

VETERINARY EDUCATION ON AQUATIC ANIMALS AND ITS IMPACT ON AQUATIC ANIMAL DISEASE CONTROL STRATEGIES IN THE REGION

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1. Introduction

In recent years, rising global demand for food has led to exponential growth in aquaculture worldwide. World aquaculture production in 2012 was 66,633,253 tonnes, with Asia accounting for the largest percentage of world production (88.39%), or a total of 58,900,068 tonnes. The continent of the Americas is the second largest producer, with 4.78%, or a total of 3,187,139 tonnes [1].

In Latin America and the Caribbean, aquaculture for domestic consumption is significant in a few countries, including Mexico and Brazil. However, the general trend in the region is to buy imported products, especially in countries such as Chile, Ecuador, Colombia, Honduras, Costa Rica, Peru and Panama [2]. Over the past ten years, production growth in the region was 22%, the world's highest growth.

A questionnaire based on the OIE recommendations on the competencies of graduating veterinarians ('Day 1 graduates') to assure national Veterinary Services of quality was prepared in order to obtain information about veterinary education on aquatic animal health (both initial and continuing) to identify gaps and assess its impact on aquatic animal disease control strategies in the region.

2. Material and method

A questionnaire was drawn up on various aspects of initial and continuing veterinary education on aquatic animal health (compared with that on terrestrial animal health) and of the management of Aquatic Animal Health Services in the region.

Two texts were used as a reference for preparing the questionnaire: *OIE recommendations on the competencies of graduating veterinarians ('Day 1 graduates') to assure national Veterinary Services of quality* [3] and *Report of the meeting of the OIE Ad Hoc Group on Veterinary Education of July 2012* [4].

The questionnaire was sent by e-mail to the Delegates of all Member Countries in the region. Ninety percent of Member Countries (27) answered the questionnaire.

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3. Results

90% of all Member Countries in the region answered the questionnaire, reflecting a high level of interest in the issue.

73% of all respondents said they were OIE Focal Points and, of these, 75% were Focal Points for aquatic animals.

3.1. Initial veterinary education and access to the profession

Most Member Countries in the region are familiar with the OIE recommendations on the competencies of graduating veterinarians ('Day 1 graduates') (96.5%, based on the 27 completed questionnaires).

A gap can be seen in the competencies covered by initial veterinary education, for both aquatic and terrestrial animals. In the case of aquatic animals, it emerges that less than 40% of these competencies are covered by initial veterinary education. The exception is the food safety competency (covered in 63% of Member Countries that answered the questionnaire).

The competencies least covered for both aquatic and terrestrial animals are: communication skills, general certification procedures, animal welfare and veterinary pharmaceuticals ([Table 1](#)).

As [Table 2](#) shows, the gap between countries widens when it comes to the advanced competencies covered by initial veterinary education on aquatic animal health. The competencies least covered for both aquatic and terrestrial animals are: organisation of Veterinary Services and Aquatic Animal Health Services, application of risk analysis, and international trade regulations.

On the subject of veterinary associations in the region, in 81.4% of Member Countries there is a veterinary statutory body and in half the Member Countries there is an institution that brings together veterinarians working in the area of aquatic animal health.

3.2. Continuing veterinary education

85.1% of countries have a continuing education programme for veterinarians, which the respondents (47.8%) estimate to cover less than 50% of veterinarians.

In most countries there are different types of continuing veterinary education programme, the most common being classroom training and postgraduate courses.

As with initial veterinary education, there is a gap between the competencies covered by education programmes on aquatic animal health and those on terrestrial animal health in the region ([Table 3](#)). The competencies least covered for both aquatic and terrestrial animals are: communication skills, general certification procedures, veterinary legislation and ethics.

As regards the advanced competencies covered by continuing education programmes, the competencies least covered for both aquatic and terrestrial animals are: organisation of Veterinary Services and Aquatic Animal Health Services, administration and management, and application of risk analysis ([Table 4](#)).

In most countries, schools or faculties of veterinary medicine are responsible for continuing education.

85.1% of Member Countries reported having a continuing education programme for veterinarians covering less than 50% of veterinarians. Only 33.3% of competent authorities establish compulsory continuing education programmes for veterinarians working in aquatic animal health, in both the public and private sectors.

