U.S. DEPARTMENT OF AGRICULTURE
FOOD SAFETY AND INSPECTION SERVICE

Petition for Rulemaking to Allow Liquid Sodium Benzoate, Sodium Propionate, Benzoic Acid and Propionic acid as Antimicrobial Agents In Meat and Poultry Products	)))))	Docket No. ____________

Submitted by

Kemin Food Technologies, Inc.

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DATE

April 23, 2010

FSIS Docket Clerk
U.S. Department of Agriculture
Food safety and Inspection Service
Room 102, Cotton Annex Building
300 12th Street, S.W.
Washington, D.C. 20250-3700

CITIZEN PETITION

I. INTRODUCTION

Kemin Food Technologies, Inc. (Kemin) is proposing to expand the list of antimicrobial agents allowed in meat and poultry products to include a) a liquid sodium propionate and b) a liquid sodium propionate and benzoate blend. Kemin's innovative research team identified a process, by which propionic acid and/or benzoic acid can be reacted with sodium hydroxide to achieve uniform and quickly available antimicrobial solutions which are highly effective in controlling growth of the food pathogen *Listeria monocytogenes*. The resulting solutions of sodium propionate alone or as a blend with sodium benzoate produce a pH range of 4.8-5.2. The advantages of this liquid application process are better dispersion of the active compounds propionic acid and benzoic acid throughout the food matrix and an increased antimicrobial activity because of the acidic pH environment compared to their alkalic dry counterparts. Besides a long history of safe use as antimicrobial agents in traditional food applications, both Kemin formulations allow for effective control of *Listeria monocytogenes* in RTE meats and poultry, lower sodium contribution to the finished meat and poultry product, and an overall lower, more cost-effective use rate than the currently used industry standard, lactates, without putting food safety at risk. Main health benefits to the consumer are less preservatives and a reduced sodium contribution from Kemin's liquid sodium propionate alone and in a blend with sodium benzoate compared to lactate-treated RTE meat and poultry products.

In support of this petition and as required by the Food Safety and Inspection Service (FSIS), Kemin conducted in-house studies and University research to confirm that the proposed antimicrobial formulations are safe and suitable at use rates of 0.3% to 0.5% for liquid sodium propionate and 0.4% for the liquid blend of sodium propionate and benzoate. Our successful use of liquid sodium propionate alone or in blend with sodium benzoate as antimicrobial products in other food applications such as tortillas and bakery products have led our research team to validate the suitability of both formulations to control *Listeria monocytogenes* in meat and poultry products. It is Kemin's objective to partner with commercial meat processing facilities to test both formulations in all meat and poultry applications, where lactates are currently used as standard antimicrobial agent.

Our proposed applications of (1) ≤ 0.5% liquid sodium propionate alone or (2) ≤ 0.4% liquid sodium propionate and sodium benzoate have effectively controlled *Listeria monocytogenes* in cured turkey and cooked chicken breast. As with any antimicrobial agent, validation of the most effective use rate needs to be performed on a case-by-case basis to account for many variables that can affect microbial growth and efficacy in specific RTE meat and poultry product applications.

To provide meat and poultry processing facilities with suitable alternatives of antimicrobial agents for inhibiting *Listeria monocytogenes* in RTE meat and poultry products, our petition asks to amend 9 CFR § 424.21 (c) to list liquid sodium propionate alone and the blend of sodium propionate and sodium benzoate as acceptable antimicrobial agents. An amendment to FSIS regulations is necessary because FSIS regulations (9 CFR 424.23(a)(3)) state a prohibition on the use of propionates, benzoates and sorbates.

II. ACTIONS REQUESTED

Kemin hereby respectfully requests that FSIS amend 9 C.F.R. Part 424 to identify liquid sodium propionate and liquid sodium benzoate as safe and suitable antimicrobial agents. We ask FSIS to amend § 424.21 (c), "Use of food ingredients and sources of radiation," to include the following specific uses:

§ 424.21 Use of food ingredients and sources of radiation

* * * * *

(c) * * *

Class of substance	Substance	Purpose	Products	Amount
* * * *				
Antimicrobial Agent	Liquid Sodium propionate (propionic acid buffered with sodium hydroxide to a pH of 4.8-5.2)	To inhibit microbial growth	Various meat and poultry products	Up to 0.5% (by weight of total formulation)
Antimicrobial Agent	Liquid Sodium propionate and sodium benzoate (propionic acid and benzoic acid buffered with sodium hydroxide to a pH of 4.8-5.2)	...... do	.... do	Up to 0.4% (by weight of total formulation)

