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National Organic Standards Board
Fall 2011 Meeting
Savannah, GA

Re. Comments on Aquaculture Materials

Dear Board Members:

These comments are submitted on behalf of Beyond Pesticides. Beyond Pesticides, founded in 1981 as a national, grassroots, membership organization that represents community-based organizations and a range of people seeking to bridge the interests of consumers, farmers and farmworkers, advances improved protections from pesticides and alternative pest management strategies that reduce or eliminate a reliance on pesticides. Our membership and network span the 50 states and groups around the world.

Thank you for this opportunity to comment on the enormous task of evaluating materials for use in organic aquaculture. We begin our comments by describing our approach to the issues the committee has raised, then address the specific questions asked by the committee.

I. Framework for evaluating aquaculture materials

A. The NOSB is in new territory in certifying organic products of aquaculture.

1. Feed the soil paradigm

Although aquaculture fits many aspects of the organic paradigm, there is a crucial aspect that is not part of aquaculture —the idea that the organic grower feeds the soil, which feeds the plants, which in turn feed livestock. This aspect will turn out to be crucial.

In spite of the fact that aquaculture is taking place in a system without soil, we can still apply organic principles:

"Organic agriculture is an ecological production management system that promotes and enhances biodiversity, biological cycles, and ***soil biological activity***. It emphasizes the use of management practices in preference to the use of off-farm inputs, taking into account that regional conditions require locally adapted systems. These goals are met, where possible, through the use of cultural, biological, and

mechanical methods, as opposed to using synthetic materials to fulfill specific functions within the system."[1]

How do we review materials for aquatic aquaculture in a system where there is no soil? Organic aquaculture, like other forms of organic agriculture, must rely on the underlying ecology to feed plants and animals, rather than outside inputs. Synthetic materials must not be used to fulfill system functions, but must be only non-routine inputs and should not serve to make up for an overcrowded or poorly designed system.

The fact that some fish that might be raised in aquaculture are predators will require materials considerations in aquaculture for situations that do not have a strict counterpart in terrestrial agriculture. In terrestrial agriculture, we have not had to consider the presence of bioaccumulating toxic materials in nonsynthetic feed because our livestock animals are fed vegetarian feed. However, if wild-caught fish are used as a feed source for fish in aquaculture, then the "incidental" level of synthetic bioaccumulative toxic chemicals must be seen as a synthetic input.

2. The aquatic environment transports materials in a form that is accessible to many organisms.

Materials —both biological and chemical— in the aquatic environment are often dissolved or suspended in the water. This makes them easily transportable—in some cases globally by organisms that are very mobile—and means that the impacts of materials added to an aquaculture system must be considered very broadly. Similarly, the aquaculture system may receive synthetic or non-organic inputs that have travelled a long distance.

3. Containment of aquatic organisms can be difficult.

The evaluation of the movement of materials offsite must include movement in organisms and their metabolic products. If fish are fed food containing bioaccumulative toxic materials, for example, then we must evaluate whether the fish may escape and cause the toxic materials to be further bioaccumulated in their predators.

4. Bioaccumulation of contaminants can result in plant and animal products that fail to meet expectations of organic consumers.

In particular, the presence of bioaccumulative contaminants in non-organic (wild-harvested) ocean fish or other organisms used for feed would increase the concentration of those contaminants in the aquaculture-fed fish. However, even fish grown organically may contain bioaccumulative toxic contaminants due to fallout from the air. Raising carnivorous fish organically therefore raises significant problems in meeting consumer expectations.

[1] "Principles of Organic Production and Handling," adopted by the NOSB October 17, 2001.

5. Impacts of removal, as well as addition, of materials to the aquatic ecosystem must be considered.

When wild-harvested organisms are considered as food sources, the impacts of depletion of their populations should be considered. In addition, the addition of pens of fish and farms of bivalves to the ecosystem can have impacts on the local biology and chemistry of the water, and these are also materials considerations, as they include food that is not organic.

6. Feed for aquacultured fish should be included on the list of things the NOSB reviews as materials. Criteria for feed should include:

- appropriateness to species - carnivorous species should be fed species similar to their natural food, raised organically.
- same prohibitions as for other livestock (no GE crops as fish feed)
- environmental impact of feed (wild fish especially)
- human health impact (bioaccumulation of POPs in fish based feed)
- biodiversity impact (ecosystem impacts of harvesting wild fish to use as feed)

7. We support the committee's approach in evaluating materials —materials in aquaculture must be reviewed for their aquaculture use. Information gathered in support of other uses —Technical Reviews, for example— can be used to supplement, but not replace aquaculture-specific information.

8. The use of the material is an essential factor —using CO2 as synthetic fertilizer is different from using it as a way to humanely kill the fish.

