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August 2, 1999

Attn: John Field
Gulf of Mexico Hypoxia Working Group
National Centers for Coastal Ocean Science
WS 13446 SSMC4
1305 East-West Highway
Silver Spring, MD 20910

Re: Feed Management's Role in Reducing the Nitrogen Content of Animal Waste

Dear Mr. Field:

The Amino Acid Education Council ("AAEC") is pleased to submit these comments on the report entitled "Reducing nutrient loads, especially nitrate-nitrogen, to surface water, groundwater, and the Gulf of Mexico" (hereinafter "Nutrient Loads Report" or "Report"). The AAEC represents manufacturers of crystalline amino acids, ingredients that are added to swine and poultry feeds. By supplementing animal feeds with amino acids, farmers can formulate diets with less total crude protein, and thereby significantly reduce the nitrogen content of the animal waste.

The Nutrient Loads Report examines the cause of the hypoxia zone in the Gulf of Mexico. The Report specifically identifies excess nutrients from the Mississippi River Basin, particularly nitrate-nitrogen, as one of the causes of this "deadzone." The Report lists feedlots and manure as the major sources of nitrogen and recommends better management of livestock manure as one of the practices that would help reduce discharges of nitrogen into streams and rivers. 1/ The Report fails to mention, however, that feed management practices, such as amino

1/ Nutrient Loads Report at 7, 22-23, 100-103 (March 1999).

acid supplementation, can significantly reduce the nitrogen content in the manure of monogastric animals such as pigs and poultry.

Overwhelming scientific evidence demonstrates that amino acid supplementation can significantly reduce the level of nitrogen in swine and poultry waste. The degree of reduction will depend on the type of livestock and the number and quantity of amino acids that are supplemented in the diet, with a greater number and quantity of amino acids resulting in a greater reduction of nitrogen. Supplementation of swine and poultry diets with four commercially available amino acids has been shown to reduce the nitrogen content of swine and poultry waste by about 40 percent and 24 percent, respectively. Amino acid supplementation also has been shown to have other environmental benefits in that it reduces ammonia emissions and odor from swine and poultry waste.

The benefits of amino acid supplementation were recently recognized by the Environmental Protection Agency ("EPA") in a report issued in December 1998, in which the Agency concluded that amino acid supplementation is an effective means of reducing nitrogen excretion by pigs. In addition, the environmental benefits of amino acid supplementation are recognized in the domestic agricultural community, by at least one State, and in Europe.

Despite obvious benefits, amino acid supplementation has not been universally adopted to date because it has not always been economically feasible to do so. Supplementation of the animal diet with up to four amino acids increases feed costs. Although these additional costs may be slight, particularly when compared to the high costs ordinarily associated with environmental control measures, the costs may exceed the profits that are being realized in today's market.

In light of the magnitude of nitrogen reductions that can be achieved through amino acid supplementation, the AAEC believes that programs and policies that are developed to address the dead zone in the Gulf of Mexico should allow, and perhaps even encourage, livestock producers to utilize pollution prevention practices such as amino acid supplementation and other feed management practices that reduce the nitrogen content of animal manure. However, the AAEC opposes any government effort to mandate specific feed management practices and believes that it would be inappropriate for regulators to interfere with a producer's ability to

ate feeds. It is the livestock producer who is in the best position to assess ractices should be employed to meet the environmental performance rds established by Congress and EPA.

More detailed information about the environmental benefits of amino pplementation is provided below.

AMINO ACID SUPPLEMENTATION CAN SIGNIFICANTLY DECREASE NITROGEN LEVELS

A. Amino Acid Supplementation Reduces Nitrogen Levels in Pig & Poultry Waste

Animals are fed large quantities of crude protein (typically in the form and soybean meal-based feeds) in order to supply amino acids, which play a role in the maintenance of health and tissue integrity, and in production of , eggs, skin, and feathers. Dietary crude protein is broken down during the ve process into amino acids. These different amino acids are used by the to maintain metabolic processes and synthesize body protein. If the diet s excess amino acids, they are converted into energy, and nitrogen is ed as a by-product of this conversion. The nitrogen is then excreted as urea mals and uric acid in poultry. 2/

Animals do not have a crude protein requirement, per se; they have ments for amino acids. Twenty-two different amino acids are used in the

