COSALFA 49
ECUADOR

FINAL REPORT

PRE COSALFA 49 INTERNATIONAL SEMINAR

IN THE CONTEXT OF A FREE STATUS WITHOUT VACCINATION
- THE GOAL OF THE PHEFA 2021-2025 -

Virtual Seminar, Ecuador | 23 - 24 August, 2022

Pan American Health Organization
World Health Organization
Americas
PAHO
PANAFTOSA
Pan American Center for Foot-and-Mouth Disease and Veterinary Public Health

PAHO Pan American Health Organization

World Health Organization
REGIONAL OFFICE FOR THE Americas

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Published in English and Spanish at
https://www.paho.org/es/tag/seminario-pre-cosalfa

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OPENING SESSION

The opening session was chaired by Dr. Christian Zambrano, animal health coordinator of the Ecuadorian Phytosanitary and Zoosanitary Regulation and Control Agency (AGROCALIDAD), on behalf of Dr. Patricio Granja Almeida, executive director, and Dr. Ottorino Cosivi, director of the Pan American Center for Foot-and-Mouth Disease of the Pan American Health Organization (PANAFTOSA/PAHO), who welcomed the participants.

Dr. Cosivi opened the meeting, highlighting that the virtual seminar seeks to establish a discussion on the accomplishments and difficulties in the process of foot-and-mouth disease eradication, as well as on the tools and methodologies under development for diagnosis and rapid response in case of foot-and-mouth disease outbreaks, for the sake of meeting the goal of the PHEFA established for 2025. He pointed out that all the territories of North America, Central America and the Caribbean have maintained their status of free without vaccination, and that almost all South American countries, except for Venezuela, have been considered free in 2021, with or without vaccination, according to the WOAH.

In this opportunity, the presentations will highlight the achievements of the countries in their processes of eradication of foot-and-mouth disease and preparation for gaining the recognition of free without vaccination. At the same time, they will describe the advances in virus diagnosis and follow-up, highly necessary to obtain and maintain the new status.

Dr. Zambrano, on behalf of AGROCALIDAD, greeted the participants restating that it was an honor for Ecuador to be the host country for this event. The last outbreak recorded in Ecuador was 11 years ago and the country has progressed to the free status in the fight against foot-and-mouth disease. In his opinion, it is important that the countries and other participants of the public and the private sector can take advantage of the experiences presented. Finally, he thanked PANAFTOSA for its support in the organization of this seminar previous to the 49th COSALFA.

The agenda of the Seminar is provided in Annex 1.

GOAL

At the end of 2020, the new 2021-2025 Action Plan of the Hemispheric Program for the Eradication of Foot-and-Mouth Disease (PHEFA) was approved, aimed at achieving the foot-and-mouth disease free status for the whole continent by 2025. Among its specific goals, this plan of action of the PHEFA seeks to achieve the eradication of the disease in Venezuela, a transition to the official status of free without vaccination in the free countries or zones which are still using vaccines, and the maintenance of the free status for those already recognized as free without vaccination.

Apart from the risk in the north – Venezuela being the only country without official recognition of foot-and-mouth disease free granted by the WOAH – no outbreaks have been detected in the rest of the region for more than 10 years. Undoubtedly, this is a historic milestone because since foot-and-mouth disease expanded in the Region in the middle of the last century, there had never been such a long period of time without the occurrence of outbreaks in the entire Southern Cone, which is useful to illustrate the success of the control programs for the eradication of foot-and-mouth disease. The next step is to prove virus elimination in vaccinated populations by suspending systematic vaccination campaigns, as Chile and Peru have done and in progress in Bolivia and Brazil.

Since PANAFTOSA/PAHO published the Technical Work Guide for the last stage of the PHEFA in 2015, the topic of the transition to free without vaccination has been addressed in successive Pre-COSALFA seminars. In this process, it was observed that, besides the risk, other socioeconomic factors are binding for decision making and the dialogue between official veterinary services and the relevant players of the private sector is essential to advance in this process.

In addition to providing more detailed information about the foot-and-mouth disease eradication program and the experience of the country since the last outbreak in 2011 in Ecuador, the host country of the COSALFA, the first session of the Pre-COSALFA seminar was focused on the vision "from the other side", i.e., based on a context of free without vaccination. Then, session 2 presented the experiences of countries and zones already free without vaccination as well as an example of a country that is starting this transition, and session 3 presented the laboratory diagnostic tests relevant for this status. The second day was focused on emergency preparedness: session 4 addressed modelling tools for emergencies, and session 5 was devoted to regional antigen banks, particularly the BANVACO.

The conclusions of each session were presented in the 49th Meeting of the COSALFA, held on August 25 – 26, 2022.

Day 1: 23 August. 2022

SESSION 1: THE FOOT-AND-MOUTH DISEASE PROGRAM OF ECUADOR: THE PATH TO ERADICATION

Moderator and introduction to the topic: *Manuel Sánchez Vázquez*, PANAFTOSA-PAHO/WHO

Dr. Sánchez, in his capacity as moderator, made a brief introduction and presented the speakers of the first 2 topics, regarding the experiences of the host country of the COSALFA 49. It was an opportunity to learn first-hand the experiences of the country since 2011, after the last incursion of foot-and-mouth disease, to the current condition of free with vaccination.

1.1 The historical review 2011-2020 of Ecuador about the process of eradicating and maintaining the status of foot-and-mouth disease free country with vaccination

Alexandra Burbano, director of Zoosanitary Surveillance, Agrocalidad, Ecuador

Dr. Burbano made a historical account of the advances in the process of eradication and maintenance, mentioning the development of the Ecuadorian program since the COSALFA 33, which established the line of work to be followed, based on the epidemiological characterization of the country, supported by APHIS/USDA and

PANAFTOSA, the strengthening of laboratory support, by AGROCALIDAD, and the creation of a financial fund with private contributions, to support the activities.

Regarding vaccine coverage and occurring strains, a characterization of national strains was made as well as a study on the coverage of existing vaccines, which established that the vaccine covered these strains and clarified doubts about the existence of exogenous strains. As from 2011, the Emblematic Project was started, consisting in strengthening the veterinary care structure; creating a legal framework; improving the vaccination process, with intercycle revaccination of young animals; upgrading vaccination teams; and adjusting the transit control system, bovine registration and the epidemiological surveillance system.