Kemin requests an expedited review of this petition by FSIS and an interim or final rule in response to it. We believe that an expedited review is appropriate for this petition, because the requested action will enhance public health by removing unavoidable *Listeria monocytogenes* in commonly consumed types of meat and poultry products and by contributing lower sodium to the consumer diet. Kemin would also ask that our Petition for Rulemaking is reviewed along side the currently pending Petition for Rulemaking for sodium benzoate and sodium propionate as antimicrobial agents in meat and poultry products filed by KRAFT on January 19, 2007.

III. STATEMENT OF GROUNDS

The ability of *Listeria monocytogenes* to persist in food-processing facilities for months by withstanding adverse conditions, indicates that meat products are likely re-contaminated, even after thermal processing while exposed to the manufacturing environment during peeling, slicing, dicing or packaging (Henning, W. and C. Cutter, 2001, Ref. 1). An effective method for controlling *Listeria monocytogenes* in RTE meat and poultry products is the addition of antimicrobial agents to the meat or poultry product. Despite adherence to good manufacturing practices, sanitation standard operating procedures, and HACCP programs, *Listeria monocytogenes* may survive and be present in food processing facilities. FSIS has approved the use of antimicrobial agents such as sodium and potassium lactates and sodium diacetate, which are used in most meat processing facilities and considered the present industry standards. Due to their combined high use rate, these approved antimicrobial agents can contribute unnecessary sodium to the American consumer diet. By attempting to substitute some of the sodium lactate with potassium lactate, potential off-flavors in treated food products were noticed and have not been well accepted by consumers. The limited number of currently approved antimicrobial agents for processed meat and poultry products does not provide additional choices. As FDA and USDA are reviewing the allowed daily intake of sodium, food manufacturers are in the process of proactively developing RTE meat and poultry products that offer lower or reduced sodium content choices to the consumer.

A. Current Regulatory Status for Propionic Acid, Sodium Propionate, Benzoic Acid and Sodium Benzoate

The Food and Drug Administration has the authority to determine the safety and wholesomeness of food and food ingredients. Many substances intentionally added to foods do not require a formal premarket review by FDA to ensure their safety, because their safety had been established by a long history of safe use in food or by virtue of the nature of the substance, its customary or projected conditions of use, and the information generally available to scientists about the substance. If the food ingredient is safe and approved by FDA or is GRAS for the intended application, FSIS evaluates suitability for use in processed meat and poultry products to ensure that the ingredient is effective for the intended application and does not cause a meat or poultry product to be adulterated or misbranded. Safety and suitability require that the antimicrobial agent be used at a concentration needed to achieve the claimed effect of controlling the food pathogen *Listeria monocytogenes* in RTE meat and poultry.

Kemin's liquid sodium propionate is a reacted propionic acid product that contains post reaction a mixture of propionic acid and sodium propionate. Our blend of liquid sodium propionate and benzoate starts with reacting propionic acid and benzoic acid with sodium hydroxide to result in a mixture of propionic acid, sodium propionate, benzoic acid and sodium benzoate. The advantages of both formulations are a liquid dispersion with highly active organic acids applied at a buffered pH. Kemin's proprietary product formulations and manufacturing process have been disclosed to FSIS staff under separate cover to ensure confidentiality (Appendix A).

1. Safety of Propionic acid and Sodium propionate

Propionic acid is a mono-carboxylic acid, which is readily miscible in water. Its sodium salt is also easily soluble in water and is commonly used as food preservative. Propionic acid is naturally found in butter and cheese. Swiss cheese for instance contains up to 1% propionic acid produced as a metabolite during growth of Propionibacteria, which are used as antimicrobial agent especially for *Listeria* inhibition and flavoring agent during the manufacture of Swiss cheese. Propionic acid has been found to be metabolized like other fatty acids, and is therefore a safe food preservative.

