Self declaration of freedom from infection with infectious salmon anaemia virus of the Republic of Korea

Self-Declaration sent to the OIE on 24 May 2019 by Dr Oh Soon-Min, Delegate of the Republic of Korea to the OIE, Director General and Chief Veterinary Officer, Animal Health Policy Bureau, Ministry of Agriculture, Food and Rural Affairs, Korea (Rep. of).

1. Overview and scope

The National Institute of Fisheries Science, the Ministry of Oceans and Fisheries, the Republic of Korea officially requests the publication by the World Organization for Animal Health (OIE) of a self-declaration of freedom from infection with infectious salmon anaemia virus (ISA V) (of the entire country of the Republic of Korea as of September 1, 2019) according to Article 10.4.4. of the Aquatic Animal Health Code (Aquatic Code). This is first self-declaration of freedom from the disease of the country.

2. Aquatic Biosecurity System in the Republic of Korea

The Republic of Korea has established a systematic national disease control infrastructure based on the Aquatic Life Disease Control Act (enforced in 2008) along with financial resources to support for the system (Annex 1). In addition, basic biosecurity requirements including reporting on suspicious infections, the early warning system, and import sanitation requirements have been and are being met. The Korean government has achieved and is maintaining a level of staff capability and technological advancement which is required to effectively respond to an animal health emergency through quality control and training programs.

2.1. Disease Control System for Aquatic Organisms

Provisions from the article 9 (Reporting on dead or diseased aquatic organisms) through the article 19 (Prohibition of excavation) of the Aquatic Life Disease Control Act provide disease control measures which should be taken against contagious aquatic organism diseases. The disease control measures have been specified by law to prevent the spread of a contagious aquatic organism disease 2. The early warning system for all relevant species has been established as shown in Annex 2.

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1 For the purpose of this self-declaration, infection with ISA V are for any detectable ISA V, including HPR0 ISA V.
2 http://www.law.go.kr/LSW/eng/engLsSc.do?menuId=2&section=lawNm&query=aquatic+animal&x=0&y=0#iBbgcolor0
The national aquatic life disease control organization in Korea refers to the National Institute of Fisheries Science (NIFS) with 8 operations (including the headquarter and the local institutes) across the country (Article 6 of the Enforcement Decree of the Aquatic Life Disease Control Act) while local-level disease control programs executed by 17 local governments across the country with each of the local government carrying out disease control programs in areas under its jurisdiction (Article 4 of the Enforcement Decree of the Aquatic Life Disease Control Act).

2.1.1. Surveillance Activities

Surveillance activities for contagious aquatic organism diseases have been conducted in accordance with the article 3 (Measures for control of aquatic organism diseases) of the Aquatic Life Disease Control Act and the article 5 (Surveillance of contagious aquatic organism diseases) of the Enforcement Rule of the Aquatic Life Disease Control Act. NIFS also enacted “Public Notice on Guidance on Surveillance and Disease Control of Contagious Aquatic Organism Diseases” and has put in place and operated an effective surveillance system for data collection and analysis which is needed for establishing the early detection and reporting system, epidemiological investigations, etc. General surveillance is implemented targeting entities which own, manage and operate aquaculture facilities subject to surveillance. This type of surveillance is carried out through activities to promote the disease prevention by the means of field visits or telephone using Q&A surveys like interviews and questionnaire surveys on the history and the current status of disease occurrences, mortalities, etc. The process of early detection of introduced disease has been established as diseases are detected by producers.

In particular, NIFS issues a warning of disease occurrence (yellow, orange, or red) under the article 20 of the “Public Notice on Guidance on Surveillance and Disease Control of Contagious Aquatic Organism Diseases”. This is linked to the National Integrated Information Network for Aquatic Disease Control, allowing an early warning system where the current status of each disease is real-time communicated.