This project was also oriented to the training of the staff on attention of outbreaks, and periodic serological and vaccination coverage sampling. In this way, the project achieved recognition of the country as free with vaccination and of the Galápagos Islands as free without vaccination by the WOAH as from 2015.

Finally, he mentioned all the public and private participants responsible for this achievement, highlighting the relevant participation of PANAFTOSA.

The prerecorded presentation is available at: https://www.youtube.com/watch?v=CDmpqKFwfgQ

1.2 The Plan of Action of Ecuador for the transition to the free status without vaccination

Christian Zambrano, General Coordination of Animal Health, Agrocalidad, Ecuador

Dr. Zambrano detailed the stages of the action plan for the transition to the free status without vaccination, the PHEFA, in force as of 2021, which made it possible to eradicate and keep the country free from the disease; the main focus was the restructuring of the Agency, with the support of the private sector and international cooperation. The plan had significant milestones such as the change in the vaccination strategy. As from 2022 the PROZEC 2022-2025 is established with the aim of strengthening zoosanitary protection in the country. The change occurred with a modification of investment processes.

The PROZEC has the following objectives: internal and external biosecurity, opening of markets, and epidemiological strategies to face diseases with and without zoosanitary status.

It was discussed whether Ecuador is prepared for the qualitative leap to free without vaccination. This will rely on a technical analysis that will open the discussion on risks and their communication to the involved parties. During its three-year term, the PROZEC has to analyze the risks, create a road map, and develop a dossier in order to achieve the status of free without vaccination. BANVACO's support is expected for that end.

The presentation is available at: https://www.paho.org/sites/default/files/aftosa-seminario-c49-ecuador-sesion1.2_0.pdf

Discussion

At the end of the session, open discussions started and the following questions were made and answers were given by attendees and speakers, respectively:

1. The discussion raised a series of questions about intercycle vaccination for young animals which, according to Dr. Burbano, are systematic and biannual.

2. How are livestock producers included in the roadmap for the transition to the free status without vaccination? As stated by Dr. Zambrano, according to a scientific-based communication, supported at the time by PANAFTOSA, during the eradication process the sector was invited to collaborate, particularly for the organization of vaccination.
3. Within the context presented regarding the necessary information to make the decision of withdrawing the vaccine, how relevant was the sanitary situation in the region? Dr. Zambrano said that the reoccurrence of the disease in Colombia and the undefined situation of Venezuela caused that the goal was reconsidered for a date later than 2023, based on a risk analysis conducted with PANAFTOSA's collaboration, which (rescheduled the withdrawal for 2024.
4. How was the process for the strengthening of the official service? Was there coordination with the private sector? Dr. Burbano pointed out that they received political support from the central government to create a field and laboratory structure to support the process. The private sector was significant for the dissemination of information and for supporting official activities.
5. What was the importance of the productive-epidemiological characterization? It was essential to identify ecosystems and, consequently, risks. It was the base to develop strategies taking into account animal transit and regional risk.
6. The socialization process with the private sector and producers was affected by pandemic-related issues. Is reactivation considered? Dr. Zambrano said it is, since the restructuring of the national program, whose structure and funding are established, reinforces the need of producers' cooperation, based on the dissemination of technical information. For this dissemination, we rely on PANAFTOSA's participation.
7. Dr. Burbano's presentation was clear in defining the sequence of actions that led to eradication. What was the turning point for the change of paradigm? The institutional strengthening with trained staff and a well -established field structure, supported by clear standards regarding actions. Revaccination was crucial to stop endemicity.
8. In general, gaining recognition is followed by political neglect. How did you manage to maintain the commitment? The support of the private sector was crucial to maintain political interest, highly interested in the new status and the opening of new markets. Foot-and-mouth disease has occurred in Ecuador for 50 years, the world situation after the pandemic and the war made clear the importance of the productive private sector for the economy of the country. Now, the foot-and-mouth disease program includes other diseases of economic impact.
9. How will vaccination be implemented in 2023? The strategy will be discussed according to the risk, with PANAFTOSA's support, and it will probably be conducted twice. Other authorities will be also included in this matter.
10. How is post vaccination monitoring conducted? We present studies of vaccine coverage and absence of viral circulation to the WOAH every year, with PANAFTOSA's support.
11. What were the main challenges in the field? Dr. Zambrano answered that they had to face many challenges: and had to push to sustain the goals, vaccinate animals, stop endemism, strengthen laboratories, protect the country against internal and external threats, based on emergency plans, restate that professionals should be clear about their commitment, and empower professionals toward the objective.
12. What is the position of producers regarding vaccine withdrawal? This depends on a great deal of information, but the sector will be involved in the process of status recognition.

Other questions were answered by the moderator, indicating the sources of information.

CONCLUSIONS OF SESSION 1:

The first session is focused on the foot-and-mouth disease program of the host country which, in this case, presented a historical overview for obtaining the foot-and-mouth disease-free status and the advances and future perspectives of foot-and-mouth disease program of Ecuador, through AGROCALIDAD.

- In 2011, the Emblematic Project is started, consisting in strengthening the veterinary care structure; creating a legal framework; improving the vaccination process; with intercycle revaccination of young animals; upgrading vaccination teams; and adjusting the transit control system, bovine registration and the epidemiological surveillance system. The most important aspects, conclusive for the control of foot-and-mouth disease, were the strengthening of the official veterinary service, both through technical improvement and empowering of staff in its tasks. The importance of having opened a space for dialogue as well as the improvement in the relationship with the private sector is highlighted.
- A document was drafted to obtain the recognition of continental Ecuador as free with vaccination and the Galapagos Islands as free without vaccination by the WOAH. Since recognition in 2015, the foot-and-mouth disease program of AGROCALIDAD has successfully maintained this status. The country has maintained both passive and active surveillance, showing absence of infection by and transmission of the foot-and-mouth disease virus. The important role of PANAFTOSA/PAHO, through the technical cooperation agreement signed in 2014, provided technical cooperation through different professionals from the center throughout this period.
- The project was also oriented to the training of staff for attention of outbreaks and periodic serological and vaccination coverage sampling. In this way, the project attained the recognition of the country as free with vaccination and of the Galapagos Island as free without vaccination by the WOAH as from 2015.
- Dr. Zambrano detailed the stages of the action plan for the transition to the free status without vaccination, the PHEFA, in force as of 2021, which made it possible to eradicate and keep the country free, and whose main objective was to restructure the Agency with the support of the private sector and international cooperation.
- AGROCALIDAD ’s future perspective regarding the foot-and-mouth disease program in Ecuador, in the context of the Action plan 2021-2025 of the PHEFA, is included in the Zoosanitary Protection Project of Ecuador – PROZEC.
- As from 2022 the PROZEC 2022-2025 is established with the aim of strengthening zoosanitary protection in the country. The change occurred with a modification in investment processes. During its three-year term, the PROZEC has to analyze the risks, create a road map, and develop a dossier in order to achieve the status of free without vaccination. BANVACO’s support is expected for that end.
- By now, they are planning to maintain vaccination as they have done so far, until more data is available to make the decision to withdraw the vaccine. The main sources of information available for this policy change will be a risk analysis performed jointly with PANAFTOSA/PAHO in 2023 so that, based on these results, the decision can be made to withdraw the vaccine in continental Ecuador in 2024.

