National Organic Standards Board
Livestock Subcommittee
Petitioned Material Proposal
Biologics - Vaccines in aquatic animal production

[+]February 18, 2014

Summary of Proposed Action:
Biologics – Vaccines, except for those produced by excluded methods, are proposed to be added to the National List at 205.611 for use in production of aquatic animals. Section 205.611 of the National List will contain a list of synthetic substances allowed in aquatic animal production.

The petitioner requests vaccines (including vaccines made with excluded methods) for the medical treatment of aquatic animals under a new Section 205.611: Synthetic substances allowed for use in organic aquatic animal production (x) As ….medical treatments as applicable, Biologics-Vaccines.

Section 6509(d)(1)(C) of the Organic Food Production Act (OFPA) authorizes the use of vaccinations as an allowed healthcare practice in the production of organic livestock.

Section 205.238(a)(6) requires that producers of land based livestock must establish and maintain preventive healthcare practices, including administration of vaccines and other veterinary biologics. At the present time organic livestock producers are allowed to use vaccines as provided in Section 205.603(a)(4) Biologics-vaccines. However, vaccines made with excluded methods (GMO) are prohibited as provided in Section 205.105 (e) However there is a specific reference at 205.105(e) providing an allowance for vaccines made with excluded methods if the vaccines are reviewed and recommended for addition to the National List by the NOSB. Such review needs to be conducted in accordance with section 205.600(a), using criteria specified in the Act at 6517 and 6518.

Products containing biologics are regulated by the USDA/APHIS Center for Veterinary biologics.

Most vaccines are injected intramuscularly or orally, although the fish can also be immersed or sprayed. Vaccines are composed of either weakened live or killed pathogens or antigenic components (molecular subunits) of pathogens. The production process begins when the virus/bacteria are replicated from “reference” organisms and grown in a protein growth medium in the laboratory. Vaccines made from excluded methods differ in that their production may be by altering, deleting, adding or otherwise genetically modifying the bacteria or virus.

The Technical Report (TR) differentiates between inactivated and modified live vaccines. Inactivated vaccines contain microorganisms and viruses rendered non-infectious by inactivation. When the inactivated microorganism is bacterial the resulting vaccine is called a bacterin. Inactivated vaccines produced from the supernatant of a bacterial culture or from an inactivated toxin are called toxoids. Formaldehyde is the most widely used agent for inactivating viral, bacterial and parasitic pathogens. Addition of necessary adjuvants which are produced from a wide range of substances including oil water emulsions, aluminum containing compounds and various proteins. Modified live vaccines are produced in a number of ways and can be immunosuppressive. (TR 146-168).

Vaccines are useful in preventing or significantly reducing clinical signs and chronic conditions and preventing spread of disease. They are best administered in the early stage of life. If

injected the fish may need to be sedated somewhat first as this is stressful on the fish and the person administering the vaccination.

Farmed fish, for example fish in net pens or tanks, are living in crowded conditions and vaccination is an excellent preventive for disease control, reducing disease spread into wild fish in the geographic area around.

Internationally vaccines are allowed in aquaculture in the UK , Canada, Japan, Sweden, except for GMO vaccines; The European Union allows GMO vaccines in aquaculture as an exception to their Rule.

Fish breeding, as with land based livestock, can be used to select highly disease resistant breeding lines for farming. Alternative substances and practices can be used to reduce or, in some cases, eliminate the need for vaccines. In the past antibiotics were administered after disease was noted. Fish can be fed herbal remedies or probiotics and other materials to stimulate their natural immune systems. Fish crowding in tanks or net pens can be reduced to avoid disease. Fish can be farmed in more complex multispecies environments. Constant monitoring of fish behavior and general health and "good husbandry" can reduce the likelihood of disease. Fish health in farmed facilities will be largely determined by required standards for organic aquaculture.

It should be noted that at the time of drafting this proposal there are no federal standards promulgated for aquatic plant or animal production and this proposal is based on the NOSB Recommendations of standards voted in 2007, 2008 and 2009.