2.1.2. Diagnostic Competence and Quality control

The national aquatic life disease control organization (NIFS) in the Rep. of Korea, in accordance with the “Notification on Designation and Operation of Disease Identification Institutes for Aquatic Organisms”, designates local governments, universities or private institutes as disease identification institutes, manage and supervise the institutes, provides them with standardized diagnostic techniques, provides training to the staff of these institutes every year, and organizes national and participates in international proficiency tests. NIFS has obtained accreditation on the ISO 17025 and has been also attending 2 kinds of international proficiency tests every year: KHV PCR proficiency tests organized by VETQAS in the U.K. (semiannual) and proficiency tests for KHV, ISAV, VHSV, IHNV, EHVN PCR and cell culture organized by DTU in Demark (annual).

2.1.3. Epidemiological Investigation and Disease Control Measures

In the case that an infectious disease has occurred or is concerned to occur, the Korean government implements epidemiological investigations as part of activities to understand the situation of disease outbreak and to track the source of infection in order to prevent the occurrence of any outbreak and the spread of the disease. Also, the purposes of an epidemiological investigation are to understand the health status of a population and disease characteristics by identifying the cause and the mechanism of transmission of the disease and to decide on reasonable disease control measures to prevent the reoccurrence of the disease.

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3 http://www.nifs.go.kr/page?id=en_index
4 http://www.law.go.kr/LSW/eng/engLsSc.do?menuId=2&section=lawNm&query=aquatic+animal&x=0&y=0#liBgcColor0,
http://www.law.go.kr/lsInfop.do?lsiSeq=203584&eyId=20180529#0000
5 http://www.law.go.kr/admRulLsInfoP.do?admRulSeq=2100000100421
6 http://www.law.go.kr/admRulLsInfoP.do?admRulSeq=2100000174789
In addition, the “Aquatic Life Disease Control Act” regulates that disease control measures shall be taken if an infectious disease is confirmed by means of surveillance, confirmatory diagnosis and epidemiological investigation. Equipment, tools, etc. at a facility where an infectious disease has occurred shall be disinfected, incinerated or buried and aquatic organisms at the affected facility shall be subjected to measures like culling, isolation, movement restriction, and restriction on disposal of carcasses. The Republic of Korea has adopted an approach of no-vaccination against ISA.

2.2. Quarantine System for Aquatic Organisms

The national quarantine organization for aquatic organisms in the Rep. of Korea refers to National Fishery Products Quality Management Service7, which operates 13 local offices across the country (the article 12 of the “Enforcement Decree of the Aquatic Life Disease Control Act”). NFQS carries out quarantine inspection of 21 kinds of notifiable diseases in fish, shellfish, crustacean species among aquatic organisms for transplant, eating, ornament, testing, research and survey, frozen and chilled abalone, oysters, and shrimps, and diagnostic reagents including pathogens under the article 22 (Quarantine of exported and imported organisms), 23 (Things designated for quarantine purpose), 27 (Quarantine inspection on imports), and 31 (Quarantine inspection on exports) of the “Aquatic Life Disease Control Act”. An imported organism must stay within a designated quarantine place (“quarantine area”, etc.) until a quarantine inspection ruling is issued. If having passed the inspection, the imports can be distributed to local destinations and if having failed the inspection, the imports should be subjected to measures like return, incineration, or burial (Annex 3.).

3. Evidence Supporting Freedom from ISA of the Country

ISA is listed as a nationally notifiable disease in the Rep. of Korea under the article 2 of the “Enforcement Rule of the Aquatic Life Disease Control Act”8. Therefore, all measures related to surveillance and disease control are specified in the current law to ensure that an appropriate level of biosecurity should be achieved for this disease.