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See generally, American Feed Industry Association ("AFIA"), "Animal ture: the Nutrition Environment Relationship" (March 1998) at 4-9 ed as Attachment 1). It is estimated that only 40% of the nitrogen in poultry used for production of eggs or meat, and the remainder is excreted; J.B. e, "Controlling Nitrogen Pollution: Practical Applications of Free Amino n Poultry Diets," Feed Mix, Vol. 2, No. 4 (1994) at 29 (enclosed as ment 2). See also S. Klausner, "Nutrient Management Planning," Animal and the Land-Water Interface, (K. Steele, ed., 1995) at 386 (feed ement is a key to reducing nutrient loss).

formation of body tissue. Although swine and poultry are able to synthesize some of these amino acids, certain "essential" amino acids must be provided via the feed because monogastric animals are unable to synthesize or produce these amino acids at sufficient rates to meet the physiological needs of their bodies. During protein synthesis, essential and "non-essential" amino acids are joined together according to a pre-determined genetic code to form animal protein. If there is a deficit of any essential amino acid, protein synthesis will be limited by the level of that amino acid. Although soybean meal is a good source of protein when combined with a cereal grain such as corn, it contains relatively low levels of certain essential amino acids, called "limiting" amino acids, such as lysine, methionine, threonine, and tryptophan. 3/ In corn/soybean meal diets fed to pigs, lysine is generally the "first limiting" amino acid -- meaning that lysine is the first essential amino acid that is likely to be in short supply, given the pig's needs and the levels of lysine found in corn/soybean meal diets. For poultry, methionine and lysine are first and second limiting, respectively. 4/

In light of the importance of these limiting amino acids, the challenge has been to find a way to supply them in sufficient quantities without oversupplying crude protein, which generally is one of the more expensive components of the diet. Members of the AAEC have responded to this challenge by making individual crystalline amino acids commercially available in the form of feed supplements. By supplementing the animal diet with one or more limiting amino acids, producers are able to reduce the amount of crude protein being fed to their animals, while ensuring that the animals are receiving the essential amino acids they need.

Overwhelming scientific evidence confirms that reducing crude protein levels while supplementing animal diets with crystalline amino acids dramatically reduces nitrogen levels in waste without any discernible impact on animal growth or productivity. The degree of nitrogen reduction depends on the animal species

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3/ "The Key to Accurate Nutrition," Feed Mix, Vol. 2, No. 4 (1994) at 9 (enclosed as Attachment 3). For example, corn contains .24% lysine, and sbm (48% crude protein) contains 2.94% lysine. Id.

4/ J.B. Schutte, supra, note 2, at 29.

and the number of limiting amino acids being added to the feed. By way of example, it has been shown that supplementing swine feed with lysine, the first limiting amino acid, reduces nitrogen levels in swine waste by 26 percent. 5/ The nitrogen content of a swine's waste can be reduced by approximately 40 percent by supplementing the diet with lysine, theronine, tryptophan, and methionine, the first, second, third and fourth limiting amino acids in pigs. 6/

In a report issued in December 1998 by EPA, the Agency concluded that "[s]upplementing the diet with synthetic lysine to meet a portion of the dietary lysine requirement is an effective means of reducing nitrogen excretion by pigs." 7/ Indeed, EPA cited data showing that a 12 percent crude protein diet supplemented with lysine can reduce the nitrogen excretion in a 200 -lbs finishing pig by 22 percent and that a 41 percent nitrogen reduction can be realized with a 10 percent crude protein diet containing lysine and three other amino acids (threonine, tryptophan and methionine).

5/ Heartland Lysine Swine Research Report 20 (enclosed as Attachment 4). See also National Pork Producer's Council ("NPPC"), "Environmental Assurance Program: Participant's Manual" (1995) at 33-34 (citing a study showing that reducing crude protein levels and supplementing with synthetic lysine reduces nitrogen excretion in finishing pigs by up to 22 percent) (enclosed as Attachment 5); F. Gaetal, "Low Protein, Amino Acid Supplemented Diets for Pigs," Feed Mix, Vol. 2, No. 4 (1994) at 33 (low-protein diet produces reduction in urinary nitrogen of 16.4% for growing pigs and 19.1% for finishing pigs) (enclosed as Attachment 6).