Propionic acid is affirmed as GRAS for use as an antimicrobial agent in food generally, with no limitation other than current good manufacturing practice (GMP). 21 C.F.R. § 184.1081. Sodium propionate is affirmed as GRAS for use as an antimicrobial agent at GMP levels, although the regulation lists the following food categories: baked goods; nonalcoholic beverages; cheeses; confections and frostings; gelatins, puddings, and fillings; jams and jellies; meat products; and soft candy. 21 C.F.R. § 184.1784.

Propionic acid and its salts have been in use as ingredients of antimicrobial products since the 1950s. FDA affirmed the GRAS status of propionic acid and sodium propionate in the same rulemaking proceeding that started in 1982 and was completed in 1984. The Agency's assessment was based on the evaluation of these ingredients by the Select Committee on GRAS Substances (SCOGS) in 1979. The Select Committee on GRAS substances concluded that there is no evidence in the available information on propionic acid or sodium propionate that demonstrates or suggests reasonable grounds to suspect, a hazard to the public when they are used at levels that are now current or that might be reasonably be expected in the future.

The evaluation of propionic acid and propionate salts by the FAO/WHO Joint Expert Committee on Food Additives (JECFA) and several additional specific publications relevant to the GRAS determination of sodium propionate resulted in the acceptable daily intake for humans as listed below:

Antimicrobial	Limitations mg/kg of body weight	Reference
Propionic acid	Not limited	FAO (1997)
Sodium Propionate	Not limited	FAO (1973)

JECFA assigned an "acceptable daily intake" (ADI) of "not limited" to propionic acid and propionates. Documents are available at http://www.inchem.org/documents/jecfa/jeceval/jec_2015.htm (Ref. 2) or http://www.inchem.org/documents/jecfa/jeceval/jec_2170.htm (Ref. 3).

When comparing the conditions identified in the GRAS regulation, the use of the antimicrobials propionic acid and sodium propionate is not substantially different from Kemin's request for use of liquid sodium propionate in processed meat and poultry.

In summary, the use of liquid sodium propionate, which is a blend of propionic acid and sodium propionate, at an application rate of 0.5% in RTE meat and poultry products is GRAS as provided in FDA's regulations, based on current good manufacturing practices.

2. Safety of Benzoic acid and Sodium benzoate

Benzoic acid is the chemical benzene carboxylic acid which is soluble to a limited extent in water. Its sodium salt is much more soluble in water than its acid form. Both acid and salt are approved by the U.S. Food and Drug Administration (FDA) as antimicrobial agents in foods. Benzoic acid occurs in nature in fruits and berries (apples, apricots, blackberries, blueberries, cherries, strawberries, tomatoes etc), fermented products (dairy products, beers, wines, black teas, etc.), spices and flavors (cinnamon, cloves and licorice), and other foods such as honey. Coffee beans, mushrooms, and green teas.

Benzoic acid and sodium benzoate are affirmed as GRAS for use as antimicrobial agents in foods at levels not to exceed GMP. Current usage results in a maximum level of 0.1% in food, however, the FDA has not determined whether significantly different conditions of use would be GRAS. Kemin's proposed use levels of 0.4% brings the percent of benzoic acid and sodium benzoate in the blend with sodium propionate well below the current maximum usage limit of 0.1% in food in the FDA regulations. CODEX specifies higher permitted levels in some foods such as liquid eggs (0.5%) and semi-preserved fish (0.2%). (http://www.codexalimentarius.net). The salt of benzoic acid is not found to occur naturally. (Reference 21 CFR § 184.1021 and 21 CFR § 184.1733, respectively)

Benzoic acid is one of the oldest chemical preservatives used in the cosmetic, drug and food industries and alongside its sodium salt were one the first chemical preservatives approved for use in foods by the U.S. Food and Drug Administration (FDA). There are many commercial advantages to consider which are its low cost, ease of incorporation into products, lack of color, and relative safety caused by using benzoic acid. Because of its positive properties benzoic acid and its salts have become one of the most widely used preservatives in the world (Davidson, P.M., 2001, Ref. 4). FDA affirmed the GRAS status of benzoic acid and sodium benzoate in 1984. The Agency's assessment was based on the evaluation of these ingredients by the Select Committee on GRAS Substances (SCOGS) in 1973. The Select Committee on GRAS substances concluded that there is no evidence in the available information on benzoic acid and sodium benzoate as food ingredients constitute a hazard to the general public when used at levels that are now current or that might be reasonably be expected in the future.