- To prevent the introduction of ISAV into the national territory, conditions specified in the Aquatic Code (the article 10.4.3 and 10.4.10) shall apply to imported Salmonidae
- The early warning system of the disease has been in place since 2008. In case of a disease outbreak, a trained aquatic organism disease inspector or a veterinarian shall conduct a clinical test and technical follow-up measures at affected farms
- Targeted surveillance has been adopted (twice a year) to detect the presence of ISAV which is accompanied with field surveillance (4 times per month) by the staff of the competent authority.
- Any detection of the presence or suspicion of ISA must be reported to the competent authority by law
- If ISA is confirmed by a confirmatory diagnosis, epidemiological investigations and control measures shall be implemented to prevent the transmission and spread of the disease

3.1. Control and Management of ISA

To maintain the status of freedom from ISAV of the country, the Republic of Korea will ensure that targeted surveillance will be continued and biosecurity conditions will be continuously maintained in accordance with Article 10.4.8 of the Aquatic Code and control in import quarantine will be continued in accordance with Article 10.4.8 of the Aquatic Code. These conditions are described under Section 2 of the document.

3.1.1. Susceptible Fish Specifies to infection with ISAV in the Country

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8 http://www.law.go.kr/lsInfoP.do?lsiSeq=203584&efYd=20180529#0000
ISA susceptible species listed in the *Aquatic code (2019)* are Atlantic salmon (*Salmo salar*), brown trout (*Salmo trutta*) and rainbow trout (*Onchorhyncus mykiss*). Among these species, rainbow trout and Atlantic salmon are farmed in Korea and subject to surveillance of ISA.

Atlantic salmon has been listed as a potential risk species (by Notification by the Ministry of Environment 2016-1235) and an introduction of this species into the country should be approved by the Ministry of Environment. Currently, eyed Atlantic salmon eggs have been imported once every year since 2015 (Table 6). The imported eggs are stocked at a freshwater aquaculture facility (the same facility where rainbow trouts are grown) where they are grown until juvenile (cultivation period: 1 year; target size: about 100 g) and all of them are then transported to a research institute under a local government (Cold Water Resources Center in Gangwon province) where they go through seawater acclimation and then used for aquaculture research in land-based farms (seawater). The research institute conducts researches on development of land-based aquaculture techniques for Atlantic salmon. Therefore, there are no F1 salmons generated from imported Atlantic salmons (F0) in the Rep. of Korea.

In Korea, the aquaculture of rainbow trout was started in 1965 when 10,000 eyed eggs were imported for exploratory aquaculture. Currently, 180 rainbow trout farms are operated producing about 3,100 tons of the fish (Table 1).

Table 1. Aquaculture production of the Salmonidae

<table>
<thead>
<tr>
<th>Year</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
<th>2018</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rainbow trout</td>
<td>3,015</td>
<td>3,067</td>
<td>3,390</td>
<td>3,304</td>
<td>3,064</td>
<td>3,066</td>
<td>3,358</td>
<td>3,179</td>
</tr>
<tr>
<td>Atlantic salmon</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>100</td>
<td>70</td>
<td>0</td>
</tr>
</tbody>
</table>

Rainbow trout aquaculture farms in Korea are under similar aquaculture environment. Rainbow trouts are farmed in land-based farm facilities of which rearing water is supplied from the groundwater, so fish escaping from farms during flooding are not supposed to survive (Figure 1).

Figure 1. Rainbow trout farms in the Republic of Korea

All susceptible species to ISA existing in Rep. of Korea, which are Atlantic salmon and rainbow trout, are only produced/kept in farms.

3.1.2. Surveillance Activities of ISA and the Results

Infection with ISA has been listed as a notifiable disease since 2008 in the country and the year-round routine surveillance system has been established to carry out surveillance inspection of the disease. The 180 Salmonidae farms have been undergoing general surveillance and since 2014, an annual average of 2.3 visits has been made for each aquaculture farm to perform inspections on disease occurrence (Table 2).