SESSION 2: EXPERIENCES AND CHALLENGES OF COUNTRIES AND ZONES DURING AND AFTER WITHDRAWING OF VACCINE

Moderator and introduction to the topic: *Guilherme Marques*, PANAFTOSA-PAHO/WHO

Dr. Marques made a brief introduction to the topic and presented the speakers for the 3 subjects to be presented in this session. He remarked the clear progress in the eradication of foot-and-mouth disease observed in the free countries with vaccination but noted the little progress in the change of status. The new PHEFA highlights the importance of moving forward to the condition of free without vaccination. Jointly with the benefit of stopping vaccination, there will be a large offer of bovine meat from regions without vaccination. There will be Commercial barriers, with additional restrictions. Vaccination is still relevant in some special situations, but it is also important as a control tool in the event of outbreaks.

Based on their own experiences, speakers will present the advantages, disadvantages and challenges in this process.

2.1 The experience of Peru, free without vaccination since 2018

Ubaldo Flores, SENASA, Peru

Dr. Flores thanked the organizers and presented the experience of Peru regarding the eradication of foot-and-mouth disease. Vaccination was stopped in 2007 to submit the dossier to the WOAH. Foot-and-mouth disease occurs sporadically in Peru and depends on an external source. He mentioned the regions affected in the country. The process to achieve recognition included characterization of the ecosystem, organization of actions and control throughout the country, particularly along the coast.

The standard in force was modified, local entities were strengthened, strategic vaccination was established, local leaders and regional professionals were trained. Transit control was fundamental. Vaccine withdrawal was questioned by some agricultural sectors due to the epidemiological dependence with neighboring countries without recognized status. Therefore, a persuasion process was necessary. In 2013, almost the entire country was recognized as free without vaccination except for a protection zone in the border with Ecuador, where special surveillance and control actions were taken. Vaccine withdrawal led to saving 10 million dollars, besides the opening of external markets. In 2018, the entire country was recognized as free without vaccination. The project to maintain the free status is still in force, based on training and education of local sensors and training of producers and other members of the productive chain.

The prerecorded presentation is available at: https://www.youtube.com/watch?v=4Vg6N1heiUQ

2.2 The experience from the states of Rondônia and Rio Grande do Sul, Brazil, free without vaccination since 2021

Márcio Petró, IDARON, Rondônia, and *Fernando Groff,* SEAPDR, Rio Grande do Sul, Brazil

The states of Rondônia and Rio Grande do Sul - RS - are free without vaccination. Dr. Groff highlighted the process by which RS was recognized as free describing the characteristics of animal production of the state and its national relevance. The state is also free from classical swine fever.

In 2017, a national strategic plan was developed for the eradication of foot-and-mouth disease, including other sectors of the society. The state showed at the beginning a good sanitary situation, without outbreaks since 2001; risk analyses were performed. A significant vaccination activity was observed, bringing professionals from other

activities. Livestock producers supported vaccine withdrawal, which favored all the animal production sectors. The process involved production sectors, which have economic resources, private attention, and the political articulation with local and national powers. The Project needed a change of paradigm, after a 60-year period of vaccination, with strengthening of passive surveillance, risk-based active surveillance, and emergency response capacity. The state was recognized in 2021 and an increase in demand of animal products is still expected.

Dr. Petró, from Rondônia, described the process that resulted in the recognition. He explained the productive characteristics of the state, described the sequence of actions on a schedule based on the national program of the MAPA. Recognition was attained in 2021. He also mentioned the difficulties encountered. There was some resistance, but other sectors understood that the absence of outbreaks and the change in risk led to the process. As a result, it can be said that the process brought the public and the private sectors closer, with the creation of a trust fund for the service, based on taxes on slaughtered animals. Livestock producers are saving the costs of the vaccine and the vaccination process. Also, the decrease in product loss due to vaccine-related injuries resulted in significant savings. The volume of exportation is increasing as well as the number of destinations. Compulsory biannual declarations and an integrated surveillance network are the base to keep records of effective animals without vaccination updated.

Prerecorded presentations are available at:

https://www.youtube.com/watch?v=Wh2E5W0iiDg and https://www.youtube.com/watch?v=yJsWYntIlpA

2.3 The experience of Paraguayan states in the process with withdrawal of vaccine

Victor Maldonado, SENACSA, Paraguay

Dr Maldonado analyzed the process under development to achieve recognition, the prevention program and its stages of work. The country has gone through different experiences throughout its program, currently consolidated. As from the last occurrence in 2012, several changes have been made. They are based on public-private participation, absence of foot-and-mouth disease in the last years, high immunity coverage, passive/active surveillance program, with periodic serological and vaccine coverage samplings in the whole country, plus a countrywide surveillance network. The master plan is based on a surveillance and early alert system with the participation of the private sector and an activity for emergency care based on a risk analysis of foot-and-mouth disease introduction to Paraguay.

The guidelines for the change of status, supported by positive indicators in the entire continent, rely on: maintaining vaccination coverage and preparing the public and the private sectors for the change, based on a technical, administrative and financial analysis of the process. The national plan 2017/2026 states that there should be total absence of cases and that all the countries of the region should have fulfilled the PHEFA technical guideline before making the political-sanitary decision. A road map of the project of change was presented, based on an IDB sanitary risk management project, mainly focused on the restructuration of the public service. He mentioned the relevance of the ongoing Brazilian project for the security at the level of the border.

