Question to EURCAW-Aqua: *Animal welfare consequences of cephalopod farming*

Question received: 1 July 2024
Question answered: 7 August 2024

EURCAW-Aqua received the following query from an NCA in one of the Member States.

Information and background context provided by the solicitor

According to EFSA [1] cephalopods are sentient beings capable of feeling pain and stress. The species of cephalopods which are of interest for human consumption are typically octopods, squid and cuttlefish.

The answer should preferably describe the impact of the various rearing parameters on the welfare of squids, octopods and cuttlefish, for example water quality, where the animals are kept and handled. The answer should also preferably reveal whether indicators have been identified for cephalopods that can be used as an indicator of good or bad welfare.

QUESTION

EURCAW-Aqua received the following question from a welfare competent authority in one of the Member States:

> "*We would like to ask a question to the European Reference Center for Aquatic Animal Welfare about the animal welfare consequences of cephalopod farming. The question has a background in a political agreement with several initiatives. In one of the initiatives, there is a desire for an assessment of animal welfare consequences of cephalopods farming, which animal welfare factors should be emphasized and which animal welfare consequences farming has for squid, octopods and cuttlefish*".

Experts from EURCAW-Aqua wrote the reply. The EURCAW secretariat did the final editing.

For queries: info@eurcawaqua.eu

ANSWER

Cephalopods are the only invertebrate animals included in a regulated framework in EU Member States (Directive 2010/63/EU) [2]. This decision was based on the EFSA 2005 Opinion report on "Aspects of the biology and welfare of animals used for experimental and other scientific purposes"[1] that placed cephalopods species within Category I of animals. Category I refers to animals that "*The scientific evidence clearly indicates, either directly or by analogy with animals in the same taxonomic groups, that animals in those groups can experience pain and distress*". Therefore, cephalopods met sufficient criteria to warrant legal protection during experimental and other research work [1,3,4].

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Following the inclusion of cephalopods in Directive 2010/63/EU, several subsequent scientific studies and international network initiatives allowed for the development of consensus-based approaches regarding the use of cephalopods in research. Some examples are given below:

- Development of guidelines for the care and welfare of cephalopods in research [5,6]
- Development of further guidance in assessing prospective severity of procedures, relevant to these species [7]
- Inclusion of cephalopods (and crustacean decapods) in a review-based recommendation [8], that appear also to support the Animal Welfare (Sentience) Act 2022 (UK)
- Consensus initiatives for guidance in the establishment of species-specific recommendations for minimal requirements for the use of these animals in scientific research [9].

Cephalopods' farming

Among the 800 living cephalopod species, there is emerging evidence that only a few species are potential candidates for aquaculture farming activities, namely the cuttlefish (*Sepia officinalis*), sepiolids (commonly referred to as squids in commercial context), and octopus (*Octopus maya*, *O. vulgaris*) [10]. Other species may have potential, but the development of an efficient pipeline of commercial/industrial interest is far from being achieved.

Basic welfare needs

Cephalopods are marine species, and their function and welfare depend heavily on the quality of the water. Proper temperature values, salinity, pH, and nitrogenous wastes should be constantly monitored according to species and ontogenetic stage. Moreover, cephalopods have species-specific preferences on housing and social conditions, with different species displaying behaviors from solitary to gregarious living [9]. Moreover, most of the species need hiding places for security reasons, as for instance dens in aquaria with octopods, as well as enrichment (i.e. physical, cognitive and sensory stimuli) to maintain a normal behavior.

Cephalopods are carnivores and display a variety of predatory strategies. Most species need to be fed diets with high protein and low lipids levels. For instance, studies in adult *Octopus vulgaris* have shown that feed composed of either crustaceans, fish or squid optimize growth rates [11]. However, there is a lack of scientific knowledge regarding the optimum species-specific and ontogeny-stage specific feeds, method of preparation, and feeding regimes.

Cephalopods can get infected by a variety of pathogens, including bacteria, fungi, parasites and viruses [11]. For this reason, high hygienic conditions are required for each holding facility. Moreover, avoiding skin injury is fundamental since skin of cephalopods is sensitive and seems to play an important role in the innate immune response of the animals [12].

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Welfare concerns

Cephalopods are marine animals, the quality of the rearing water should by according to specific guidelines. Moreover, these animals are active predators and not sedentary animals. In the wild, the foraging area of an octopus is estimated (based on the available knowledge) to be about 200 square meters. Under circumstances linked to lab/experimental purposes, an octopus is constrained to a tank that represents an area that - under the best conditions - is about 50 times larger than the average size of an octopus, but more than 300 times smaller than the one commonly used by an animal in the field during sorties or excursions. The current recommendations for housing cephalopods (see #7 and revision of Annex III of the Directive) brings mandate minima requirements for a minimum space (and water column) required for each individual animal, designed, and set in a way that assure their wellbeing.

Additionally, these animals are mostly solitary (squids may form schools and some octopus species are more social-tolerant than others), and highly territorial, therefore, high densities characterized common aquaculture activities, may not be easily applicable for some cephalopods.

Welfare Indicators in Cephalopods

The study of welfare needs in cephalopods is a quite new research field. Most of the published data is the outcome of scientific initiatives like CephRes, CephsInAction and the support of FELASA. Guidelines for the "Care and Welfare of Cephalopods in Research" [9.13] is available to provide information for investigators, animal care committees, facility managers and animal care staff which are involved in rearing and experimental procedures.

The EURCAW-Aqua will work on the assessment of animal welfare consequences of cephalopods rearing, since there is an increasing interest in the farming of these species.

References

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