The evaluation of benzoic acid and benzoate salt by the FAO/WHO Joint Expert Committee on Food Additives (JECFA) and several additional specific publications relevant to the GRAS determination of sodium propionate resulted in the acceptable daily intake for humans as listed below:

Antimicrobial	**Limitations mg/kg of body weight**	**Reference**
Benzoic acid	0-5*	FAO (2002)
Sodium Benzoate	0-5*	FAO (1996)

* As sum of benzoic acid and sodium benzoate (calculated as benzoic acid)

JECFA assigned an "acceptable daily intake" (ADI) of "0-5 mg/kg of body weight" to benzoic acid and sodium benzoate. Documents are available at http://www.inchem.org/documents/jecfa/jeceval/jec_184.htm (Ref 5) or http://www.inchem.org/documents/jecfa/jeceval/jec_182.htm (Ref. 6).

When comparing the conditions identified in the GRAS regulation, the use of the antimicrobials benzoic acid and sodium benzoate is not substantially different from Kemin's request for use of liquid sodium benzoate at 0.1% in RTE meat and poultry.

3. Proposed Labeling of liquid Sodium propionate alone and in a blend with Sodium benzoate

Kemin has proposed and received feedback from FSIS labeling staff on customer-friendly labeling options of liquid sodium propionate alone and in a blend with sodium benzoate for RTE meat and poultry products. The intended labeling statements are listed in Appendix A.

4. Historical Suitability of Propionic acid, Sodium propionate, Benzoic acid and Sodium benzoate

The antimicrobial activity of weak organic acids often correlates with their dissociation constant or pH at which 50% of the total acid is dissociated, with propionic acid having a pK_a value of 4.87 and benzoic acid of 4.19. It is at low pH, when weak acids are likely to be in their undissociated (uncharged) stage, allowing them to pass freely across the lipid bacterial membrane into the cytoplasm, thus accummulating protons and anions within the cell. This decreases the proton motive force and interferes with the bacterial metabolism (Young, K.M. and P.M. Foegeding, 1993, Ref. 7). Best efficacy is therefore seen when used in foods that have a pH close to these values. Using a liquid sodium propionate or the blend of sodium propionate and sodium benzoate allow the pH of the solutions to be around 5.0, which increases their antimicrobial activity in the brine. El-Shenawy and Marth (1989, Ref. 8) determined survival of *Listeria monocytogenes* or growth in Tryptose Broth and found with adding 0.3% sodium propionate and at a pH of 5.0 there was less than 1 log increase over 12.5 days at 13°C storage. When incubated at pH of 5.6 and 13°C, 0.3% sodium propionate controlled *Listeria* growth for 4 days at 1 log of increase. At a pH of 5.0 and 21 C, 0.25% of sodium propionate controlled the pathogen for more than 5 days at 1 log. The conclusion is that at lower pH the efficacy of the antimicrobial agent can be increased.

Glass et al. (2007a, Ref. 9) found that the addition of a combination of 0.05% sodium propionate and 0.05% sodium benzoate prevented growth of *Listeria monocytogenes* in cured pork-beef bologna stored at 4°C for 13 weeks. In another study Glass et al. (2006, Ref. 15; 2007b, Ref. 10) tested cured ham with 0.1% sodium benzoate or 0.2% sodium propionate and found that growth of *Listeria monocytogenes* was inhibited after storage at 4°C for 12 weeks. Uncured turkey supplemented with 0.2% sodium propionate inhibited listerial growth in the product stored at 4°C. for 12 weeks.

Islam et al. (2002, Ref. 11) found that *Listeria monocytogenes* can effectively be controlled on chicken luncheon meats. Antimicrobials were sprayed on the surface of chicken luncheon meat at concentrations of 15, 20, or 25% wt/vol., and then stored under refrigeration temperatures. Slices of chicken luncheon meat were surface inoculated with *Listeria monocytogenes*. When stored at 13°C for 14 days luncheon meat sprayed with 25% sodium benzoate showed less than 1 log increase in *Listeria* growth compared to the increase of 3.2 logs in the untreated control. In comparison 25% sodium propionate-treated luncheon meat showed a 1.3 log increase compared to a 3 log increase in *Listeria* growth for the untreated control luncheon meat after 14 days of storage at 13°C.

