



History of the FGBI “ARRIAH” international cooperation on foot-and-mouth disease (on occasion of the 65th anniversary of the Institute)

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SUMMARY

The paper covers the long history of the FGBI “ARRIAH” international cooperation on foot-and-mouth disease, starting from 1964 when its name was the All-Union Foot-and-Mouth Disease Research Institute. Foot-and-mouth disease was the main focus of the Institute’s research activities. Under of the auspices of the Institute, a Coordination Board was established. It consisted of the specialists of the veterinary services, research and educational institutions from all the republics of the USSR. A common research programme aimed at the development and implementation of effective tools and methods for FMD control was worked out. The next stage of international cooperation was related to the functioning of the Council for Mutual Economic Assistance (CMEA or COMECON). Starting from 1977, the Institute coordinated the CMEA member countries’ research activities on 11 topics of the FMD issue, held meetings on the subject, as well as meetings of the Board of Commissioners. After formation of the Commonwealth of Independent States (CIS), the Institute developed the long-term “Programme of joint activities of the CIS member states for the prevention and control of foot-and-mouth disease in the CIS member states” (2004). Later on, the Programme was repeatedly altered and extended to address new priorities, with the Institute undertaking the coordinating role. The “Set of joint measures of the CIS member states for the prevention and control of foot-and-mouth disease for the period up to 2025” has now been adopted, and the FGBI “ARRIAH” also performs the functions of the base organization of the CIS member states for the advanced training and retraining in animal disease diagnosis and control. At present, much of the FGBI “ARRIAH” international cooperation on FMD takes place through its acting as the WOAHP Reference Laboratory for Foot-and-Mouth Disease and the FAO Reference Centre for Foot-and-Mouth Disease.

Keywords: review, foot-and-mouth disease, international cooperation, FGBI “ARRIAH”

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История становления в ФГБУ «ВНИИЗЖ» международного сотрудничества по ящуру (к 65-летию института)

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РЕЗЮМЕ

Материалы статьи освещают многолетнюю историю осуществления международного сотрудничества по ящуру в ФГБУ «ВНИИЗЖ» начиная с 1964 г., когда учреждение еще носило название «Всесоюзный научно-исследовательский ящурный институт». Научная тематика по ящуру была главенствующей для учреждения, при институте был создан Координационный совет, в состав которого входили специалисты ветеринарных служб, исследовательских учреждений и учебных институтов из всех союзных республик СССР, прорабатывалась единая научная программа, направленная на разработку и внедрение эффективных средств и методов борьбы с ящуром. Следующий этап международного сотрудничества связан с функционированием Совета экономической взаимопомощи (СЭВ), когда институт с 1977 г. координировал исследования по 11 темам проблемы ящура стран – членов СЭВ, проводил совещания по тематике и заседания Совета уполномоченных. С созданием Содружества Независимых Государств (СНГ) учреждением в 2004 г. была разработана долгосрочная «Программа совместных действий государств – участников СНГ по профилактике и борьбе с ящуром в государствах Содружества», которая затем неоднократно изменялась и продлялась с появлением новых приоритетных целей, при этом координирующая роль отводилась институту. В настоящее время принят «Комплекс совместных мер государств – участников СНГ по профилактике и борьбе с ящуром на период до 2025 года», а ФГБУ «ВНИИЗЖ» выполняет также функции базовой организации государств – участников СНГ по повышению квалификации и переподготовке кадров в области диагностики и контроля болезней животных. Существенную роль в международном сотрудничестве института по ящуру на современном этапе играет исполнение функций Референтной лаборатории ВОЗЖ по ящуру, а также Референтного центра ФАО по ящуру.

Ключевые слова: обзор, ящур, международное сотрудничество, ФГБУ «ВНИИЗЖ»

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The analysis of the centuries-old experience in combating foot-and-mouth disease in the world has given full grounds to the Food and Agriculture Organization of the United Nations (FAO) and the World Organisation for Animal Health (WOAH, founded as OIE) to define this problem in the developed Global FMD Control Strategy (2012) as one of the classic global problems affecting animal farming industry, impeding free and safe movement of animal products, requiring huge and constant governmental and private investments in animal health protection in enzootic and disease free regions. That is, practically all countries, whether foot-and-mouth disease affected or free, have to bear the costs associated either with direct losses from the disease or expenditures for measures to prevent it [1].