Table 2. Number of activities for general surveillance (2011-1st half of 2019)

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<tr>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of visits for general surveillance</td>
<td>19</td>
<td>19</td>
<td>203</td>
<td>648</td>
<td>743</td>
<td>714</td>
<td>602</td>
<td>424</td>
<td>89</td>
<td>3,461</td>
</tr>
</tbody>
</table>

*First half 2019
Infection with ISAV has never been suspected or detected in the country, NIFS designed targeted surveillance considering that ISA has never historically been reported in Korea. Thus, a surveillance plan has been established to detect a fish infected with ISA, which has been maintained to date. A design prevalence of 1%, a sensitivity of 90%, a specificity of 100%, and a confidence of 99% were taken into account in calculating the sample size. The calculated sample size for the targeted surveillance plan was 510 fish per year at a confidence of 99% and a greater number of animals than the calculated size have been subjected to the disease test. Besides, fish which are going to be released for fisheries recovery or found suspicious during general surveillance are also tested by laboratory examination. Test samples were treated in accordance with article 3 and 4.3.1.2.3.1 of the chapter 2.3.5 (infection with HPR-deleted or HPRO infectious salmon anemia virus) of the Aquatic Animal Manual and analyzed with RT-PCR. The selection of specimens to be used for lab tests is implemented in accordance with points 3.1 and 3.4 of Chapter 2.3.5 of the Aquatic Animal Manual. For detection of HPR-deleted ISAV, fish displaying clinical signs or gross pathology should be sampled. For detection of HPRO ISAV, randomly selected individuals should be sampled at different time points throughout the production cycle. These samples are presented in Table 3. Under the targeted surveillance program, 10-27 Salmonidae fish have been collected from 29-121 farms among the total 180 farms from 2011 to 1st half of 2019, with a total of 8,857 fish having been subjected to disease test during the above-mentioned period (Table 3).

Confirmatory diagnosis of ISA is carried out NIFS, which is the national reference laboratory for aquatic organism diseases in the country. The laboratory is equipped with necessary facilities for diagnostic work on aquatic organism diseases including PCR, real-time PCR, and cell culture facilities (Annex 4).

Table 3. Number of farms subject to the targeted surveillance program an lab tests for both HPR-deleted and HPRO ISAV (2011-1st half of 2019)

<table>
<thead>
<tr>
<th>Province</th>
<th>Rainbow trout</th>
<th>Atlantic salmon</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No. of farms inspected</td>
<td>No. of tested fish per farm</td>
</tr>
<tr>
<td>2011</td>
<td>39</td>
<td>15</td>
</tr>
<tr>
<td>2012</td>
<td>43</td>
<td>16</td>
</tr>
<tr>
<td>2013</td>
<td>29</td>
<td>14</td>
</tr>
<tr>
<td>2014</td>
<td>39</td>
<td>15</td>
</tr>
<tr>
<td>2015</td>
<td>42</td>
<td>23</td>
</tr>
<tr>
<td>2016</td>
<td>45</td>
<td>27</td>
</tr>
<tr>
<td>2017</td>
<td>99</td>
<td>13</td>
</tr>
<tr>
<td>2018</td>
<td>51</td>
<td>23</td>
</tr>
<tr>
<td>2019*</td>
<td>70</td>
<td>19</td>
</tr>
</tbody>
</table>

*First half of 2019

I terms of the administrative province, 3 provinces of Gangwon, Gyeongsang, and Chungcheong have 171 Salmonidae farms, or 95% of the total number of the Salmonidae farms (Table 4, Figure 2). This corresponds to testing an average of 984 fish sampled from an average of 53.3 farms every year.

