



AQUATIC LIFE
—INSTITUTE—

WHY CEPHALOPOD FARMING MUST BE REJECTED BEFORE IT STARTS

AQUATIC LIFE INSTITUTE
FEBRUARY 2023

CONTENTS

Introduction	1
Animal welfare concerns	2
Environmental concerns	5
Public health concerns	5
Additional concerns	8
Conclusion	9



INTRODUCTION

A highly concerning farming endeavor is quickly gaining momentum as the next problematic trend in aquaculture: The farming of octopus and other cephalopods is being planned in several locations including Spain, Mexico and Japan.

Despite claims by industry, “sustainable” cephalopod farming cannot exist. Sustainable development by definition is to satisfy the demands of current generations without threatening the needs of future generations, while taking economic growth, environmental care, and social well-being into account. Under these principles, cephalopod farming is not sustainable.

Numerous animal protection and environmental organizations, scientists and policy makers, have shown grave concern over these projects, as they pose severe animal welfare and environmental risks. The potential risks and hazards surrounding cephalopod farms are related to animal welfare, biodiversity and biosecurity, environmental degradation, antibiotic resistance, public health, food security, and the livelihoods of coastal communities. Some of these concerns are evaluated in this document.



ANIMAL WELFARE CONCERNS

In November 2021, the United Kingdom extended the scope of the Animal Welfare (Sentience) Bill to recognize octopus and cephalopod mollusks (squid, cuttlefish, etc.) as sentient beings (ones that can reason, learn, and experience sensations) following the findings of a government-commissioned independent review by the London School of Economics and Political Science (LSE). The five-year project drew on more than 300 existing scientific studies to reach a sentient conclusion, and the authors recommended that the government expand its definition of animal welfare to include these animals. This report ultimately led to the inclusion of cephalopods in the Animal Sentience Act in the UK.

Scientists have highlighted the many issues of octopus farming, all of which are related to the fact that these animals, like many others, are not suited in any way, shape, or form for large-scale farming. The Aquatic Life Institute (ALI) turns to 5 pillars of welfare in our engagements with key decision-makers, in addition to other welfare concerns as laid out below:



Environmental Enrichment

They are intelligent and inquisitive. They would require a high level of enrichment which would not be possible in a farm scenario, resulting in extreme boredom, and chronic mental/physical stress.



Feed Composition

They rely on unsustainable carnivorous diets. An increased use of fishmeal/fish oil derived from capture fisheries would place even more pressure on an already unsustainable practice.



Stocking Density & Space Requirements

These animals are solitary by nature. High stocking densities, which is a standard industry practice to amplify production in farms, could result in aggression, cannibalism and social stress.



Water Quality

They are very fragile due to the lack of internal or external skeletons, and could be highly susceptible to any sudden changes in their environment.



Stunning & Slaughter

Presently, no humane method of slaughter exists. Slaughter methods have been studied, however, none have been scientifically approved as humane.



Transportation and Handling

(a) The transport of any live octopus could pose a significant threat to welfare and survival due to demanding environmental requirements. High mortality rates and transportation costs could be expected.

(b) Injuries may be inflicted by captive conditions, handling, and transport. For example, *O. vulgaris* may fight if transported together and eventually bite or cannibalize one another.¹

¹ Borrelli, L, Gherardi, F, Fiorito, G. A Catalogue of Body Patterning in Cephalopoda, Napoli, Italy: Stazione Zoologica A. Dohrn; Firenze University Press, 2006, pp. 626–626.



Health and Medical Treatment

(a) The major threats to health/disease in octopus are water quality issues, physical injury, and infection (due to parasites or other pathogens), all of which may be interrelated. Disease risk is exacerbated by crowded conditions.

(b) The immune system of octopus is poorly known to date. The lack of genomic information makes it difficult to understand vital processes like immune defense mechanisms and their interaction with pathogens at a molecular level. No farm-level treatment plans, prevention strategies, and risk assessments have been developed at this time.

(c) In terms of reproduction, broodstock welfare considerations are nonexistent.

(d) As this would be an unprecedented factory farming endeavor with significant welfare, environmental, and sustainability concerns, high levels of mortality are to be expected, especially within the first few years of production.