Evaluation Criteria (see attached checklist for criteria in each category)

	Criteria Satisfied?		
1. Impact on Humans and Environment	x☐ Yes	☐ No	☐ N/A
2. Essential & Availability Criteria	x☐ Yes	☐ No	☐ N/A
3. Compatibility & Consistency	x☐ Yes	☐ No	☐ N/A

Subcommittee Action & Vote:

Classification Motion: Motion to classify Biologics – Vaccines for Aquatic Animals, as petitioned as synthetic.
Motion by: Jean Richardson
Seconded by: C. Reuben Walker
Yes: 7 No: 0 Absent: 0 Abstain: 0 Recuse: 0

Listing Motion: Motion to list Biologics: Vaccines for Aquatic Animals at §205.611 with the following annotation: except those produced with excluded methods
Motion by: Jean Richardson
Seconded by: Joe Dickson
Yes: 6 No: 1 Absent: 0 Abstain: 0 Recuse: 0

Basis for annotation: x☐ To meet criteria above ☐ Other regulatory criteria ☐ Citation

Minority Opinion: see end of document

Approved by Tracy Favre, Subcommittee Chair to transmit to NOSB February 18, 2014

NOSB Evaluation Criteria for Substances Added To the National List: Livestock

Category 1. Adverse impacts on humans or the environment? Biologics-Vaccines (aquatic animals)

Question	Yes	No	N/A	Comments/Documentation (TAP; petition; regulatory agency; other)
1. Is there a probability of environmental contamination during use or misuse? [§6518(m)(3)]		X		In the case of killed and modified live vaccines there is potential for incomplete inactivation for a particular vaccine lot leaving live pathogen and the reversion to virulence of the modified vaccine inadvertently precipitating a new epizootic through vaccination. But the vaccines themselves contain mostly organic material that rapidly degrades in the environment.(TR 656-659) All vaccines under USDA license are manufactured under strictly controlled facilities and stringently regulated under EPA, thus environmentally detrimental waste is unlikely (TR 660-666) Modified live vaccines are desirable and highly effective in closed systems. However the virus is still capable of infection. These vaccines have not usually been considered acceptable due to the environmental risk that non-virulent viruses could revert to virulent forms or that attenuated viruses that are not virulent in vaccinated species could prove virulent to other species in open systems (TR 296-299) Host density plays a critical role in spread of fish disease in the environment among wild and farmed fish. Low host density reduces rate of encounter between susceptible hosts and pathogens. (TR 748-754) and thus much will depend on the scope and detail provided in the yet to be promulgated Standards for Aquaculture.
2. Is there a probability of environmental contamination during, manufacture or disposal? [§6518(m)(3)]		X		See 1 above.
3. Are there any adverse impacts on biodiversity? (§205.200)	X			Because live vaccines have a short life span outside the host, environmental damage is not expected from accidental release or shedding from animals (Petition p. 10) and see 1 above.
4. Does the substance contain inerts classified by EPA as 'inerts of toxicological concern'? [§6517 (c)(1)(B)(ii)]		X		The substance falls into the category of a medicine (TR 504)