The same position is clearly formulated in the final lines of the monograph "Foot-and-mouth disease" by the outstanding German scientist H. Röhrer: "... In order to achieve the set goal – the complete elimination of epizootics (of foot-and-mouth disease) ... with international relations growing and reviving everywhere, an effective fight against epizootics on the globe should become a common cause" [2].

Precisely in order to develop a scientifically sound system of foot-and-mouth disease control measures with uniform methodological guidance and unified coordination of research activities, Resolution of the Central Committee of the Communist Party of the Soviet Union and the Council of Ministers of the USSR No. 909-426 of 7 August 1958 was adopted. According to the Resolution, the Ministry of Agriculture of the USSR was to establish the All-Union Foot-and-Mouth Disease Institute with an experimental laboratory for the testing of biological products against highly dangerous infections in the RSFSR on the basis of the existing research and educational institutions and state-owned farms in 1958–1960 [3–8].

By the time of the Institute's establishment and launching (1962), the number of foot-and-mouth disease affected localities in the country annually amounted to hundreds and thousands (type A, FMD in 1951–1954 and type A₂₂ FMD in 1964–1968). Before the Institute was established, more than 30 research institutions of the country had been studying various aspects of foot-and-mouth disease due to the urgency of this issue [9].

In June 1964, the All-Union Foot-and-Mouth Disease Research Institute (the new name of the Institute according to Order of the Ministry of Agriculture of the USSR No. 225 of 25 November 1960) hosted the first coordination meeting on this issue with participation of the representatives of 22 research and educational institutions, veterinary services. The meeting addressed the outcomes

of research activities for 1963 and research activity plans for 1964–1965. The Institute was tasked with the coordination of foot-and-mouth disease research activities in the country.

In 1966, the Ministry of Agriculture of the USSR included the topic "Eradication of foot-and-mouth disease in the country" in the plan of research activities, and the All-Union Foot-and-Mouth Disease Research Institute was designated as the lead institution in that respect starting from January 1966. The following institutions were involved in addressing the issue:

- 16 research institutes of the republics of the Soviet Union;
- 8 veterinary research stations (those of Novosibirsk, Altai, Kuybyshev, Kursk, Voronezh, Gorky, Irkutsk, Saratov);
- in 1970, they were joined by the Transcaucasian (Yerevan, Armenia) and Central Asian (Dushanbe, Tajikistan) branches of the All-Union Foot-and-Mouth Disease Research Institute.

Under the auspices of the All-Union Foot-and-Mouth Disease Research Institute, a Coordination Board was established, which included the heads and specialists of the veterinary services of the USSR republics, researchers from research and educational institutes, staff members of establishments dealing with the foot-and-mouth disease issue. The meetings of the Board were held annually starting from 1966. The Board was headed by professor V. P. Onufriyev, the Director of the All-Union Foot-and-Mouth Disease Research Institute.

The common scientific programme for the Development and implementation of highly effective tools and a scientifically based system of measures for the control of foot-and-mouth disease in livestock taking into account zonal animal husbandry systems was worked out.

The meetings of the Coordination Board had obvious scientific significance and were also very important for furthering the relevant knowledge, especially for the early career staff members of the Institute, as they provided an opportunity to come into direct contact with practical problems, get acquainted with the country's leading foot-and-mouth disease experts. In particular, the following topics were addressed during the meetings: issues of regional epizootology, progress in foot-and-mouth disease vaccine development made by the All-Union Institute of Experimental Veterinary Medicine (VIEV) and the Soviet State Scientific and Control Institute for Veterinary Drugs Control (VGNKI), the activities of the VGNKI anti-epizootic mission led by I. A. Rostovtseva, etc. There were, however, some unsuccessful experiments and scientifically unsubstantiated statements, such as studies of

the non-apthous (intestinal) form of foot-and-mouth disease and the transformation of one type of the virus into another in the refrigerator, the possibility of the virus typing "by eye", the failed experience of live foot-and-mouth disease vaccine development using cold mutants of the virus and attenuated strains.