The prerecorded presentation is available at: https://www.youtube.com/watch?v=q-MmfkuEAs8

Discussion

The discussion was focused on the difficulties of the countries to maintain the status and the advantages observed.

1. Regarding surveillance in Peru, how many reports of suspected vesicular diseases are treated every year? Dr. Ubaldo gave a recent example, 49, most of them positive for VDs. In previous years, 180 or more were recorded, but they are usually nonspecific or VDs.

2. How many livestock sensors act in Peru? 544 sensors, regularly trained
3. Does the surveillance system in the boundary between Peru and Ecuador have georeferenced animal identification? The project started in 2016 and expanded to other areas with the IDB project.
4. Regarding the private fund of Rondônia, which is the private contribution and who manages this contribution? It is based on slaughtered animals, not only cattle, and now equines will probably be included. The fund manages 5 million dollars every year and the money is used for other diseases of economic relevance.
5. Has the recognition of RS as free had any impact on swine production? Dr. Groff said that an increase in herd size was observed as well as the technification of exploitation; however, no economic return was reported, considering other kind of trouble observed in this period.
6. What were the main concerns of the productive sector about vaccine withdrawal? Was there a division among the participants? The issue was discussed with the official service and other participants in the process, taking into account the risk of the withdrawal. This situation, however, was counteracted by the existence of methods and tools to guarantee the process.
7. How is the productive sector interest maintained after vaccine withdrawal? Dr. Petró explained that, in Rondônia, anything that changes the value of animals raises questions. Therefore, a surveillance program was designed with strong participation of producers and other agricultural stakeholders. The same occurred in RS with the creation of a strategic surveillance plan including the participation of livestock farmers, by means of a biannual census of effective animals.
8. How do you manage small farmers in Peru? Dr. Flores said that they created a registry of producers, with a compulsory sworn statement of effective animals. The system is aimed at producers who have not submitted a statement, for registry updating.
9. Do you consider that the implementation of actions should be strengthened in the border, regarding transit of vaccinated animals? Dr. Petró said that the border with Bolivia is sufficiently covered since actions have been in force for 20 years now. They are based on ships and airplanes covering the extension of the river. Regarding the states that vaccinate, surveillance had to be reinforced in the border. The same happens in RS, in the dry border with Uruguay, and in the Paraná River with Argentina. Surveillance was always conducted with those countries. Vaccine savings enabled to strengthened posts in the border, using mobile bases and drones for surveillance.

CONCLUSIONS OF SESSION 2

This session included the participation of Brazil, with the states of Rondônia and Rio Grande do Sul, as well as Peru and Paraguay. All of them presented their experiences and perspectives about the advances on the transition from free with vaccination to free without vaccination, compliant with the plan of the PHEFA.

- Peru, free without vaccination since 2013 – Vaccine withdrawal resulted in a saving of 10 million dollars each year, besides the opening of new external markets. In 2018, the whole country was recognized as free without vaccination. The project to maintain the condition of free is still in force, based on training and education of local sensors and training of producers and other members of the productive chain.
- Paraguay informed that the national plan 2017/2026 states that there should be total absence of cases and that all countries of the region should have fulfilled the PHEFA technical guideline before making the political-sanitary decision. A road map of the project for vaccine withdrawal in 2024 was presented as well as the submission of the dossier to the WOAH to attain the status by 2026. The relevance of the ongoing Brazilian project for the security at the level of the border and for decision making was also stated.

- Rondônia and Rio Grande do Sul/Brazil described the process that resulted in the recognition. They explained that livestock farmers are saving the costs of the vaccine and the vaccination process. The decrease in product loss due to vaccination-related injuries resulted in significant savings. The volume of exports is increasing as well as the number of destinations. In order to keep the registries of effective animals without vaccination updated, they rely on a compulsory sworn statement and an integrated surveillance network.

SESSION 3: NEW TOOLS AND APPROACHES FOR DIAGNOSING FOOT-AND-MOUTH DISEASE AFTER THE FREE STATUS WITHOUT VACCINATION

Moderator and introduction to the topic: *Maristela Pituco*, PANAFTOSA-PAHO/WHO

Dr. Pituco, in his capacity as moderator, made a brief introduction to present the speakers of the 3 subjects addressed in this session, highlighting the need to have new diagnostic tools to face the new challenges posed by the qualitative change of free without vaccination.

3.1 Activities of the Global Foot-and-Mouth Disease Research Alliance (GFRA)

Alejandra Capozzo, GFRA

Dr. Capozzo, executive director of the Alliance, described its structure, vision and mission. This is a global alliance of scientific organizations devoted to foot-and-mouth disease research, with the purpose of producing evidence and innovation for the progressive control and eradication of foot-and-mouth disease, through joint research projects, the promotion of scientific knowledge and the development of tools for the progressive control of foot-and-mouth disease. The GFRA is composed of renowned international research institutions, collaborators, and supporters who fund operations.

Some of the activities developed are regional meetings with EUFMD, WOAH-FAO, regional workshops and the Annual Scientific Meeting of the GFRA. Also, the Alliance issues publications with the advances of the works of its members and awards grants to researchers on the topic.

The prerecorded presentation is available at: https://www.youtube.com/watch?v=VvB9bSdi8u8

3.2 Experience with the use of lateral flow device for Foot-and-Mouth Disease detection (GFRA)

Labib Bakkali Kassimi, Laboratoire de Santé Animale de Maisons-Alfort, ANSES, France

Dr. Kassimi highlighted the importance of developing safe diagnostic tests at field level which enable supplementary characterization studies. However, the delivery of field samples to laboratories may be difficult and expensive. The lateral flow device (LFD) under development by the ANSES laboratory in France, facilitates the process. Dr. Kassimi described the test and detailed its use for the detection of the foot-and-mouth disease virus in the field. He described the process of sample collection in the field, inactivation of positive samples and their delivery to reference laboratories for further testing.

Summing up, the LFD test is easy to use for initial diagnosis, allows the safe and inexpensive delivery of positive samples through an inactivation protocol even with high concentrations of the virus, and enables detection and characterization of field samples.