Only 30.8% of competent authorities lay down requirements for approving private veterinarians working in Veterinary Services in the area of aquatic animal health. The requirements include: minimum experience in aquaculture and/or epidemiology; aquaculture

training in health and in inspection and certification processes; mandatory registration with the veterinary statutory body; and accreditation by the competent authority.

In most Member Countries (59.2%), aquatic animal health is controlled by veterinarians in conjunction with other professionals. Aquatic animal health is controlled solely by civil service veterinarians in only three countries (11.1%).

The main constraints reported by Member Countries with respect to initial and continuing veterinary education on aquatic animal health are a lack of such courses in initial education and a lack of specialist veterinarians ([Table 5](#)).

Overall, 51.8% of Member Countries in the region believe that *Aquatic Animal Health Services* **do not** have the skills required to control aquatic animal diseases.

3.3. Management of Aquatic Animal Health Services

- In 77.7% of countries surveyed, the *Veterinary Authority* is responsible for both terrestrial and aquatic animals.
- There is a *Veterinary Authority* specific to aquatic animal health in Brazil, Chile and Ecuador, where it is in different institutions from the *Veterinary Authority* for terrestrial animals.
- As regards control strategies, most countries in the region (77.7%) implement strategies for preventing exotic diseases. 70% of countries have implemented specific surveillance programmes for OIE listed aquatic animal diseases.
- In addition, nearly half the countries in the region (48.1%) have implemented specific surveillance programmes for OIE *listed diseases*.
- 48.1% of countries have implemented a control or eradication programme. 29.6% of countries have implemented specific programmes for the control or eradication of non OIE-listed aquatic animal diseases.
- Despite having implemented specific control programmes, half the countries in the region have had no aquatic animal emergencies caused by disease outbreaks.
- Lastly, all Member Countries stated that the OIE should strengthen its work concerning veterinary education on aquatic animal health.
- Most countries believe that action plans should be implemented to improve veterinary education on aquatic animal health in the Americas ([Table 6](#)).

4. Conclusions

- 90% of Member Countries answered the questionnaire (27). This shows their high level of interest in aquatic animal health.
- With respect to veterinary education on aquatic animal health, the results show that less than half the competencies recommended by the OIE are covered by either initial veterinary education or continuing education in the region.
- It emerged that initial and continuing veterinary education covered fewer competencies than education on terrestrial animal health (an average 38% of the 11 basic specific competencies is covered by initial veterinary education on aquatic animal health, compared with 72% in the case of terrestrial animal health).
- In initial veterinary education, the specific competencies least covered for both aquatic and terrestrial animals are: communication skills, general certification procedures, pharmaceuticals and animal welfare. The advanced competencies least covered are:

organisation of Veterinary Services and Aquatic Animal Health Services, application of risk analysis, and international trade regulations.

- In continuing veterinary education, the specific competencies least covered for both aquatic and terrestrial animals are: communication skills, general certification procedures, veterinary legislation and ethics. The advanced competencies least covered are: organisation of Veterinary Services and Aquatic Animal Health Services, administration and management, and application of risk analysis.
- 85.1% of Member Countries reported having a continuing education programme for veterinarians covering less than 50% of veterinarians. Most of these programmes comprise (in order of frequency): classroom training, postgraduate courses, distance learning and diploma courses. However, only 32.1% of competent authorities establish compulsory continuing education programmes for both public- and private-sector veterinarians working in the area of aquatic animal health.
- With respect to the management of *Aquatic Animal Health Services*, in 77% of Member Countries, the *Veterinary Authority* is responsible for both terrestrial and aquatic animals. There is a Veterinary Authority specific to aquatic animal health in only three countries in the region.
- As regards strategies for controlling aquatic animal diseases in the region, most countries have developed systems for preventing the entry of exotic diseases (78%) and have already implemented specific surveillance programmes for OIE listed aquatic animal diseases (70%).
- 48% of countries have implemented a specific surveillance programme for non OIE-listed diseases, for diseases deemed to be important by individual countries. Some of these diseases have been removed from the OIE list. However, several countries in the region have implemented surveillance for emerging diseases like shrimp early mortality syndrome.
- 48% of countries have implemented a programme for the control or eradication of OIE listed diseases and 30.77%, for non OIE-listed diseases.
- Half the countries in the region have had no aquatic animal emergencies caused by disease outbreaks.
- Even though aquatic animal health actions have been implemented in several countries in the region, more than half those surveyed (51.8%) believe that *Aquatic Animal Health Services do not* have the skills required to control aquatic animal diseases.