The last, as it turned out, meeting of the Coordination Board was held in April 1991. During the meeting, the overall outcomes were summarized and a significant improvement of the foot-and-mouth disease situation in the USSR was acknowledged, which was a natural consequence of the immense work undertaken.

The next stage in the development of the Institute's international cooperation on foot-and-mouth disease was associated with the member countries of the Council for Mutual Economic Assistance (CMEA or COMECON). On 14 September 1974, the Ministries of Agriculture of the People's Republic of Bulgaria, the Hungarian People's Republic, the German Democratic Republic, the Republic of Cuba, the Mongolian People's Republic, the Polish People's Republic, the Socialist Republic of Romania, the USSR and the Czechoslovak Socialist Republic concluded the Agreement on the establishment of reference centres for the most important strains of viruses, bacteria and phages, their respective antigens and control sera, as well as certain laboratory chemicals, and in December of the same year – the Intergovernmental agreement on coordination of research activities and the establishment of reference centres in the topical areas of agricultural science, which included the Agreement on scientific and technical cooperation of the CMEA member countries for the prevention and effective control of foot-and-mouth disease, as well as the development of highly effective foot-and-mouth disease vaccines. The functions of the coordination centre were assigned to the VGNKI, and starting from September 1977 – to the All-Union Foot-and-Mouth Disease Research Institute, where a special unit – the Mu-

seum of strains with the coordination centre working group (A. I. Gritsenko, I. V. Zubov, V. M. Zakharov, L. A. Globenko) was established in 1978.

The first programme of cooperation for 1976–1980 was adopted in December 1975 at the first meeting of the Board of Commissioners (during all those years, the USSR was represented by Deputy Head of the Main Veterinary Department of the Ministry of Agriculture of the USSR P. P. Rakhmanin). The programme included 11 topics and involved 22 institutions of 9 CMEA member countries. The agreement provided for the coordination of activities carried out by national organizations on the agreed topics, according to the joint work plans, taking into account the mutual interest of the parties. During the coordination process, information was exchanged, mutual consultations and practical trainings were held.

The cooperation results were discussed at the annual meetings of the Board of Commissioners (Fig. 1). Every year, the coordination centre held meetings on specific topics of the foot-and-mouth disease issue, organized symposiums and seminars, publication of scientific materials [10].

During the symposiums, the cooperation outcomes were summed up, the key research activities for the upcoming five years were formulated. For example, the Detailed programme for 1986–1990 was developed, which was subsequently (at the meeting of the Board of Commissioners, Mongolia, 1988) transformed into the target project "Development and cooperative production of veterinary medicinal products for the prevention and control of foot-and-mouth disease", with the All-Union Foot-and-Mouth Disease Research Institute as the lead institution. The following activities were planned: studies on the molecular biology and genetics of foot-and-mouth disease virus, the development of technology and manufacture of diagnostics, in particular those based on monoclonal antibodies, the application of new adjuvants and inactivants in vaccine production, the establishment



Fig. 1. Participants of the meeting of the Board of Commissioners of the CMEA member countries on foot-and-mouth disease, Moscow, 1975 (V. P. Onufriyev is in the centre of the first row)

of a bank of vaccines, including dry shelf-stable ones, for the CMEA member countries at the facilities of the All-Union Foot-and-Mouth Disease Research Institute.

Based on the joint research activity results, a number of documents were developed, such as the CMEA standards for foot-and-mouth disease diagnosis methods and tools, Requirements for inactivated vaccines against foot-and-mouth disease, Instructions for foot-and-mouth disease control at pig breeding complexes, Recommendations for foot-and-mouth disease prevention and control at large livestock complexes, Draft measures to prevent the introduction of exotic foot-and-mouth disease types.

The main positive outcomes of the CMEA member countries' cooperation on foot-and-mouth disease include:

- maintenance of sustainable foot-and-mouth disease freedom of most CMEA member countries;
- acquisition of valuable experience in international cooperation on foot-and-mouth disease with foreign partners, including on a bilateral interstate basis;
- detailed familiarization of the researchers of the All-Union Foot-and-Mouth Disease Research Institute with foot-and-mouth disease diagnosticum and vaccine development and production at the facilities of the leading European foot-and-mouth disease centres (primarily in Czechoslovakia, Hungary, Romania);
- assembly of a large collection of production and epizootic strains of foot-and-mouth disease virus, which still makes up the "golden fund" of the Institute's museum of microorganism strains.