6/ Eurolysine Trial Report 17 (finding a 39% reduction in nitrogen wastes) (enclosed as Attachment 7); NPPC, supra note 5, at 33-34, (citing Cromwell, NPPC Environmental Symposium, (1993)) (reducing the crude protein content by 4% with the use of additional synthetic amino acids would reduce nitrogen excretion by 41%).

7/ See "Preliminary Data Summary: Feedlots Point Source Category Study," Technology Appendix (hereinafter "Feedlot Study") (December 1998) at 9-11 (relevant excerpts enclosed as Attachment 8 hereto).

Significant nitrogen reductions have also been observed in poultry. For example, several researchers have shown that reducing dietary protein content by 10% and 15%, while maintaining required essential amino acid levels within each age period for broilers, will reduce litter nitrogen content (% dry matter basis) by approximately 24% without impairing weight gain. 8/ Reductions in nitrogen excretion may be even greater when low protein/amino acid supplemented diets are used in the context of "phase feeding," in which the producer/nutritionist changes the feed supplied during the growth cycle to more closely meet amino acid needs, which vary depending upon age, gender, and other factors. 9/

The United States Department of Agriculture ("USDA") also has previously recognized that it is possible to reduce the nitrogen content of manure by

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8/ AFIA, supra, note 2, at 5; see B. Leclercq, "Reducing Nitrogen Losses of Broiler Chicken by Using Industrial Amino Acids," (paper given at Utrecht, Netherlands at the Viv Europe 1997) (one of the most efficient ways to reduce nitrogen losses from non-ruminants is to better balance dietary amino acid profiles by supplementing diets with industrial amino acids) (enclosed as Attachment 9). See N.S. Ferguson, R.S. Gates, J.L. Taraba, A.H. Cantor, A.J. Pescatore, M.J. Ford, and D.J. Burnham, "The Effect of Dietary and Crude Protein on Growth, Ammonia Concentration, and Litter Composition in Broilers," 77 Poultry Science 1481 (Oct. 1998) (supplementing broiler diets with amino acids while reducing crude protein reduces nitrogen in litter by 31%) (enclosed as Attachment 10). Similar results have been obtained for layers. See Schutte, supra, note 2 (reducing dietary protein from 16.5% to 14% of layer's diet reduced total nitrogen output by 25%) at 30.

9/ AFIA, supra note 2, at 7-8; see also J.Y. Dourmad, N. Guingand, P. Latimier, and B. Seve, "Nitrogen and Phosphorus Consumption, Utilisation and Losses in Pig Production: The Situation in France," (paper presented at the 48th Meeting of the European Association of Animal Production ("EAAP")) (Aug. 1997) (use of industrial amino acids has been proved to be efficient for reducing nitrogen output); D. Bourbon, J.Y. Dourmad, and Y. Henry, "Reduction of Nitrogen Output in Growing Pigs by Multiphase Feeding with Decreased Protein Level," (paper presented at the 48th Meeting of the EAAP) (Aug. 1997). Both EAAP papers are enclosed as Attachment 11.

changing the ingredients fed to livestock. 10/ Significantly, in its recent revision to the USDA model conservation practice standard governing the management of nutrients from animal waste, USDA advised farmers to "consider ways to modify the chemistry of animal manure, including modification of the animal's diet to reduce manure nutrient content," as a means of "enhanc[ing] the producer's ability to manage manure effectively." 11/

B. Amino Acid Supplementation May Improve Air Quality and Reduce Odor-Causing Compounds

As regulators and producers examine various "manure management" solutions to the "deadzone," it will be important that such solutions not create new and different types of environmental concerns. One advantage to amino acid supplementation is that the same practice that reduces the nitrogen content of the manure can also also mitigate the atmospheric deposition of nitrogen from animal feedlots. The Report specifically cites ammonia volatization from "[i]ntensive agricultural practices, particularly feedlots," as a source of the nitrogen that contributes to the deadzone in the Gulf of Mexico. 12/ To the extent regulators determine that volatilized ammonia nitrogen from animal feed operations is a concern, amino acid supplementation offers a potential means for reducing ammonia nitrogen at the source.

In one independent study, researchers found that feeding a balanced amino acid diet to poultry broilers resulted in reductions of 12% and 22% in

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10/ See D. Leuck, "Policies to Reduce Nitrate Pollution in the European Community and Possible Effects on Livestock Production," (Economic Research Service, Ag. and Trade Analysis Division, USDA) (Sept. 1993) at 19 (enclosed as Attachment 12).