(e) Large-scale aquatic farms are a breeding ground for pathogenic bacteria, and therefore contribute to the overuse of antibiotics and the dangerous creation of multidrug-resistant bacteria.

(f) Pathogens associated with skin lesions (*Photobacterium swingsii*, *Lactococcus garvieae* and betanodavirus) have been found in deceased octopuses in previous studies.²

2 Fichi, G, et al. "Skin Lesion-Associated Pathogens from Octopus Vulgaris: First Detection of Photobacterium Swingsii, Lactococcus Garvieae and Betanodavirus." Diseases of Aquatic Organisms, vol. 115, no. 2, 23 July 2015, pp. 147–156, 10.3354/dao02877.

ENVIRONMENTAL CONCERNS



1. Octopus farming raises significant environmental concerns due to new effluents being produced and subsequently discharged into surrounding ecosystems.
2. Ample evidence gathered around the world,^{3,4} has shown that intensive farming of other carnivorous species, such as Salmon, have caused the progressive and grave decimation of related wild species due to the pathogens, competition, genetic abnormalities, and many other factors. There is profound concern that cephalopod farms would cause similar impacts on already vulnerable and declining wild cephalopod populations.
3. Octopus farm escapes also pose a serious risk to local habitats and animal populations with a high potential of transferring any on-farm diseases, antibiotics, etc. Octopus are notorious for escaping their enclosed containers.

PUBLIC HEALTH CONCERNS

1. *Todarodes pacificus* (Japanese flying squid) have been reported to be positive for Betanodavirus,⁵ which is an agent of a serious viral disease known as VER (viral encephalopathy and retinopathy) that has been detected in a wide range of vertebrate and invertebrate hosts worldwide and caused severe mass mortalities in both farmed and wild marine organisms.⁶ Betanodavirus was also identified in skin lesions, in the eye, and in the branchial heart of *O. vulgaris*.^{7,8}

3 Fichi, G, et al. "Skin Lesion-Associated Pathogens from Octopus Vulgaris: First Detection of Photobacterium Swingsii, Lactococcus Garvieae and Betanodavirus." Diseases of Aquatic Organisms, vol. 115, no. 2, 23 July 2015, pp. 147–156, 10.3354/dao02877.

4 "A Global Assessment of Salmon Aquaculture Impacts on Wild" 12 Feb. 2008, <https://journals.plos.org/plosbiology/article?id=10.1371/journal.pbio.0060033>.

5 Gomez, DK, Mori, K, Okinaka, Y, Nakai, T, Park, SC. Trash fish can be a source of betanodavirus for cultured marine fish. Aquaculture 2010; 302: 158–163.

6 Vendramin N, Patarnello P, Toffan A, Panzarin V, Cappelozza E, Tedesco P, Terlizzi A, Terregino C and Cattoli G. Viral encephalopathy and retinopathy in groupers (*Epinephelus* spp.) in southern Italy: a threat for wild endangered species? BMC Vet Res 2013; 9: doi:10.1186/1746-6148-9-20.

7 Vanni A, Fichi G, Cardeti G, Cersini A, Perrucci S, Lenzi F, DeWolf T, Fronte B, Ricci E, Campeis F and Susini F. Potenziali patogeni in popolazione naturale e in soggetti stabulati di *Octopus vulgaris*. Atti Società Italiana di Patologia Ittica, XIX Convegno Nazionale 2013; 80.

8 Florito, Graziano, et al. "Guidelines for the Care and Welfare of Cephalopods in Research –a Consensus Based on an Initiative by CephRes, FELASA and the Boyd Group." Laboratory Animals, vol. 49, no. 2_suppl, 9 Sept. 2015, pp. 1–90, 10.1177/0023677215580006.