II. Questions about the Development Process for Board Discussion and Public Comment

A. Are there international bodies or organizations with a good material review process? If so, who? How could we interact with these entities to address material evaluation issues that we have?

We have not found an international body with a particularly good materials review process. Existing certification programs used in the EU do not have acceptable materials policies. However, these elements of the IFOAM Aquaculture norms are relevant here:

1. Animal Nutrition

- Most of the nutritional needs must be supplied from organic plants and animals appropriate for digestive and metabolic system of the species and that meet their physiological needs.
- The system must be designed so that production area comprises entire food with minimal outside inputs.

Taken together, these requirements do not allow for routine use of synthetic or non-organic inputs for feed.

2. Prohibitions

IFOAM prohibits the following in aquaculture systems:

- Prophylactic use of veterinary drugs
- Use of chemical allopathic veterinary drugs and antibiotics
- Synthetic hormones and growth regulators
- Synthetic pesticides and fertilizers

These are prohibitions that should be adopted by the NOSB. In addition, the NOSB should prohibit experimental veterinary drugs and dyes fed to change fish's flesh color.

3. Location of facility considerations

The siting of facilities must include, among other considerations:

- Distance to sources of contamination
- Distance to conventional agriculture

Sites near some sources of contamination, particularly nutrient-rich flows, such as those from agriculture or sewage, might be seen by conventional aquaculturists as advantageous places for siting. This is an example of how broad the consideration of materials inputs must be in aquaculture, because of the high mobility of synthetic chemicals in an aquatic environment.

B. How do we ensure that our organic aquaculture material review process is viewed from an aquaculture lens rather than a crop or livestock lens, while not compromising organic farming and environmental principles? In other words, how do we maintain the level of review of materials consistent with crops and livestock uses, while viewing materials in their unique application to aquaculture systems?

All materials review should be done keeping in mind the "Principles for Organic Production and Handling" adopted by the board October 17, 2001. Most of these principles translate directly from terrestrial systems to aquatic systems. As we pointed out above, organic aquaculture must, like terrestrial organic agriculture, rely on the underlying ecology to feed plants and animals, rather than outside inputs. Synthetic materials must not be used to fulfill system functions, but must be only non-routine inputs. On the other hand, the review process must take into account the unique aspects of the aquatic environment and ecology in assessing inputs for their impacts both on the products of aquaculture and the surrounding environment.

C. How can the review of aquaculture materials proceed cautiously while not compromising consumer expectation of the organic label? What do consumers expect from organically produced aquaculture products, and how does that translate into specific requirements concerning materials, e.g., environmental impacts, hormones, organic feed, etc.?

Consumer expectations may be difficult to meet in aquaculture, especially aquaculture in open water or involving carnivorous fish. Even though organic agriculture is process-oriented and not driven by residues, consumers expect organic products to be free of toxic residues. In

an environment where persistent organic pollutants abound and bioconcentration is the rule, it will be difficult to meet those expectations.

Consumers expect that livestock will be fed organic feed and not be fed or treated with hormones or antibiotics. It is a matter of principle and law that organic production seeks to avoid adverse impacts on ecosystems and build biodiversity. This cannot be achieved with wild fish based food or open net pens.

The NOSB can best "proceed cautiously" by limiting consideration to contained land-based systems producing plants and herbivorous fish.

III. Questions Concerning the Material Evaluation Process:

A. What criteria are specific to open systems? Closed systems?

1. Open systems

"Open systems" may be in marine water (offshore or close to shore), open net pens or cages, sometimes called "pods," in which water flows through system and is released into surrounding environment.

We do not believe that open systems —net pens or bivalves in natural bodies of water— can be certified organic. In order for these systems to meet expectations for the label "organic," they must meet high standards of preventing impacts outside the aquaculture system and preventing pollutants from affecting the organic aquaculture system. Here we give some examples of the standards that must be met in order for aquaculture to meet the expectations of the organic label.

a) Materials added to the system must be contained within the system.

In a closed system, materials will generally affect the surrounding ecosystem only during specific, definable events —when tanks or ponds are purposely emptied, during floods or other containment breaches, or when wild animals visit the facility. In an open system, there is constant flux between "inside" and "outside." Water soluble materials have no boundaries, solid materials will fall out of the net pens, and there will be constant movement of algae and small animals in and out of the pens, even barring escapes.[2] Any material added to the system will be an input to the larger ecosystem if extraordinary measures are not taken to confine it.

b) Materials should be reviewed based on the scenario that they are not contained.