Table 4. Number of farms subject to the targeted surveillance program and tests by province (2011-1st half of 2019)

<table>
<thead>
<tr>
<th>Province</th>
<th>Gangwon</th>
<th>Gyeongsang</th>
<th>Chungcheong</th>
<th>Jeolla</th>
<th>Gyeonggi</th>
<th>Jeju</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of farms inspected</td>
<td>389(81%)</td>
<td>59(12.3%)</td>
<td>25(5.2%)</td>
<td>1(0.2%)</td>
<td>6(1.3%)</td>
<td>0(0%)</td>
<td>480</td>
</tr>
<tr>
<td>No. of tested fish</td>
<td>6,871(77.6%)</td>
<td>1,262(14.2%)</td>
<td>524(5.9%)</td>
<td>30(0.3%)</td>
<td>170(1.9%)</td>
<td>0(0%)</td>
<td>8,857</td>
</tr>
</tbody>
</table>

Through the targeted surveillance which was continued for 8 and half years from 2011 to 1st half of 2019, a total of 480 inspections were carried out at the 180 Salmonidae farms, resulting in negative results from all of the 8,857 tested fish (Figure 3). This result indicates that the country is free from ISA at a confidence level of 99%.
3.2. Import Quarantine of ISA

If rainbow trouts and Atlantic salmons for transplant are imported into the country, the whole amount of the imported fish should undergo a lab examination of ISA to be permitted for being imported. The number of Salmonidae fish permitted for import is shown in Table 6. By requiring imported fish to be accompanied with a certificate of ISA freedom⁹, the Republic of Korea initially prevents the disease from entering its territory. In addition, aquatic organisms imported (transplanted) into the territory of the Republic of Korea must undergo quarantine inspection in accordance with the article 27 and 29 of the Aquatic Life Disease Control Act and Public Notice on Examination Methods and Criteria of Designated Quarantine Items (NFQS). Once having been transplanted, Salmonidae fish are monitored on endemic and exotic diseases through routine surveillances in accordance with the article 3 of the Aquatic Life Disease Control Act and the article 5.4 of the Enforcement Rule of the Act and the Public Notice on Implementation Guidance for Surveillance and Control of Contagious Aquatic Organism Diseases. The Republic of Korea imports eyed eggs, which are ISA susceptible, for aquaculture from countries like Denmark, Canada, USA, and Norway. These imported salmon eggs originate from ISA free farms and areas in the above-mentioned countries. The exporting countries implement lab tests of salmon eggs to be exported to Rep. of Korea following the OIE aquatic manual and issue certificates of no detection of ISA (HPR0 and HPR-deleted IAV) in the salmon eggs to be exported and these certificates are submitted to the government of Rep. of Korea.

In terms of fish sampling for laboratory tests performed during import quarantine, fish displaying clinical signs of ISA are preferred. In terms of internal organs to be used for laboratory tests, kidney (mid-kidney), heart, and gill are sampled as recommended in the OIE Aquatic Manual. These organs are used for RT-PCR to detect ISA. In the case of eyed eggs, the whole imported batches are used as test samples for lab examinations through cell culture and RT-PCR.

Table 6. Number of imported Salmonidae for transplant (No. of importing event; kg)

<table>
<thead>
<tr>
<th>Species (eyed eggs)</th>
<th>2014</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
<th>2018</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No. of event</td>
<td>Weight</td>
<td>No. of event</td>
<td>Weight</td>
<td>No. of event</td>
</tr>
<tr>
<td>Atlantic salmon</td>
<td></td>
<td></td>
<td>1</td>
<td>34</td>
<td>1</td>
</tr>
<tr>
<td>Rainbow trout</td>
<td>10</td>
<td>289</td>
<td>12</td>
<td>386</td>
<td>12</td>
</tr>
</tbody>
</table>