11/ See Natural Resources Conservation Service, Conservation Practice Standard, "Nutrient Management Code 590" available at www.nhq.nrcs.usda.gov/BCS/nutri/590.html; 64 Fed. Reg. 19122 (Apr. 19, 1999) (announcing revisions to Nutrient Management Code 590).

12 Nutrient Loads Report at 8, Table 1.1.

ammonia emissions, without any production loss. 13/ In a study published last October, researchers found that reducing crude protein in broiler diets while supplementing with amino acids reduced ammonia gas concentrations by 31 percent and nitrogen content of litter by 16%. 14/ The researchers noted that both of these reductions "will improve air quality within the housing facility and possibly reduce heating costs during winter associated with higher ventilation rates required to reduce elevated NH_3 gas concentrations." 15/ Other studies have produced similar results. 16/

Recent studies conducted by Purdue University and Pennsylvania State University researchers have determined that supplementing hog diets with amino acids while reducing crude protein in hog feed dramatically reduces ammonium nitrogen.17/ Specifically, when researchers compared the manure produced by hogs who were fed a 13% crude protein diet with the manure produced by hogs fed a 8% crude protein diet supplemented by lysine, threonine, tryptophan and methionine, they found that fresh manure from the second group of contained 45% less ammonium nitrogen and 61% less volatile fatty acids, as well as a lower pH. 18/

13/ T.A. Scott, J.W. Paul, R.C. Newberry and P.K. Barton, "Balanced Amino Acid Diets Increase Bird Health and Reduce Ammonia Emissions," 13 WORLD POULTRY No. 12 (1997) (enclosed as Attachment 13).

14/ Ferguson, et al, supra n. 7.

15 Id. at 1481.

16/ See Dourmad et al, supra, note 9, at 7 ("[f]eeding low protein diets appears to be an efficient way of reducing the volatilisation of ammonia").

17 A. Sutton, "Less Protein Cuts Odor Compounds," National Hog Farmer (March 15, 1998) at 29 (enclosed as Attachment 14).

18 Id. at 30; Feedlot Study, supra, note 7, at 11-6 ("Amino acid additions to pig feed such as lysine allow a reduction in the total protein intake, which results in lower excretion of total nitrogen and up to 45% less ammonia." See also P. Hobbs,

C. State Regulatory Agencies are Recognizing the Benefits of Amino Acid Supplementation

State regulators are now paying close attention to research on amino acids. In adopting regulations to implement Amendment 14,19/ a voter initiative adopted last November that imposes specific odor control and waste management requirements on hog farm operators, the State's Air Quality Control Commission and Water Quality Control Commission both recognized the role feed management practices, such as amino acid supplementation, could play in addressing environmental concerns. 20/ Moreover, in a guidance document being prepared by the Colorado Department of Public Health and Environment regarding odor reduction technologies, CDPHE's Air Quality Control Division identified nitrogen as a key source of odor from swine manure and identified amino acid supplementation as a potential odor reduction technology. 21/

The State of North Carolina has also implemented extensive regulations on hog farms. This includes a program to convert swine waste lagoons and sprayfields to new technologies and implementation of a state-side Nutrient Management Plan. In developing these programs, the North Carolina Department of Environmental and Natural Resources has specifically indicated that it is

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B. Pain, R. McKay and P. Lee, "Reduction of Odorous Compounds in Fresh Pig Slurry by Dietary Control of Crude Protein," 71 J. Sci. Food Agric. (1996) at 508-514 (finding that low protein/amino acid supplemented diets for growing and finishing pigs produced significant reductions in odorous compounds in pig slurries) (enclosed as Attachment 15).

19 25 Colo. Rev. Stats. §§ 25-8-501.1, 25-7-138.

20/ 5 C.C.R. § 1001-4, Part B (odor regulations); 5 C.C.R. §§ 1002-61.13 (water quality regulations).

21/ Draft Guidance Document for Technologies to Minimize to the Greatest Extent Practicable Odorous Emissions from Housed Commercial Swine Feeding Operations (Dec. 2, 1998) at 15 (enclosed as Attachment 16).

examining "low protein feed to reduce nitrogen levels in the waste" 22/ We have been advised that the state is examining amino acid supplementation as one component of the nutrient management plan as a means of managing excess swine nutrients.