Islam et al (2002, Ref. 12) showed control of *Listeria monocytogenes* on turkey frankfurters by sodium propionate. Frankfurters, which were surface inoculated in a challenge study with *Listeria monocytogenes*, were dipped for 1 min in solutions of 15, 20, 25% wt/vol sodium propionate. After 14 days at 13°C, the 25% sodium propionate treated frankfurters was 2.5 logs less than control. Frankfurters treated with 25% sodium benzoate were inhibitory to Listeria when held at 22°C for 7 days or longer. Hu, A. and L. Shelef (1996, Ref. 13) showed that fat content increased Listeria control of sodium propionate when applied at 0.2% in pork liver sausage and stored at 4°C.

All virulent strains of *Listeria monocytogenes* strains produce Listeriolysin O, a sulfhydryl-activated protein which is regarded as an essential virulence factor of the organism. Kouassi et al. (1995, Ref. 14) evaluated Listeriolysin O secretion by *Listeria monocytogenes* in Tryptic soy broth containing sodium propionate or other salts of organic acids and found sodium propionate addition to be the most effective, followed by potassium sorbates, sodium acetate, sodium lactate and lastly sodium citrate.

B. Suitability of liquid Sodium propionate alone or in a blend with Sodium benzoate for use as antimicrobial agents in processed meat and poultry products

Through in-house product testing, Kemin confirmed that both the liquid sodium propionate alone at use rates between 0.3-0.5% and a liquid blend of sodium propionate and sodium benzoate at a combined use rate of 0.4% are suitable for use as antimicrobial agents for *Listeria monocytogenes* control in ready-to-eat meat and poultry products. We have shown in research conducted with the University of Wisconsin that the effectiveness of Kemin's liquid antimicrobial formulations compares well with that of the current industry standards lactates and sodium diacetate. Kemin's proposed liquid sodium propionate alone or as blend with sodium benzoate do not conceal damage or mask spoilage, do not negatively affect sensory attributes or consumer acceptance when used at up to 0.5% or 0.4% use rates, respectively, and have a lower sodium contribution than the industry standard.

1. Liquid Sodium propionate alone or in combination with Sodium benzoate are effective antimicrobial agents for RTE poultry products

FSIS requires confirmation that antimicrobial agents are effective for their use in processed meat and poultry as anti-listerial control agents. A commercially available product $\text{SHIELD}_{\text{brand}}$ NA liquid developed and manufactured by Kemin, for which the percent ingredients are nearly the same as our proposed liquid sodium propionate formulation, was used to evaluate its potential for *Listeria* control on cooked chicken breast. Its efficacy was compared to a dry sodium propionate and the current industry standard lactate (Liessens, M. and K. Pardons, 2008, Ref. 16). An in-vitro growth assay was conducted to determine the Minimum Inhibitory Concentration (MIC) value against several food microorganisms such as *Lactic acid bacteria, Escherichia coli, Listeria monocytogenes* and *Salmonella typhimurium*. MIC values for $\text{SHIELD}_{\text{brand}}$ NA liquid were 0.3335 - 0.667% for *Listeria* control, 0.0833% - 0.1668% for *E.coli* and *S. typhimurium* inhibition and > 0.667% for *Lactobacillus plantarum* control. In a challenge study with *Listeria monocytogenes* conducted under laboratory conditions Kemin's scientists treated cooked chicken breast with 0.267% or 0.4% $\text{SHIELD}_{\text{brand}}$ NA liquid and found that both concentrations resulted in a strong delay in bacterial growth and outperformed the industry standard at 2.5% and a dry sodium propionate treatment applied at equivalent use rates (based on propionic acid concentrations).