Since extraordinary measures are needed to contain inputs to an open system, the review of materials should be based on the impacts of the materials if they are not contained (a worst case scenario). Impacts to aquatic plants, organisms, and wild populations must be considered (predators like sharks and other fish come to the open net pens because there is so much food and waste

[2] The Center for Food Safety has compiled a list of reported escapes from fish farms, which will be included in their comments. Every time fish escape, they carry with them the residues and metabolites of many materials added to their diet, so that movement of materials should be taken into account in assessing the impacts of materials.

that comes out that they can eat, in addition to escaped fish). Consider impacts to open water and benthic species.

c) Aquatic plants and animals must not be exposed to synthetic materials from the aquatic environment.

Unfortunately, our oceans and streams are not pristine. They are not even as clean as farmland in transition to organic practices, and no transition can make pollution levels in the ocean acceptable. Any consideration of materials on an open system *must* take into account the likelihood of synthetic chemical pollutants entering the system.

2. Closed systems

"Closed systems" are inland, recirculating, contained, and release no water. Not all inland facilities fit this definition —for example, inland trout farms release a tremendous amount of wastewater into the environment. Containment, in addition to the inland location, is critical to the concept of a closed system.

We believe that land-based, contained aquaculture systems *may* be able to meet expectations for organic production. Nevertheless, there are challenges in both preventing unwanted toxic inputs and preventing impacts on the surrounding ecology.

a) Toxic inputs must be prevented.

Of course, all intentional additions to the aquaculture system need to be evaluated through the NOSB materials evaluation process. And of course, every effort will be made to avoid contamination from sources like pesticide drift. But these are not the only sources of contamination. Waterbodies all over the world are contaminated by persistent organic pollutants (POPs) with no obvious controllable point source. When these chemicals enter aquatic food webs, they are biomagnified and may appear in fish at levels that exceed FDA action levels. These pollutants are not generally problematic in terrestrial organic agriculture because the food chains are so short. However, aquaculture systems that raise predatory fish, whether in open systems or "closed" systems, are vulnerable to POPs that bioaccumulate. *These need to be considered material inputs.*

For example, ATSDR lists as a bioaccumulation factor for PCBs in salmonids 3.9×10^6.[3] This means that the concentration in the flesh of the salmonid fish is almost four million times that of its food and water sources. With this level of bioaccumulation, no level of PCBs in the food of the fish can be ignored.

b) Impacts of materials must be confined to the aquaculture system.

When ponds or tanks are emptied and cleaned, the water should be of a quality that does not have negative impacts on the receiving waterbody. Thus, one class of criteria for evaluating materials, even in closed systems, is their ecological impact when water is discharged —either purposely or accidentally.

[3] ATSDR, 2000. Toxicological Profile for Polychlorinated Biphenyls (PCBs), p. 494.

c) Impacts on aquatic, semi-aquatic, visiting animals need to be taken into account.

Closed systems will not have the same likelihood of routine impacts on the surrounding ecosystem. Nevertheless, water that is discharged will have an impact on receiving waterbodies, and there may be semi-aquatic or other animals attracted to the facility, and impacts on them should be considered.

B. Which evaluation questions in current crops/livestock evaluations are relevant to aquaculture materials?

Category 1. Adverse impacts on humans or the environment?

1. Are there adverse effects on environment from manufacture, use, or disposal? [§205.600 b.2]

This includes discharge of water when tanks, ponds, etc. are cleaned, for which a NPDES permit may be required.

2. Is there environmental contamination during manufacture, use, misuse, or disposal? [§6518 m.3]

This includes discharge of water when tanks, ponds, etc. are cleaned.

3. Is the substance harmful to the environment and biodiversity? [§6517c(1)(A)(i);6517(c)(2)(A)i]

"Environment" includes especially, but not only, the aquatic environment. Even in closed systems, it should include those birds, mammals, amphibian, and reptiles who might be attracted to the facility.

4. Does the substance contain List 1, 2, or 3 inerts? [§6517 c (1) (B)(ii); 205.601(m)2]

5. Is there potential for detrimental chemical interaction with other materials used? [§6518 m.1]

Since everything is in solution, there are many more opportunities for interaction in an aquatic system.

6. Are there adverse biological and chemical interactions in agro- ecosystem? [§6518 m.5]

This needs definition in the context of an aquaculture system, but it might include oxygen depletion, or any biological or chemical change that would lead to a need for intervention (e.g., pest control measures.)

8. Is there a toxic or other adverse action of the material or its breakdown products? [§6518 m.2]

The degradation pathways and half-life in aquatic systems need to be established.

9. Is there undesirable persistence or concentration of the material or breakdown products in environment?[§6518 m.2]

In particular, look at the aquatic environment. Does the material bioaccumulate?