D. Producer Groups Recognize the Benefits of Amino Acid Supplementation

Within the United States, there is a growing recognition that environmental concerns associated with animal waste can be addressed by modifying animal diets. The "Environmental Assurance Program" developed by the National Pork Producers Council notes that "[r]educing the crude protein content of feed through the addition of supplemental amino acids (lysine, methionine, tryptophan and theronine (sic)) can also reduce manure nitrogen concentration," perhaps by upwards of 40%. 23/ The American Feed Industry Association also recommends low protein/amino acid supplemented diets as a means of reducing nitrogen in swine and poultry waste. 24/ Indeed, in an otherwise hotly contested rulemaking proceeding, the references to amino acid supplementation noted above were added to the Colorado regulations without any opposition from industry or environmentalists.

E. The Benefits of Amino Acid Supplementation are Recognized in Europe

The environmental benefits of low protein/amino acid supplemented diets are well-understood in Europe. The AAEC is not endorsing adoption in the United States of the approaches taken in Europe, but is describing these

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22/ See NCDENR's "Framework for the Conversion of Anaerobic Swine Waste Lagoons and Sprayfields" at www.enr.state.nc.us/ENR/files/hogs/hogplan.htm.

23/ NPPC, supra, note 5 at 33-34.

24/ AFIA, "Animal Agriculture: the Nutrition Environment Relationship," supra, note 2, at 4-8.

approaches to demonstrate that other countries have recognized that the nitrogen content of animal wastes can be reduced by adjusting animal diets.

In the Netherlands, for example, livestock farmers must track quantities of phosphate and nitrogen that enter and leave their farms. Nutrient inputs (via feed and fertilizers) and outputs (in the form of meat, milk, or manure), are then compared, and it is assumed that inputs that are not otherwise accounted for have been lost into the environment. Nutrient losses in excess of prescribed amounts are subject to penalties. The Dutch approach helps educate farmers as to the sources of excess nutrients, and rewards those farmers that control nutrients by eliminating unneeded nutrients from animal diets. Obviously, this approach also ensures that farmers factor environmental costs into their feed and fertilizer purchase decisions. 25/

In France, regulators have also attempted to find ways to get farmers to move away from overfeeding protein. As in other EU countries, French farmers are subject to a 170 kg of nitrogen per hectare limit when land applying animal manure in "vulnerable areas." In determining whether these limits are met, French regulators now use more favorable assumptions regarding the nitrogen content of pig slurry when it is produced at farms that limit maximum crude protein consumption as opposed to farms that do not abide by such limits. 26/

25/ See C.M.C. van der Peet-Schwering, A.W. Jongbloed, and A.J.A. Aamink, "Nitrogen and Phosphorus Consumption, Utilisation, and Losses in Pig Production: The Situation in The Netherlands," (paper presented at the 48th Annual Meeting of the EAAP) (Aug. 1997) at 13 (enclosed as Attachment 17); P. Gassman and A. Bouzaher, "Livestock Pollution: Lessons from the European Union," Animal Waste and the Land-Water Interface, K. Steele (ed.) (1995).

26/ See Dourmad et al, supra note 9, at 2, 8 and Table 4; R. Pinot, "French Action on Nitrogen Excretion from Animals," Sanofi Sante Nutrition Animale (enclosed as Attachment 18).

II. THE MARKET CURRENTLY OFFERS FEW INCENTIVES FOR PRODUCERS TO SWITCH TO ENVIRONMENTALLY FRIENDLY ANIMAL DIET STRATEGIES

In view of the environmental benefits and savings in crude protein costs, it is natural to wonder why producers have not already universally adopted amino acid supplementation. The answer is that they have -- but only when it has been economically feasible to do so.

Indeed, the degree to which swine and poultry producers utilize crystalline amino acids depends largely on the price differential between the cost of amino acids derived from traditional sources of crude protein (such as soy protein) and crystalline amino acids. When an amino acid such as lysine is less expensive than other sources of protein in the swine diet, swine producers find that adding the amino acid and reducing the amount of crude protein in animal diets is cost-effective. On the other hand, in today's market, where soy protein is at near record-low prices, the cost savings from lysine supplementation is less significant and the swine producers have less of an incentive to reduce crude protein. Thus, in the current market, the environmental benefits of amino acid supplementation are not realized when soy protein prices are comparable to, or lower than, the amino acid prices.