The prerecorded presentation is available at: https://www.youtube.com/watch?v=4EZ8aVbKaTc

3.3 The role of Genomic Surveillance for Foot-and-Mouth Disease

Deyvid Emanuel Amgarten, Albert Einstein Hospital, São Paulo, Brazil

Dr. Amgarten is a scientist at the Albert Einstein Hospital, highly experienced in genomic epidemiological surveillance of viral diseases. He presented the process as a popular research tool, the development of which would be interesting for foot-and-mouth disease.

He mentioned the use of genomic surveillance for the identification and tracking of the foot-and-mouth disease virus. In order to understand genomics – the science that studies genomes – it should be considered that protein chains represent a unique and specific "fingerprint" for each individual that can be used for virus traceability. DNA sequencing, including that of humans, is performed with sequencers that have evolved in the past few years.

He talked about the process for characterization of viruses with a genomic structure different than that of other organisms. This particular composition enables virus tracking, their characterization according to the genomic alignment, their identities and differences, as well as genomic mapping, distributing families in the regions, and can be also used to track the virus throughout the dissemination of the disease, search for its origins and evolution, and for vaccine production.

Finally, he mentioned the use of genomic surveillance in characterization studies of SARS-COV-2 virus strains.

The prerecorded presentation is available at: https://www.youtube.com/watch?v=n7QH_RbFLQc

Discussion

1. Viral inactivation protocol for the use of LFD: should the sample be inactivated in tissue sections in the venue? Dr. Kassimi said that citric acid and other inactivators can be used. However, they do not use it to inactivate tissue and thinks that the acid would not be efficient to inactivate large sections of tissue. Other products may be better in this case. The advantage of LFD is that it is easy to use in the field, and the sample can be inactivated later.
2. Can the virus be recovered with any extraction buffer? The most important thing is to maintain the quality of the genome, which must be preserved.
3. Is it possible to implement a network for human and animal genomic diagnostic testing in South America? Dr. Kassimi thinks that it is possible and the recent pandemic showed the importance of joint work.
4. According to the experience of the GFRA, is any interest observed in endemic countries to fight against foot-and-mouth disease? Dr. Capozzo thinks that there are no apparent changes in endemic countries; most of them are still fighting to identify their problems. However, others are starting to structure their programs.

CONCLUSIONS OF SESSION 3

Session 3 introduced the subject of new tools and approaches for the diagnosis of foot-and-mouth disease after attaining the condition of free without vaccination. Discussions addressed the advantages, challenges, and how to overcome the obstacles in the context of laboratory diagnosis, in the situation of free without vaccination.

- Dr. Capozzo, executive director of the Alliance, described its structure, vision and mission. This is a global alliance of scientific organizations devoted to foot-and-mouth disease research, with the purpose of producing evidence and innovation for the progressive control and eradication of foot-and-mouth disease, through joint research projects.
- Dr. Kassimi highlighted the importance of developing safe diagnostic tests at field level which enable supplementary characterization studies.
- Dr. Amgarten is a scientist at the Albert Einstein Hospital, highly experienced in genomic epidemiological surveillance of viral diseases. He presented the process as a popular research tool, the development of which would be interesting for foot-and-mouth disease.

Day 2: 24 August. 2022

The second day of the international Pre-COSALFA seminar is focused on two tools that assist the countries in a FMD emergency: mathematical modelling and vaccine banks.

SESSION 4: TOOLS FOR PREPAREDNESS AND EARLY RESPONSE TO FOOT-AND-MOUTH DISEASE

Moderator and introduction to the topic: *Manuel Sánchez Vázquez*, PANAFTOSA-PAHO/WHO

Dr Sánchez, in his capacity as moderator, made a brief presentation of the speakers of the 4 topics addressed in this session and underscored the importance of modelling as a surveillance and decision-making tool in the fight against foot-and-mouth disease.

This session will be focused on discussing the mathematical modelling tools, important elements for surveillance and prevention and for foot-and-mouth disease emergencies. Modelling and simulation exercises are essential tools to deal with emergencies, which enable to evaluate the cost/benefit relationship of the measures to be taken in emergencies.

4.1 Application of modelling tools to support emergency preparedness

Richard Bradhurst, University of Melbourne, Australia

Dr. Bradhurst presented the methodology of the Australian Animal Disease Spread Modelling framework (AADS), which is based on the agent and enables to simulate the variables of an outbreak, from the introduction of the agent, its spread, detection and response, as well as post outbreak management. The model takes into account the stain of the agent, the production system, and the size of the exploitation. It can be fed with specific information of each agent/environment/host for simulating an occurrence and evaluating the best control actions. It has been already extended to other animal and human diseases and plant pests, and can be a useful tool. However, it cannot predict the results of epidemics, and it is best used to compare control policies and decision making.

The prerecorded presentation is available at: https://www.youtube.com/watch?v=u3zm0Xm8-f4

4.2 Evaluating the the effectiveness of foot-and-mouth disease control measures using modeling in the state of Rio Grande do Sul, Brazil

Gustavo Machado, School of Veterinary Medicine, North Carolina State University, USA

Dr. Machado explained the use of mathematical models for decision making and selection of health policies in times of epidemics. His model was based on data about production, animal transit and commercialization in RS. For the simulation exercise, a MultiHostAnimalSpread Model was used and the population was divided according to the following criteria: susceptible, exposed, infected, and recovered (SEIR). He detailed the components of its model and the conditions for use. According to his results, the model could predict the best measures to control the outbreak. The details can be consulted in the presentation.

The prerecorded presentation is available at: https://www.youtube.com/watch?v=0jkx6EOrsQI

4.3 Application of modelling for a simulation exercise of foot-and-mouth disease emergency in Brazil

Fernando Ferreira, School of Veterinary Medicine and Animal Science (USP), São Paulo, Brazil

Dr. Ferreira described an emergency simulation model based on virus spread in unvaccinated bovines. He explained the reasons for the elaboration of the model, its description, implementation, and the discussion of results. The model was commissioned by the MAPA in order to simulate the introduction and spread of an agent,

test different interventions and improve the epidemiological surveillance system. It has also been used to simulate the required number of vaccines in a bank.

Like previously presented models, it uses the SEIR concept and considers other components of the epidemiological process, such as size of the farm, distance transmission, etc. Dr. Ferreira presented the data of his simulation as well as the peculiarities of his model, as can be seen in the presentation.