10. Is there any harmful effect on human health? [§6517 c (1)(A) (i) ; 6517 c(2)(A)I; §6518 m.4]

Category 2. Is the Substance Essential for Organic Production?

1. Is there a natural source of the substance? [§205.600 b.1]

4. Is there a wholly natural substitute product? [§6517 c (1)(A)(ii)]

6. Are there any alternative substances? [§6518 m.6]

7. Is there another practice that would make the substance unnecessary? [§6518 m.6]

Category 3. Is the substance compatible with organic production practices?
2. Is the substance consistent with organic farming and handling, and biodiversity? [§6517 c (1)(A)(iii); 6517 c (2)(A)(ii)]
In particular, this question needs to address impacts on aquatic ecosystems, including semi-aquatic organisms and those animals visiting because they are attracted by the water source.
3. Is the substance compatible with a system of sustainable agriculture? [§6518 m.7]
This needs to take into account depletion of nutrients that sustain other life.
4. Is the nutritional quality of the food maintained with the substance? [§205.600 b.3]
5. Is the primary use as a preservative? [§205.600 b.4]
6. Is the primary use to recreate or improve flavors, colors, textures, or nutritive values lost in processing (except when required by law, e.g., vitamin D in milk)? [205.600 b.4]
7. Is the substance used in production, and does it contain an active synthetic ingredient in the following categories:
a. copper and sulfur compounds;
b. toxins derived from bacteria;
c. pheromones, soaps, horticultural oils, fish emulsions, treated seed, vitamins and minerals?
d. livestock parasiticides and medicines?
e. production aids including netting, tree wraps and seals, insect traps, sticky barriers, row covers, and equipment cleaners?

C. Which evaluation questions do not apply, or need to be modified?

Need to be modified:
Category 1.
7. Are there detrimental physiological effects on soil organisms, crops, or livestock? [§6518 m.5]
As we mentioned above, organic aquaculture, like other forms of organic agriculture, must rely on the underlying ecology to feed plants and animals, rather than outside inputs. Synthetic materials must not be used to fulfill system functions, but must be only non-routine inputs. Therefore, we suggest the following:
7. Are there detrimental physiological and ecological effects on aquaculture crops, animals, or the organisms supporting the aquatic system?

Do not apply:
Category 1.
11. Is there an adverse effect on human health as defined by applicable Federal regulations? [205.600 b.3]
12. Is the substance GRAS when used according to FDA's good manufacturing practices? [§205.600 b.5]

13. Does the substance contain residues of heavy metals or other contaminants in excess of FDA tolerances? [§205.600 b.5]

Category 2.
2. Is there an organic substitute? [§205.600 b.1]
3. Is the substance essential for handling of organically produced agricultural products? [§205.600 b.6]
5. Is the substance used in handling, not synthetic, but not organically produced? [§6517 c (1)(B)(iii)]

Category 3.
1. Is the substance compatible with organic handling? [§205.600 b.2]

Category 4. Is the commercial supply of an agricultural substance as organic, fragile or potentially unavailable?
(All questions apply to processing and handling.)

D. What new questions need to be asked about aquaculture materials?

Does the material contain bioconcentrating synthetics? There is some precedent for giving special consideration to chemicals that concentrate. Pesticide residues in processed food that are concentrated beyond the residues present in the raw agricultural commodity, the additional residue is considered a food additive.[4] Similarly, we argue that bioaccumulative synthetic chemicals should be considered as synthetic inputs into an aquaculture system when they concentrate above the levels found in the ambient water.

E. What information needs to be considered in assessing the essentiality of a material in the context of cultural practices as they apply to water instead of soil ecosystems?

If an aquatic system is managed according to organic principles, it will promote and enhance biodiversity and biological cycles. It will promote and enhance those elements of an aquatic ecosystem that support plant and animal growth, without requiring outside inputs or synthetic materials to fulfill system functions. Synthetic materials, if used, will not be routine.

F. Do different questions need to be asked about carnivorous and herbivorous fish? Carnivorous fish pose additional problems, as has been pointed out by commenters. Because of the bioaccumulation of toxic chemicals, it is difficult to find clean natural foods for carnivorous fish.

Bioaccumulative toxic contaminants in fish used for feed must be considered to be synthetic additives. Bioaccumulative toxic contaminants should be considered added synthetics when they are in feed. This is one reason that organic certification of aquaculture should be restricted to herbivorous species.

[4] 21 CFR 170.19

Thank you for this opportunity to comment on issues related to materials used in aquaculture systems. We repeat the advice buried in the comments above that **the NOSB can best "proceed cautiously" by limiting consideration to contained land-based systems producing plants and herbivorous fish.**

Sincerely,

Terry Shistar, Ph.D.
Board of Directors