Kemin's subsequent research in collaboration with the University of Wisconsin (Glass et al., 2010, Ref. 17, Appendix B) focused on verifying *Listeria* control with liquid sodium propionate alone at inclusion rates of 0.3-0.5% or in combination with sodium benzoate at use rates of 0.2-0.4% in cured turkey. Their antimicrobial efficacy was then compared to that of the current industry standard lactates and an untreated control. We found that moisture, salt, pH and added nitrite will affect the efficacy of antimicrobial agents in turkey products. Sliced, cured turkey, formulated with liquid sodium propionate at either 0.3% propionate, 0.4% or 0.5% use rates, effectively controlled growth of *L. monocytogenes* for extended period of time. The blend of sodium propionate and benzoate was evaluated in the first replicate trial at all three use rates, specifically 0.2%, 0.3% and 0.4%. To limit the number of treatments, Kemin did not replicate all use rates, but continued replication at the best inhibitory rate for Listeria, which was 0.4%. The combination treatment with sodium benzoate validated the success in extending shelf-life and inhibiting Listeria at 0.4% use rate.

Products were manufactured by injecting whole muscle turkey breasts with brine solutions, which included sodium nitrate (to yield 120 ppm final concentration before cook). Liquid sodium propionate or blend of sodium propionate and sodium benzoate were added to the brine solution to achieve a final concentration as appropriate. Addition of 0.3%, 0.4% and 0.5% liquid sodium propionate or 0.4% of the blend of sodium propionate and sodium benzoate to high-moisture cured turkey significantly controlled growth of *L. monocytogenes* across both replicate studies. As expected *Listeria monocytogenes* grew more rapidly when products were stored at slight abuse temperature (7ºC), but trends in relative inhibition were similar to those observed at 4ºC.

No significant difference was noticed by either group in preference for color, texture or purge for untreated or treated with liquid sodium propionate at various inclusion rates. Consumer sensory preference (based on color, aroma, flavor, texture, overall acceptance, and likely to purchase) was evaluated with two groups of student taste panels. Greater inclusion rate of liquid sodium propionate slightly affected consumer preference based on flavor and aroma. Several individuals in the untrained sensory panel chose a rating of "dislike slightly" or "dislike moderate" when tasting slices of cured turkey treated with 0.4% or 0.5% sodium propionate. The bland taste of cured turkey and lower contribution of sodium may have played a role in the slight taste preference for the untreated or lactate-treated cured turkey. Sensory analysis conducted by Glass et al. (2006) and sponsored by the American Meat Institute which evaluated Listeria control for benzoate or propionate-treated RTE cured ham showed that consumers preferred the flavor of cured ham treated with 0.3% sodium propionate or 0.1% sodium benzoate compared with the combination of 1.6% sodium lactate and 0.1% sodium diacetate.

2. Evaluation of Normal Indicators and Spoilage

Kemin also evaluated if the proposed uses of liquid sodium propionate alone or in a blend with sodium benzoate would affect normal spoilage indicators in cured turkey. In the same study with the University of Wisconsin cured turkey samples inoculated with *Listeria* were either kept untreated or treated with liquid sodium propionate, the combination of propionate and benzoate or treated with the industry standard, changes in Listeria counts, Lactic acid bacteria and pH were monitored.

Meat treatments were produced under Good Manufacturing Practices in a pilot facility of a commercial meat processing facility. Turkey was manufactured by injecting whole muscle turkey breasts with brine solutions. The proposed antimicrobial solutions were added to the brine solution at 0.3%, 0.4%, and 0.5% for sodium propionate alone or at 0.4% when combined with sodium benzoate. Kemin's antimicrobial treatments were then compared to an untreated control or the current industry standard. Chilled, sliced meat was packaged and shipped to the University under refrigeration, and then inoculated with a five-strain mixture of *Listeria monocytogenes*, to provide approximately 5-log CFU per 100 g package.

Although growth of spoilage microorganisms was significantly different between the two replicate trials, the competitive microflora did not appear to have been affected by Kemin's antimicrobial products and normal spoilage indicators were not disguised.

3. Sensory evaluation

Color measurements were taken on freshly cut surfaces of each treated sample using a chroma meter at six different times post processing. CIE a* and b* values suggest that the ranges of values for a* and b* are similar, and no visual difference between treatments would be perceived by consumers.

Purge loss (water holding capacity) was determined by weight difference method. As expected percentage of purge loss generally increased over time. Although differences were found, the variation was considered relatively small and not of practical significance by experienced meat scientists at the University of Wisconsin.