The prerecorded presentation is available at: https://www.youtube.com/watch?v=iIDYZcpt75A

4.4 Application of agent-based modelling to simulate a foot-and-mouth disease emergency in Ecuador

José Pablo Gomez-Vazquez, Center for Animal Disease Modeling and Surveillance, UC Davis, USA.

In the same line of the previous presentation, Dr. Gómez-Vázquez introduced his agent-based model to allow decision making in emergency situations, applied to Ecuadorian data.

Modelling is aimed at estimating the impact of introduction, spread and impact on production. On the other hand, the model can be used to assess the actions to be made.

In the creation of the simulation, the model divides populations according to their health status and production forms. These models are not widely used in countries without free status or which have recently been granted the free status.

The model was used several times and results showed that interactions depend on the virulence of the sample, the quality of the vaccine, and the region where the agent was introduced, and spread can be evaluated according to the speed of the response.

Dr. Gómez-Vázquez detailed the components of the model and presented the results of simulation exercises. Population data for the simulation exercise was produced by AGROCALIDAD, and the actions taken by the service were also included in the model. The details can be consulted in the presentation.

The prerecorded presentation is available at: https://www.youtube.com/watch?v=u71ygyiZryA

Discussion

1. When will the Australian model be adapted for South America? PANAFTOSA/PAHO is negotiating with the government and we expect that it will be ready soon.
2. Is the model scalable? Can other countries be included? Dr. Ferreira explained that the web and simulation interfaces are under development to expand its use to other countries. It will be made available for all the countries.
3. Is spread due to animal transit considered? What distance should be considered in the field for distant spread? Transmission rate can be modified according to each case; the involved elements such as staff, animals in transit, are important for this calculation. The models are adequate to evaluate the type of control measure to be taken.
4. Is it possible to define the profile of users that can use the package? Dr. Machado said that the model is based on multispecies and it will be made available, at no cost, for interested parties. It will be flexible for interventions such those foreseen in the Brazilian program! The package will be available as of October.
5. Does the ranking of variables change with the population structure? We haven't tested it, but if the agent is considered, the measures depend on decision trees.
6. Is it possible that PANAFTOSA deliver courses on this topic? Yes, it is being discussed with countries and institutions.
7. Does the use of vaccination instead of stamping out allow to return to the previous status? It depends on the approach, because the WOAH has its conditions.

CONCLUSIONS OF SESSION 4

This session was focused on discussing mathematical modelling tools, important elements for foot-and-mouth disease surveillance, prevention and emergencies.

- Modelling and simulation exercises are essential tools to deal with emergencies, which enable to evaluate the cost/benefit relationship of the measures to be taken in emergencies.
- These tools are increasingly used by the countries when they have to design policies and contingency plans for a potential foot-and-mouth disease emergency due to virus introduction, since they help with information on potential impacts.
- The questions to be answered are related with the magnitude of a potential emergency: how many animals and how many herds can be affected, how long can an emergency last, what contention measures will work better, when should emergency vaccination be applied, when is sanitary slaughter necessary, how many -financial and human- resources are we going to need, etc. But several limitations of use and interpretation should also be considered.

SESSION 5: REGIONAL ANTIGEN AND VACCINE BANKS TO USE IN EMERGENCIES

Moderator and introduction to the topic: *Manuel Sánchez Vázquez*, PANAFTOSA-PAHO/WHO

Dr Sánchez, in his capacity as moderator, briefly introduced the speakers of the 3 topics to be presented in this session, remarking the importance of vaccine and antigen banks for addressing health emergencies. This is considered a need to face emergencies, they are indispensable tools in decision making for the control of introductions. Banks should have a regional vision due to the transboundary nature of foot-and-mouth disease.

5.1 BANVACO Regional Bank for the Americas to support the PHEFA

Guilherme Marques, PANAFTOSA-PAHO/WHO

Dr. Marques made a historical account of foot-and-mouth disease occurrences caused by autochthonous strains in border regions; he underlined the transboundary nature of the disease. In this context, and as a safety measure for the countries, adhesion to a vaccine and antigen bank is advisable. He detailed the process for the creation and development of the BANVACO, since 2012, when it was proposed at the COSALFA, until its approval in 2018.

The BANVACO belongs to member countries and membership is open. Currently, the member countries of the provisional steering committee are eight: Bolivia, Brazil, Chile, Colombia, Ecuador, Paraguay, Peru and Uruguay. PANAFTOSA and GIEFA participate in the management and scientific support of the bank, which does not have a functional venue, since the vaccines are kept in the industries. Although it has been recently created, it already has a schedule of activities that includes integration with the pharmaceutical industry and other existing banks, selection of strategic strains and definition of the number of doses; coordination of international missions; facilitation of imports of supplies, and strengthening of the biosafety commission of the COSALFA.

The prerecorded presentation is available at: https://www.youtube.com/watch?v=xMMpoKOvX08

5.2 North American Foot-and-Mouth Disease Vaccine Bank - NAFMDVB (Agreement between USA, Canada and Mexico)

Jamie L. Barnabei, Director, National Animal Vaccine and Veterinary Countermeasures Bank (NAVVCB), USDA/APHIS, USA.

Dr. Barnabei started her presentation describing the Foreign Animal Disease Diagnostic Laboratory - FADDL. The North American Foot-and-Mouth Disease Vaccine Bank (NAFMDVB) was established in 1982 by an agreement between USA, Canada and Mexico, with the aim of guaranteeing the timely availability of foot-and-mouth disease vaccines in the case of an outbreak in North America. Mexico left the bank as of 2020.

Nevertheless, the United States have another vaccine bank, the National Animal Vaccine and Veterinary Countermeasures Bank. (NAVVCB), which does not replace the previous bank but has additional functions such as offering additional coverage to the USA, the function of the original bank, and evaluating the possibility of storing vaccines against other transboundary diseases of economic importance. All this, within the context of the USA as a free country without vaccination and commercial position of the USA should be maintained.

The selection of strains to be maintained in the bank is decided by technicians of the member countries based on information covering epidemiological and production aspects as well as vaccine control. This information is sent to veterinary services of the member countries for revision and updating every two months.

The vaccines purchased are tested by the services compliant with highly strict standards before their incorporation to the bank.