2. A wide variety of pathogens have been isolated from infection sites of octopuses and squids in a laboratory.⁹

- Acinctohacter lwoffii
- A. hydrophila
- Cytaphaga sp.
- P. putrificiens
- P. stutzeri
- Vibrio alginolyticus
- V. carchariae
- V. costicola
- V. cholerae
- V. damsela
- V. fluvialis
- V. natriegenes
- V. parahaemolyticus
- V. pelagius (biovar 2)
 - Vibrio spp. is considered as a significant problem to the development of the aquaculture sector with severe economic losses worldwide.
 - Vibrios are gram-negative, ubiquitous in marine, estuarine ecosystems as well as aquaculture farms and one of the major microbiota of these ecosystems. Many vibrios are serious pathogens for animals reared in aquaculture.
 - Cholera is a potentially zoonotic epidemic and life-threatening secretory diarrhea characterized by numerous, voluminous watery stools, often accompanied by vomiting, and resulting in hypovolemic shock and acidosis. It is caused by certain members of the species Vibrio cholerae.
 - Cholera is endemic or epidemic in areas with poor sanitation; it occurs sporadically or as limited outbreaks in developed countries. In coastal regions it may persist in plankton.¹⁰
 - Octopus farming could become a serious public health risk, as captive cephalopods could be vectors of multiple unknown pathogens and zoonotic diseases such as cholera.

9 Ruth Francis-Floyd, D. V. M. "IAAAM 1987." VIN.com, 10 May 1987, www.vin.com/apputil/content/defaultadv1.aspx?pld=11104&id=3981710&print=1.

10 Finkelstein, Richard A. "Cholera, Vibrio Cholerae O1 and O139, and Other Pathogenic Vibrios." Nih.gov, University of Texas Medical Branch at Galveston, 2015, www.ncbi.nlm.nih.gov/books/NBK8407/.

3. These treatments (antibiotics and protozoacides) used against disease were applied to octopuses in various dosages, durations and frequencies:

- Acetic Acid
- Antimony
- Acriflavine
- Amikacin sulfate
- Atabrine
- Calcium hypochlorite
- Cefotaxime
- Chloramphenicol
- Formalin
- Furazolidone
- Gentamicin sulfate
- Kanamycin
- Malachite Green
- Metronidazole
- Minocycline hydrochloride
- Neomycin sulfate
- Neosporin
- Nifurpirinol
- Nitrofurazone
- Oxytetracycline - hydrochloride
- Panos
- Piperacillin

Some of these compounds, e.g. malachite green, have been banned in various EU member states. Denmark banned the compound in the 1990s. Many of these antibiotics are used to treat diseases in humans, so using them in octopuses significantly increases the risk of generating antibiotic resistance, which is a serious threat to the public health of humans, animals and the environment, as established in the report of the United Nations Environment Program, UNEP, in 2021.¹¹

¹¹ Environmental Dimensions of Antimicrobial Resistance Summary for Policymakers. https://wedocs.unep.org/bitstream/handle/20.500.11822/38373/antimicrobial_R.pdf

ADDITIONAL CONCERNS



Adequate Employee Training

- a. There are no octopus-specific training programs for farm employees.
- b. Octopus are fragile and would require high levels of care when any type of handling occurs. Care would be compromised during production due to stocking densities, lack of knowledge, and “fast” procedures.



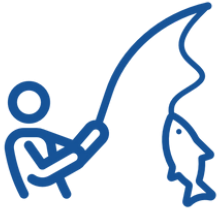
Data-Driven Approach, Record Keeping, and Reporting

Adequate, regular, and detailed monitoring procedures or emergency preparedness plans related to imminent environmental damages or threats do not exist as an industry standard at this point in time.



Legislative Considerations

There is currently no legislation protecting the welfare of farmed cephalopods in those jurisdictions where octopus farming is being developed.



Livelihoods

These projects could have negative effects on the livelihoods of the surrounding communities as well. The United Nations General Assembly declared 2022 the International Year of Artisanal Fisheries and Aquaculture (IYAFA 2022). This vision statement seeks to develop “A world in which small-scale artisanal fishers, fish farmers and fish workers are fully recognized and empowered to continue their contributions to human well-being, healthy food systems and poverty eradication through the responsible and sustainable use of fisheries and aquaculture resources.” Industrial cephalopod farming operations would not support these initiatives whatsoever, and could negatively affect traditional scale artisanal fisheries, as well as the communities that rely on these activities to sustain their livelihoods.

CONCLUSION

Hundreds of organizations, including the signatories of the Aquatic Animal Alliance’s [open letter to ban cephalopod farming](#), thousands of concerned citizens such as the [signatories of this petition](#), and renowned scientists such as Dr. Jane Goodall, Dr. Andrew Knight and Dr. Jennifer Jacquet, are urging for the ban of these farms before they begin operations.