⁹ www.nfqs.go.kr/2013/contents.asp?m=2&s=1&s2=4
4. Conclusion

The Republic of Korea declares that the entire country is free from ISA as it has fulfilled the requirements for obtaining the disease-free status described in Chapter 1.4. of the OIE Aquatic Animal Health Code (Aquatic Code) and Chapter 2.3.5. of the OIE Manual of Diagnosis Tests for Aquatic Animals (Aquatic Manual) (2014). As a country where the infection status of ISA prior to targeted surveillance was unknown, the Republic of Korea intends to make a self-declaration of freedom from ISA as basic biosecurity conditions have been continuously met for at least the past 2 years (practically 8 years) and targeted surveillance, as described in Chapter 1.4. of the Aquatic Code has been in place for 8 years without any detection of the disease. Therefore, the Delegate of the Republic of Korea to the OIE declares to the OIE that the country is free from ISAV according to the point 2, Article 10.4.4. of Chapter 10.4. of the Aquatic Code.
### 5. Annexes

#### Annex 1. Structure of the Law of Aquatic Life Disease Control

<table>
<thead>
<tr>
<th>Basic concepts (Article 2)</th>
<th>Purpose (Article 1)</th>
<th>Responsibilities and duties of the State, etc. (Articles 3 and 5)</th>
</tr>
</thead>
</table>
| - Recognizing aquatic organisms as an importance source for animal protein supply  
  - Establishing a routine monitoring and control system for rapidly spreading infectious diseases  
  - Exploring measures for preventing outbreaks and the spread of infectious disease for a sustainable development of the aquaculture industry | - To establish a comprehensive control system to prevent outbreaks and the spread of contagious aquatic organism diseases, to strengthen the quarantine of imported aquatic organisms, etc.  
- To contribute to the stable production and supply of aquatic organisms  
- To contribute to the enhancement of citizens’ health | - To establish and implement comprehensive control measures to prevent outbreaks and the spread of a contagious aquatic organism disease  
- To establish and implement a comprehensive plan for developing medicines to be used for prevention, diagnosis, and treatment of an aquatic organism disease and technologies to improve the sanitation environment for aquatic organisms |

#### 3 pillars of aquatic organism disease control

<table>
<thead>
<tr>
<th>Control of contagious aquatic organism diseases (chapter I)</th>
<th>Quarantine of aquatic organisms (Chapter III)</th>
<th>Restrictions etc. on use of unapproved medicines (Article 40)</th>
</tr>
</thead>
</table>
| - Reporting on dead or diseased aquatic organisms  
  - Implementing disease identification and epidemiological investigation  
  - Inspecting aquaculture facilities, medication, etc.  
  - Culling order and restriction on disposal of carcasses  
  - Incineration, etc. of contaminated things  
  - Inspection, etc. of aquatic organisms for stocking (Articles 7-21) | - Things designated for a quarantine purpose  
- Prohibition of import  
- Import quarantine and dispatched quarantine  
- Restriction on importing places  
- Export quarantine and re-inspection Import risk analysis (Articles 22-37) | - Restriction and ban on use of medicines for aquatic organisms which are likely to cause a serious hazard  
- Restriction and ban on use of an unapproved medicine, chemical substance, etc. |

<table>
<thead>
<tr>
<th>Medical treatment of aquatic organisms (Chapter III-2)</th>
<th>Supplementary provisions (Chapter IV)</th>
</tr>
</thead>
</table>
| - License of aquatic organism disease inspector  
  - Prohibition against unlicensed medical treatment  
  - Medical treatment register and carcass examination register  
  - Public aquatic organism disease inspector  
  - Reporting on suspension and closure of business | - Education on control of contagious aquatic organism disease  
- Compensation and subsidization to owners of aquatic organisms which have become subject to culling, etc.  
- Appointment of honorary observer for control of aquatic organism disease  
- Subsidization, etc. for expenses |
Annex 2. Early warning system for aquatic organism disease in Rep. of Korea (Procedures of surveillance, diagnosis, epidemiological investigation, and disease control measure)

- Establishment and implementation of a comprehensive plan for infectious disease control
- Establishment and implementation of a plan for developing technology for disease control for aquatic organism
- Training and operating aquatic organism disease control officers
- Operating the national integrated information network for the aquatic organism disease control
- Designation and management of disease identification institutes for aquatic organism
- Infectious disease testing of aquatic organisms for stocking
- Epidemiological investigation
- Test and analysis on a disease prevention technology
- Support for urgent disease control measure