The prerecorded presentation is available at: https://www.youtube.com/watch?v=i6Z4zOtCHyM

5.3 The concept of the QUADS - Quadrilateral Animal Health Committee

Tom Smylie, Senior Staff Veterinarian, Canadian Food Inspection Agency

The Animal Health Quadrilateral Group (QUADS) is an institution that emerged from a questioning regarding depopulation of health animals as an action to control the spread of the agent in health emergencies. The members are the veterinary services of Canada, New Zealand and USA, that decided to evaluate the effectiveness of using vaccines to control outbreaks. Several modeling exercises were performed which showed that the use of the vaccine at the start of the outbreak reduced the impact of the disease.

The QUADS developed the concept of a joint vaccine bank, with vaccines produced in a single laboratory, enabling the possibility of lending vaccines in the case of a regional risk. This mechanism has been in force since 2016 and is aimed at disseminating the idea to other continents. The advantages and disadvantages, as well as the operating mechanisms of the initiative are included in the presentation.

The prerecorded presentation is available at: https://www.youtube.com/watch?v=b6LYjLOCG2w

Discussion

1. How is the BANVACO funded and what would the participation of each country be? The BANVACO is in embryonic stage, with only eight member countries. The mode of funding is different. The country will not pay for operational costs, just fixed costs. The steering commission consists of members who decide cost-sharing. The cost of joining the bank is USD 25 thousand. Cost forecast will depend on vaccine stock, to be detailed by the technical committee; each country will determine how many vaccines it requires as well as their formulation. Country PWRs should collaborate with the logistics.
2. How are standards established for vaccine production? How is this discussed? We have a group for vaccine distribution that meets regularly to establish the standards for vaccine licensing in the involved countries.

3. Which are the control and modelling processes for the use of vaccines during outbreaks? The QUAD has a modelling group that compares stamping out and vaccination, and the experiences show that vaccination reduces spread.
4. Who pays the costs of the American bank? Funds from the American and the Canadian governments.
5. In the case of an outbreak in Central America, would it be possible to use vaccines from the American bank? This is a political decision that would be made according to a risk analysis. However, preference is given to the two countries.
6. What is the biosafety level of facilities and vaccine producers? The BANVACO document establishes the standards, which will be controlled by the South American biosafety commission. We are not only concerned about costs but also quality.
7. How are these biosafety criteria applied for QUADS laboratories? We only procure products from Boheringer and Biogenesis Laboratories. Both of them have been visited and we are satisfied with their quality. Due to the occurrence of South America-related strains in Asia, they will be kept in our bank.
8. What are the quality limits for antigens, and for how long? Shelf life of 12 years, antigens are kept for 10 years and the time required for the production of a vaccine in emergencies is two weeks.

CONCLUSIONS OF SESSION 5

- The BANVACO has made large improvements since its constitution in 2022, with the provisional association of some countries such as Brazil, Bolivia, Chile, Colombia, Ecuador, Paraguay, Peru and Uruguay, and consolidated the training of regional experts, under PANAFTOSA/PAHO management, for the preparation of the necessary proposals for the signing of the countries in order to consolidate the BANVACO.
- In 1982, the North American bank of vaccines was established with the participation of the United States, Mexico and Canada. Mexico is no longer participating due to economic reasons. The experiences of the Bank and the opportunities for the region were presented.
- In 2010, the concept of the network was presented to the Animal Health Quadrilateral Group (Quads) in the venues of the OIE previous to the general session.
- The concept was favorably received, and the development of the International FMD Vaccine Strategic Reserves Network (IVSRN) was strongly supported by OIE and FAO. The members of the IVSRN are Australia, Canada, México, New Zealand, United Kingdom and the United States.

CLOSING SESSION

The closing ceremony was in charge of Dr. Zambrano who, on behalf of AGROCALIDAD, thanked the opportunity of learning about these enriching experiences from the speakers, for the benefit of the participants.

The Director of PANAFTOSA/PAHO, Dr. Cosivi, thanked AGROCALIDAD for their collaboration in these meeting, attended by nearly 600 participants from 22 countries. We think we have contributed to the dissemination of knowledge through this event.

ANNEX 1

AGENDA

(Version 24/08/2022)

INTRODUCTION

At the end of 2020, the new **Action Plan 2021-2025** of the Hemispheric Program for the Eradication of Foot-and- Mouth Disease (PHEFA) was approved, with the intention of achieving the foot-and-mouth disease free status for the whole continent by 2025. Among its specific goals, this action plan of the PHEFA seeks to complete the eradication of the disease in Venezuela, a transition to the official status of free without vaccination in the free countries or zones still using vaccines and maintain the free status in those countries recognized as disease-free without vaccination.

Besides the localized risk in the north, with Venezuela as the only country without official recognition of foot-and- mouth disease-free by the WOAH, no outbreaks have been detected in the Region for over 10 years. Undoubtedly, this is a historical milestone never experienced before because since foot-and-mouth fever spread in the Region by the middle of the last century, there has never been such a long period without the occurrence of outbreaks in the entire Southern Cone, which shows the success of monitoring the programs for the eradication of foot-and- mouth disease. The next step is to demonstrate the elimination of the virus in vaccinated populations by suspending systematic vaccination campaigns, as done in Peru and as currently ongoing in Bolivia and Brazil.

Since PANAFTOSA/PAHO published the **Technical Guide for the Work involved in the Last Phase of PHEFA**, in 2015, the subject of the transition to free without vaccination has been addressed in the consecutive Pre-COSALFA seminars. This process has showed that besides the risk, other socioeconomic aspects are binding for decision making and the dialogue between official veterinary services and relevant players of the private sector is essential to advance in this process.

In the first session of this Pre-COSALFA seminar, in addition to knowing more details about the foot-and-mouth disease eradication program of Ecuador, the host country of the COSALFA, and its experience since the last outbreak in 2011, we would like to focus on the view “from the other side”, namely, based on a free without vaccination context. Therefore, in session 2, we will present the experiences of countries and zones already free without vaccination and, in session 3, we will learn about laboratory diagnostic tests relevant for that status. On the second day, we will center our attention on emergency preparedness. Session 4 will be focused on emergency response modelling tools, and session 5 will address the subject of regional antigen banks, particularly, the BANVACO.

The topics will be addressed by well-known specialists as well as by representatives of veterinary services in virtual theme sessions, followed by discussions to learn about different viewpoints of the audience made up of the main players and representatives of the public, private and academic sectors interested in the eradication of foot-and- mouth disease. The conclusions of each section will be presented in the 49th Meeting of the COSALFA, to be held on August 25 – 26, 2022.