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Appendix 1**Table 1.– Results of the questionnaire regarding the specific competencies covered by initial veterinary education on aquatic and terrestrial animal health in Member Countries in the region**

Specific competency	Aquatic animals		Terrestrial animals	
	Frequency	%	Frequency	%
1. Epidemiology	11	40.7	23	85.2
2. OIE listed diseases	11	40.7	22	81.5
3. Non-OIE listed diseases	10	37.0	22	81.5
4. Emerging diseases	11	40.7	22	81.5
5. Disease prevention and control programme	11	40.7	22	81.5
6. Food safety	17	63.0	22	81.5
7. Veterinary pharmaceuticals	8	29.6	23	85.2
8. Animal welfare	9	33.3	20	74.1
9. Veterinary legislation and ethics	12	44.4	21	77.8
10. General certification procedures	6	22.2	10	37.0
11. Communication skills	5	18.5	11	40.7
Average total		37.4		73.4

Table 2.– Results of the questionnaire regarding the advanced competencies covered by initial veterinary education on aquatic and terrestrial animal health in Member Countries in the region

Advanced competency	Aquatic animals		Terrestrial animals	
	Frequency	%	Frequency	%
1. Organisation of Veterinary Services and Aquatic Animal Health Services	7	25.9	13	48.1
2. Inspection and certification procedures	8	29.6	14	51.9
3. Management of animal diseases	12	44.4	23	85.2
4. Food safety	17	63.0	22	81.5
5. Application of risk analysis	7	25.9	9	33.3
6. Research	11	40.7	20	74.1
7. International trade regulations	9	33.3	11	40.7
8. Administration and management	9	33.3	16	59.3
Average total		37.0		59.3

Table 3.– Results of the questionnaire regarding the specific competencies covered by continuing veterinary education programmes on aquatic and terrestrial animal health in Member Countries in the region

Specific competency	Aquatic animals		Terrestrial animals	
	Frequency	%	Frequency	%
1. Epidemiology	14	51.9	19	70.4
2. OIE listed diseases	13	48.1	18	66.7
3. Non-OIE listed diseases	13	48.1	18	66.7
4. Emerging diseases	11	40.7	18	66.7
5. Disease prevention and control programme	11	40.7	16	59.3
6. Food safety	14	51.9	18	66.7
7. Veterinary pharmaceuticals	8	29.6	17	63.0
8. Animal welfare	8	29.6	18	66.7
9. Veterinary legislation and ethics	8	29.6	12	44.4
10. General certification procedures	9	33.3	10	37.0
11. Communication skills	9	33.3	10	37.0
Average total		39.7		58.6

Table 4.– Results of the questionnaire regarding the advanced competencies covered by continuing veterinary education programmes on aquatic and terrestrial animal health in Member Countries in the region

Advanced competency	Aquatic animals		Terrestrial animals	
	Frequency	%	Frequency	%
1. Organisation of Veterinary Services and Aquatic Animal Health Services	9	33.3	13	48.1
2. Inspection and certification procedures	11	40.7	13	48.1
3. Management of animal diseases	13	48.1	19	70.4
4. Food safety	16	59.3	18	66.7
5. Application of risk analysis	9	33.3	11	40.7
6. Research	15	55.6	16	59.3
7. International trade regulations	11	40.7	13	48.1
8. Administration and management	9	33.3	14	51.9
Average total		43.1		54.1

Table 5.– Results of the questionnaire regarding constraints in veterinary education on aquatic animal health in the region

Constraint	Frequency	%
Failure to include aquatic animal health in the veterinary curriculum	20	74.1
Lack of specialist veterinarians	21	77.8
Lack of experience in aquatic animal health	16	59.3
Aquaculture is still being developed	11	40.7
Lack of OIE reference centres	7	25.9

Table 6.– Action plans suggested by the Member Countries surveyed to strengthen veterinary education on aquatic animal health

Suggested action plan	Frequency	%
Engendering further adjustments at the level of initial veterinary education on aquatic animal health	23	88.9
Further development of guidelines for postgraduate and continuing veterinary education on aquatic animal health	23	88.9
Establishment of an OIE Collaborating Centre specifically for veterinary education on aquatic animal health in the region	20	77.8
Drafting a more detailed definition of 'veterinarian' and 'aquatic animal health professional'	18	70.4