behar
Yes: 5 No: 0 Abstain: 0 Absent: 1 Recuse: 0

National List Motion:

Motion to add glycolic acid as petitioned at 205.601
Motion by: Ashley Swaffar
Seconded by: Jesse Buie
Yes: 3 No: 2 Abstain: 0 Absent: 1 Recuse: 0

Approved by Ashley Swaffar, Livestock Subcommittee Chair, to transmit to NOSB February 23, 2018