TUESDAY, 23 August, 2022 | 10:00 A.M. - 02:30 P.M. (São Paulo time, Brazil)	
09:30 - 10:00	Hands-on session for the speakers of the Pre-COSALFA Seminar: Sound and video check 07:30: COL - ECU - PE - PAN | 08:30: BOL - CHI - PRY - VEN - GUY | 09:30: BRA - ARG - URU - SUR
10:00 - 10:15	Opening Session of the Pre COSALFA 49 International Seminar General Coordinator of Animal Health of Agrocalidad, *Christian Zambrano* Director of PANAFTOSA-PAHO/WHO, *Ottorino Cosivi*
10:15	**SESSION 1. THE FOOT-AND-MOUTH DISEASE PROGRAM OF ECUADOR: The Path to Eradication** Moderator and Introduction to the topic*: Manuel Sánchez Vázquez,* PANAFTOSA-PAHO/WHO
10:20 - 10:40	**1.1** The historical review 2011-2020 of Ecuador about the process of eradicating and maintaining the status of foot-and-mouth disease-free country with vaccination *Alexandra Burbano,* Director of Animal Health Surveillance, Agrocalidad, Ecuador
10:40 - 11:00	**1.2** The Plan of Action of Ecuador for the transition to the free status without vaccination *Christian Zambrano,* General Coordinator of Animal Health, Agrocalidad, Ecuador
11:00 - 11:15	Discussion of SESSION 1
11:15 - 11:20	**SESSION 2. EXPERIENCES AND CHALLENGES OF COUNTRIES AND ZONES DURING AND AFTER WITHDRAWAL OF VACCINE** Moderator and Introduction to the topic*: Guilherme Marques,* PANAFTOSA-PAHO/WHO
11:20 - 11:35	**2.1** The experience of Peru, free without vaccination since 2018 *Ubaldo Flores*, SENASA, Peru
11:35 - 11:50	**2.2** The experience of Paraguayan states in the process with withdrawing of vaccine *Victor Maldonado,* SENACSA, Paraguay
11:50 - 12:05	**2.3** The experience from the states of Rondônia and Rio Grande do Sul, Brazil, free without vaccination since 2021 *Márcio Petró*, IDARON, Rondônia and *Fernando Groff,* SEAPDR, Rio Grande do Sul, Brazil
12:05 - 12:20	Discussion of SESSION 2
12:20 - 13:20	Break
13:25 - 13:30	**SESSION 3. NEW TOOLS AND APPROACHES FOR DIAGNOSING FOOT-AND-MOUTH DISEASE AFTER THE FREE STATUS WITHOUT VACCINATION** Moderator and Introduction to the topic: *Maristela Pituco*, PANAFTOSA-PAHO/WHO
13:30 - 13:40	**3.1** Activities of the Global Foot-and-Mouth Disease Research Alliance (GFRA) *Alejandra Capozzo*, GFRA
13:40 - 13:55	**3.2** Experience with the use of lateral flow devices for Foot-and-Mouth Disease detection (GFRA) *Labib Bakkali Kassimi,* Laboratoire de Santé Animale de Maisons-Alfort, ANSES, France
13:55 - 14:10	**3.3** The role of Genomic Surveillance for foot-and-mouth disease *Deyvid Emanuel Amgarten*, Hospital Albert Einstein in São Paulo, Brazil
14:10 - 14:25	Discussion of SESSION 3
14:30	Closure of day 1

WEDNESDAY, 24 August, 2022 | 10:00 A.M. - 12:45 P.M. (São Paulo time, Brazil)	
09:30 - 10:00	Hands-on session for the speakers of the Pre-COSALFA Seminar: Sound and video check 07:30: COL - ECU - PE - PAN | 08:30: BOL - CHI - PRY - VEN - GUY | 09:30: BRA - ARG - URU - SUR
10:00 - 10:05	**SESSION 4. TOOLS FOR PREPAREDNESS AND EARLY RESPONSE TO FOOT-AND-MOUTH DISEASE** Moderator and Introduction to the topic: *Manuel Sánchez Vázquez*, PANAFTOSA-PAHO/WHO
10:05 - 10:20	**4.1** Application of modelling tools to support emergency preparedness *Richard Bradhurst*, University of Melbourne, Australia
10:20 - 10:35	**4.2** Evaluating the effectiveness of foot-and-mouth disease control measures using modeling in the state of Rio Grande do Sul, Brazil *Gustavo Machado,* College of Veterinary Medicine, North Carolina State University, USA
10:35 - 10:50	**4.3** Application of Modelling for a simulation exercise of foot-and-mouth disease emergency in Brazil *Fernando Ferreira,* School of Veterinary Medicine and Animal Science of University of São Paulo (USP), Brazil
10:50 - 11:05	**4.4** Application of Agent-based Modelling to simulate a foot-and-mouth disease emergency in Ecuador *Jose Pablo Gomez-Vazquez*, Center for Disease Modeling and Surveillance, UC Davis, USA
11:05 - 11:20	Discussion of SESSION 4
11:20 - 11:25	**SESSION 5. REGIONAL ANTIGEN AND VACCINE BANKS TO USE IN EMERGENCIES** Moderator and Introduction to the topic: *Manuel Sánchez Vázquez*, PANAFTOSA-PAHO/WHO
11:25 - 11:40	**5.1** BANVACO Regional Bank for the Americas to support the PHEFA *Guilherme Marques,* PANAFTOSA-PAHO/WHO
11:40 - 11:55	**5.2** North American Foot-and-Mouth Disease Vaccine Bank – NAFMDVB (Agreement between USA, Canada, and Mexico) *Jamie L. Barnabei,* Manager, National Animal Vaccine & Veterinary Countermeasures Bank (NAVVCB), USDA/APHIS, USA
11:55 - 12:10	**5.3** The concept of the Quads - Quadrilateral Animal Health Committee *Tom Smylie*, Senior Staff Veterinarian, Policy and Programs Branch, Canadian Food Inspection Agency, Canada
12:10 - 12:25	Discussion of SESSION 5
12:25 - 12:45	Closure of the Seminar Director of PANAFTOSA-PAHO/WHO, *Ottorino Cosivi* General Coordinator of Animal Health of Agrocalidad, *Christian Zambrano*