Annex 3. Process of import quarantine inspection

1. Entry into the quarantine area
2. Application for quarantine (via visit, email, or fax)
3. Reception of the application (by regional office of NFOS)
4. Document examination
5. Clinical examination
6. Laboratory examination
7. Application and attached documents
8. Swimming behavior, gross and anatomical symptoms, etc.
9. Histopathology and molecular biological tests
10. Quarantine ruling

- Pass
  - Issuance of quarantine certificate
  - Distributions to local destinations

- Fail
  - Notification to the applicant and the head of the relevant customs office
  - Return, incineration or burial of the quarantined item
Annex 4. Diagnostic Competence Control of the National Aquatic Life Disease Control Organization

1. Introduction of the National Aquatic Life Disease Control Organization
The national aquatic life disease control organization refers to the National Institute of Fisheries Science. The national disease control organization consists of 8 operations at the headquarter and 7 local institutes located around the coast of the country (Figure 1).

![Figure 1. The headquarters and local branches of NIFS, the national aquatic life disease control organization](image)

2. Quality Control of the National Aquatic Life Disease Control Organization
2.1. ISO 17025
The national disease control organization obtained accreditation on the ISO 17025 from Korea Laboratory Accreditation Scheme (KOLAS) in 2015 and all the lab staff completed the education on KS Q ISO/IEC 17025 and uncertainty in measurement (Figure 2).

![Figure 2. Certificate of accreditation to ISO 17025 from KOLAS](image)

2.2. Participation in International Proficiency Tests
The national aquatic life disease control organization (NIFS) has been participating in 2 kinds of international proficiency tests since 2014. The organization has passed all KHV PCR proficiency tests organized by VETQAS in the U.K (semiannual) and proficiency tests for KHV, ISAV, VHSV, IHNV, EHNV PCR and cell culture organized by DTU in Demark (annual).
2.3. Operation of domestic proficiency tests

Under the article 6(2) of the "Notification on Designation and Operation of Disease Identification Institutes for Aquatic Organisms", NIFS carries out the control of diagnostic competence of disease identification institutes. It organizes in-house and outsourced proficiency tests for staff working at the disease identification institutes at least once a year (Figure 4). In 2016, NIFS implemented proficiency tests of genetic analysis (3 samples for blind tests) for the NIFS branch institutes and the disease identification institutes and conducted re-training for those who failed the test (2 institutes in 2015, 1 institute in 2016).

* NIFS has currently designated 9 local governments, 3 universities and 1 private institute as disease identification institutes forming a disease diagnosis network. These institutes conduct disease identification and tests of infectious diseases in aquatic organisms for stocking. In case of a positive test, these institutes ask NIFS for a confirmatory diagnosis. If an infection is confirmed, disease control measures should be taken.

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**Figure 3. Test samples for VETQAS proficiency tests and the results**

**Figure 4. Institutes specialized in disease identification of aquatic organism disease (Disease Identification Institute)**

**Figure 5. Proficiency tests organized by NIFS**
3. Equipment in NIFS

NIFS is suitably equipped with a BSL (Biosafety Level) II level laboratory and tank facilities completely isolated from the outside. It is thus equipped with the optimized lab and tank facility for diagnosis of and research on notifiable diseases (Fig.6).

A. PCR machine

B. DNA sequence analysis, SG/3500

C. ELISA reader

D. Real-time PCR

E. Transmission electronic microscope

F. Confocal Microscope

G. Microtome, Leica microsystems nussloch, DE/CM3050S

H. Auto stainer and blanketing system, Leica, DE/AutoStainer XL
I. Main facilities (filtering disinfection facility and ai shower) in the vaccine validation center

Figure 6. Equipment and tank facilities in NIFS