5. Is there potential for detrimental chemical interaction with other materials used in organic farming systems? [§6518(m)(1)]		X		Many chemicals are used in producing fish vaccines. Formaldehyde and ethyleneimine for example are not on the National List, yet they are presently used in production of approved vaccines. Adjuvants are added to vaccines to promote antigenicity and are not considered excipients Polyvalent vaccines should always be used under veterinary supervision as adverse events could occur between vaccines from different sources.(TR 337-353)
6. Is there a toxic or other adverse action of the material or its breakdown products? [§6518(m)(2)]		X		See 1 and 5 above Some reports have described autoimmune disease development in farmed salmon after vaccination with oil adjuvated vaccines. There is possibility of increased infection with unvaccinated pathogens as a result of vaccine induced autoimmunity. Vaccines can largely reduce risks for large scale animal suffering caused by disease in fish farming.(TR 620-636)
7. Is there persistence or concentration of the material or breakdown products in the environment? [§6518(m)(2)]		X		See 1 above
8. Would the use of the substance be harmful to human health or the environment? [§6517 (c)(1)(A)(i); §6517 (c)(2)(A)(i); §6518(m)(4)]		X		The aim of vaccines is to prevent mass destruction of large numbers of infected or potentially contagious animals, prevent transmission of diseases to humans, promote good health of animals farmed and wild, and protect the environment. (TR 300-302) Self injection appears to be the most important human health risk from use of fish vaccines. (TR 760-761). All vaccines are rigorously tested in the USA. See also 1 above
9. Are there adverse biological and chemical interactions in the agro-ecosystem? [§6518(m)(5)]		X		Vaccination is aimed to imitate natural processes in fish and have been found to be effective. (TR 684-712) Much depends on management of host density farmed in tanks or net pens (TR748) There is one DNA vaccine to control an infectious virus (hematopoietic necrosis) but little is known about impacts of this in net pens or tanks (TR 713-727) Ongoing research will be needed to evaluate impacts after regulations are promulgated. (TR 728-738)
10. Are there detrimental physiological effects on soil organisms, crops, or livestock? [§6518(m)(5)]		X		See 1 and 9 above

NOSB Evaluation Criteria for Substances Added To the National List: Livestock

Category 2. Is the Substance Essential for Organic Production? Biologics-Vaccines (aquatic animals)

Question	Yes	No	N/A	Comments/Documentation (TAP; petition; regulatory agency; other)
1. Is the substance agricultural? [§6502(1)]		X		
2. Is the substance formulated or manufactured by a chemical process? [§6502(21)]	X	X		Vaccines are created by naturally occurring biological processes including cell culture and fermentation. (TR548-585). However, some vaccines are produced with formaldehyde inactivation, or chemical bonding with adjuvants
3. Is the substance formulated or manufactured by a process that chemically changes a substance extracted from naturally occurring plant, animal, or mineral sources? [§6502(21)]	X			See 1 above Most of the vaccines approved for use by the USDA for fish are produced by conventional methods starting from natural pathogens gown in culture. (TR 73-86)
4. Is the substance created by naturally occurring biological processes? [§6502(21)]		X		
5. Is there a natural source of the substance? [§ 205.600(b)(1)]		X		
6. Is there an organic substitute? [§205.600(b)(1)]		X		
7. Is there a wholly natural substitute product? [§6517(c)(1)(A)(ii)]		X		
8. Are there any alternative substances? [§6518(m)(6)]	X			Host density increases the spread of aquatic pathogens in to and within farmed fish populations, and from farmed fish to wild fish. (TR 778-780) There are some alternative substances, but probably not as effective as vaccines. In the past farmed fish were treated with antibiotics when sick. Today the goal is prevention. Use of probiotics and feed additives, herbal extracts etc. can be fed to stimulate natural immune systems (TR 781-806)
9. Are there other practices that would make the substance unnecessary? [§6518(m)(6)]	X			See 8 above Vaccines should only be administered to healthy fish. Healthy Fish populations for farming can be selected from certain breeding lines. Management and good husbandry can reduce possibility of infection both in open and closed systems. Disease surveillance must be a rigorous aspect of fish farming to avoid disease as far as possible.(TR 25-259)

NOSB Evaluation Criteria for Substances Added To the National List: Livestock

Category 3. Is the substance compatible with organic production practices? Biologics-Vaccines (aquatic animals)