Texture analysis was performed with a TA.HDi texture analyzer and showed that all treatments were similar to textural properties suggesting that the treatments had little impact on texture. Sensory evaluation (preference based on color and taste) on four select uninoculated treatments were conducted using consumer preference panels at the Sensory Analysis laboratory, UW-Madison and results were evaluated by Dr. Scott Rankin.

No significant difference was observed for color and texture for the various treatments. There were little effects on quality tests (texture, purge and color), but addition of 0.4 or 0.5% liquid Sodium propionate resulted in somewhat reduced consumer preference, based on flavor and aroma, compared to cured turkey either untreated or treated with 3.2% lactate-diacetate blend. We believe this could be due to the inexperience of some panelists and possibly due to lower sodium content in the cured turkey treated with 0.4 or 0.5% liquid sodium propionate.

4. Nutritional composition

Effect of liquid Sodium propionate alone or in combination with Sodium benzoate on moisture, salt, pH and water activity were also evaluated. Average values across the treatments were 76.4% moisture, 1.73 NaCl, pH 6.31, a_w 0.975 and residual nitrite 36.6 ppm (Table 1a, Glass et. al., 2010, Ref. 17). An independent laboratory analysis showed that 0.3%, 0.4% and 0.5% of sodium propionate were 0.143%, 0.198% and 0.250% propionate, respectively, whereas 0.4% sodium propionate in a blend with sodium benzoate contained 0.190% propionate and 0.010% sodium benzoate in RTE cured turkey.

5. Intended Packaging

Kemin intends to use liquid sodium propionate alone or in combination with sodium benzoate in RTE meat and poultry products in a variety of different packaging options which will include vacuum packaging and modified atmosphere packaging which are commonly used in the industry. The RTE meat and poultry studied in the University of Wisconsin study used cured turkey slices, which were vacuum-packaged in gas-impermeable pouches and samples of each treatment were stored at 4°C for a potential maximum of 18 weeks of storage and at abuse temperature of 7°C for maximum of 9 weeks. No differences are expected to be seen with the type of packaging system used.

6. Liquid Sodium propionate is effective in other RTE meat and poultry products

Kemin is currently working with commercial meat processing companies to arrange testing of liquid sodium propionate alone or in combination with sodium benzoate in a number of different meat and poultry applications to be able to add other meat and poultry applications to the scope of this petition. This will include the following meat and poultry categories:

	M&P Category:	Specific Applications:
1.	Raw Poultry	Whole muscle turkey
2.	Raw Meat	Ground beef, uncured bacon
3.	Sausage/Hot Dogs	Bratwurst, summer sausage, and pork/beef hot dogs
4.	Soups/stews/salads	Deli salads with ham, Deli salad with chicken; meat soup, poultry soup
5.	Surface treatment	Hot dogs (with SLIC method), bagged ham, bagged whole muscle prod. Sliced meats (single/stacked). Packaged poultry products.
6.	Brine/injection into whole product	Cured turkey, cured ham

IV. CONCLUSION

The proposed use of liquid sodium propionate alone or as a blend with sodium benzoate offer safe and effective alternatives to the currently used lactates. Another benefit is the lower inclusion rates to the finished processed meat and poultry products which will be more cost-effective, add lower concentrations of preservatives, and offer a lower sodium contribution to processed meat and poultry products, thus keeping the consumer's health concerns in mind, while protecting food safety.

The requested action offers the opportunity to promote healthier options for the consumer and add two new alternative antimicrobial agents for inhibition of *Listeria monocytogenes* that may be unavoidably present in commonly consumed meat and poultry products. To achieve these important consumer benefits, Kemin requests an expedited review of this petition.

V. ENVIRONMENTAL IMPACT

The action requested by the Petition is not expected to have significant effect on the quality of the human environment. Furthermore, the requested action addresses the addition of two antimicrobial agents to food regulated by FSIS and therefore, is categorically excluded from the requirement to prepare an Environmental Assessment (EA) or Environmental Impact Statement (EIS) pursuant to 7 CFR 1b.4 of the National Environmental Policy Act.

VI. CERTIFICATION

The undersigned certifies that to the best of her knowledge, this petition includes all information and views on which the petition relies, and that the petitioner is not aware of information that is unfavorable to the petition.

Respectfully submitted,

Sylvia A. Bergman

Sylvia A. Bergman, Ph.D.
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VII. REFERENCES

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