Moreover, to fully realize the environmental benefits of amino acids, producers would have to supplement the diet with more than one amino acid. Although crystalline sources of lysine and methionine are commercially available at prices competitive with or less expensive than soy protein, two other limiting amino acids for swine (i.e., threonine and tryptophan) are generally more expensive than soy protein and other dietary sources of crude protein. The use of up to four amino acids in swine and poultry diets would increase slightly the total feed costs.

Although the potential costs associated with amino acid supplementation may appear small, particularly in light of the high costs frequently associated with measures aimed at managing releases into the environment, these costs may actually exceed the per animal profits that currently are being made on each pig and chicken in today's market. Accordingly, amino acid supplementation will not succeed as a solution to animal waste management concerns without appropriate incentives and support from policy makers.

III. THE BENEFITS OF FEED MANAGEMENT SHOULD BE RECOGNIZED AS POLICIES ARE DEVELOPED TO ADDRESS REDUCING NITROGEN LOADING OF THE GULF OF MEXICO

The Nutrient Loads Report identifies animal manure as a significant source of nitrogen. Indeed, animal manure is listed as the fourth largest contributor of nitrogen following fertilizer use, mineralized soil nitrogen and legume nitrogen-fixation. 27/ Although the Report makes several recommendations on how manure could be applied to minimize the loss of the nitrogen into waterways, no mention is made of the technologies that are available to reduce the nitrogen content of the manure. The AAEC believes that the Report should recognize the benefits of feed management, including amino acid supplementation, in reducing the nitrogen content in manure, and that producers should be encouraged to utilize scientifically proven pollution prevention technologies such as amino acid supplementation.

The AAEC opposes mandatory use of amino acids or of any feed management practice. Amino acid supplementation and other feed management practices that have been scientifically proven to reduce the nitrogen content of animal manure should be identified as acceptable pollution prevention technologies and individual producers should be given the flexibility of determining how to achieve any necessary reduction in their discharges of nitrogen into the environment. This approach serves both the environment and agriculture, because producers are in the best position to assess the most cost-effective means of achieving environmental objectives at their individual farms.

IV. CONCLUSION

In the Pollution Prevention Act of 1990, Congress established a national policy which requires that "pollution should be prevented or reduced at the source whenever feasible." 28/ Under the Pollution Prevention Act's pollution

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27/ Nutrient Loads Report at Table 1.1.

28/ 42. U.S.C. § 13101(b) (emphasis added).

management hierarchy, alternative pollution management strategies, including recycling, treatment, and safe disposal, are to be employed only when pollution cannot be feasibly prevented. 29/ Feed management strategies such as amino acid supplementation offer industry leaders and policy makers an excellent opportunity to apply this Congressional mandate in favor of pollution prevention and source reduction to the current policy debate over animal feedlots.

As policy makers consider whether and to what extent amino acid supplementation should be included in any programs designed to reduce the nitrogen load in the Gulf of Mexico, the AAEC suggests policy makers allow themselves to be guided by EPA's own statement concerning the virtues of source reduction and pollution prevention:

> EPA has made significant progress over the last 20 years in improving the quality of the environment by controlling pollution with its air, water, and hazardous and solid waste programs. The traditional approach, however, stresses treatment and disposal after pollution is generated. EPA now believes that reducing or eliminating the source of pollution is a competitive, effective way to reduce risks to human health and the environment. This approach is also the most cost-effective option because it reduces raw material losses, the need for expensive "end-of-pipe" technologies, and long-term liability. In short, pollution prevention offers the unique advantage of harmonizing environmental protection with economic efficiency. 30/

Like other pollution prevention techniques, the AAEC believes that amino acid supplementation can make a significant, cost-effective contribution to addressing environmental concerns. We encourage regulators to recognize the

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29/ Id.

30/ USEPA, "Pollution Prevention Incentives for States" at 1 (emphasis added). (Spring 1994)

benefits of feed management in any programs or policies that are developed to address the nitrogen levels discharged into the Mississippi River Basin.

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If you have any questions, or if we can provide additional information regarding amino acid supplementation, please do not hesitate to contact the AAEC at 202/637-5926 (Martin Hahn) or 303/899-7355 (Scott Reisch).

Sincerely,

Martin J. Hahn

Enclosures