Question	Yes	No	N/A	Comments/Documentation (TAP; petition; regulatory agency; other)
1. Is the substance consistent with organic farming and handling? [§6517(c)(1)(A)(iii); 6517(c)(2)(A)(ii)]	X			Biologics-vaccines are allowed in land based livestock production 7 U.S.C.Section 6509(d)(1)(C)) 7 CFR 205. 238(a)(6) Section 205.603(a)(4) Section 205.103(e) excludes vaccines made with excluded methods except as provided in 205.600(a), using criteria at 7 U.S.C Section 6517 and 6518 NOTE that this proposal does NOT propose to add to the National List any vaccine made with excluded methods (GMO)
2. Is the substance compatible with a system of sustainable agriculture? [§6518(m)(7)]	X			See 1 above.
3. If used in livestock feed or pet food, Is the nutritional quality of the food maintained with the substance? [§205.600(b)(3)]		X		
4. If used in livestock feed or pet food, Is the primary use as a preservative? [§205.600(b)(4)]		X		
5. If used in livestock feed or pet food, Is the primary use to recreate or improve flavors, colors, textures, or nutritive value lost in processing (except when required by law)? [§205.600(b)(4)]		X		
6. Is the substance used in production, and does it contain an active synthetic ingredient in the following categories: [§6517(c)(1)(B)(i); copper and sulfur compounds		X		
toxins derived from bacteria		X		
pheromones, soaps, horticultural oils, fish emulsions, treated seed, vitamins and minerals		X		
livestock parasiticides and medicines	X			The substances fall into the category of a medicine (TR 504)
production aids including netting, tree wraps and seals, insect traps, sticky barriers, row covers, and equipment cleansers		X		

Minority Opinion – Biologics - Vaccines in aquatic animal production
February 21, 2014

Annotation motion for aquaculture vaccines: Add annotation, "Until May 1, 2019 [or sunset date]."
Justification: Since this petition is being considered in the absence of regulations defining acceptable practices in organic aquaculture, essentiality in particular cannot be judged at this time, so the NOSB needs to reconsider the approval in five (5) years. Current consideration of the material has raised issues relating to health or environmental impacts, especially relating to those in water receiving discharges or open water systems; and alterative natural materials and management methods. The review in five (5) years provides an opportunity for the Board to reevaluate and vote for the continued or modified use of the material under the same standard of review that is used to approve the material initially.

In addition, the minority makes the following comments:
The answers (yes/no) checked often do not conform to the evidence presented in the comments/documentation column.

With regard to checklist Category 1, Adverse Impacts on Humans and the Environment, the minority believes the following need to be considered:

- The following statements in response to the question, "Is there a probability of environmental contamination during use or misuse?" suggest that the answer should be *yes* instead of *no*:
    - In the case of killed and modified live vaccines there is potential for incomplete inactivation for a particular vaccine lot leaving live pathogen and the reversion to virulence of the modified vaccine inadvertently precipitating a new epizootic through vaccination. (TR 656-659)
    - Modified live vaccines are desirable and highly effective in closed systems. However the virus is still capable of infection. These vaccines have not usually been considered acceptable due to the environmental risk that non-virulent viruses could revert to virulent forms or that attenuated viruses that are not virulent in vaccinated species could prove virulent to other species in open systems. (TR 296-299)
- The following responses to, "Is there potential for detrimental chemical interaction with other materials used in organic farming systems?" suggest that the answer should be *yes* instead of *no*:
    - Many chemicals are used in producing fish vaccines. Formaldehyde and ethyleneimine for example are not on the National List, yet they are presently used in production of approved vaccines. Adjuvants are added to vaccines to promote antigenicity and are not considered excipients. (TR 338-348)
    - Polyvalent vaccines should always be used under veterinary supervision as adverse events could occur between vaccines from different sources. (TR 349-354)
- The following response to, "Is there a toxic or other adverse action of the material or its breakdown products?" suggests that the answer should be *yes* instead of *no*:
    - Some reports have described autoimmune disease development in farmed salmon after vaccination with oil adjuvated vaccines. There is possibility of increased infection with unvaccinated pathogens as a result of vaccine induced autoimmunity. (TR 630-634)
- The following responses to, "Are there adverse biological and chemical interactions in the agro-ecosystem?" indicate that not enough is known to justify the *no* answer:

- There is one DNA vaccine to control an infectious virus (hematopoietic necrosis) but little is known about impacts of this in net pens or tanks. (TR 714-728; 642-656)
- Ongoing research will be needed to evaluate impacts after regulations are promulgated. (TR 728-738)