The working meetings on various topics of cooperation, symposiums, meetings of the Board of Commissioners held annually alternately in each cooperating country enabled the researchers of the Institute to establish personal and scientific contacts with foreign specialists and significantly expand their horizons.

But the main outcome was that the All-Union Foot-and-Mouth Disease Research Institute convincingly confirmed the high scientific level of its research activities, demonstrated the ability to ensure a clear coordination of comprehensive efforts with respect to the foot-and-mouth disease issue at both national and international levels, acquired the relevant organizational experience, gained international recognition and authority, which subsequently became the most important factors in the development of the Institute.

However, with the dissolution of the USSR in 1991, international cooperation in this direction ceased.

With the formation of the Commonwealth of Independent States (CIS) in 1991 and the termination of the functioning of the All-Union veterinary structures of the USSR, which had ensured the centralized implementation of the unified policy in the organization of anti-epizootic measures, the epizootic situation in the newly formed sovereign states worsened, which raised the question of the need for anti-epizootic measure coordination in the post-Soviet space.

The heads of the governments of 10 CIS member states (Armenia, Belarus, Kazakhstan, Kyrgyzstan, Moldova, Russia, Tajikistan, Turkmenistan, Uzbekistan and Ukraine) signed the Agreement on cooperation in the veterinary field¹ in Moscow on 12 March 1993. The agreement

¹ Agreement on cooperation in the veterinary field. Available at: <https://fsvps.gov.ru/ru/fsvps/laws/203.html>. (in Russ.)



Fig. 2. Leaders of the seminar: N. Belev (in the centre), Director of the FGBI "ARRIAH" V. A. Gruby (to his right)

served as a basis for launching joint activities for the control and prevention of highly dangerous animal diseases. Based on this agreement, the Intergovernmental Council for Cooperation in the Veterinary Field was established in the same 1993. During the meetings of the Council (Tbilisi, October 1996; Yerevan, October 1997; Alma-Ata, April 1998), the Institute, renamed the All-Russian Research Institute for Animal Health (ARRIAH) in 1992, repeatedly raised the question of the need for coordination of foot-and-mouth disease control measures in the CIS member countries [11–14].

Entrusted by the Intergovernmental Council for Cooperation in the Veterinary Field, the FGI "ARRIAH", with participation of the veterinary services of the CIS countries, developed the Programme of joint activities of the CIS member states for the prevention and control of foot-and-mouth disease in the CIS member states² for the period up to 2010. On 16 April 2004, the programme was approved by a decision of the Council of the CIS Heads of Governments (Cholpon-Ata, the Kyrgyz Republic).

The main goal of the programme was to ensure foot-and-mouth disease freedom of each member state and the Commonwealth as a whole. Its implementation became a practical measure for foot-and-mouth disease prevention and control in the CIS member states, allowing to minimize economic damage in case of an outbreak. On the basis of this programme, most of the CIS member states developed and adopted national programmes, rules (instructions) for foot-and-mouth disease prevention and control. The progress of the programme implementation was periodically addressed at the meetings of the Intergovernmental Council for Cooperation in the Veterinary Field.

The main foot-and-mouth disease control activities undertaken in the Russian Federation in 2007–2010 included:

- expert missions of the FGI "ARRIAH", the FGI "Veterinary Centre", the Rosselkhoz nadzor, the Veterinary Department of the Ministry of Agriculture of the Russian Federation to different regions of the Russian Federation and other countries for the implementation of epizootological monitoring and participation in foot-and-mouth disease control activities;

² Programme of joint activities of the CIS member states for the prevention and control of foot-and-mouth disease in the CIS member states. Available at: <https://e-ecolog.ru/docs/4ba3bDCZMR2FMLUJRmuS2/77>. (in Russ.)

- manufacture of various diagnostic reagents and the complement fixation test, ELISA, etc. test kits by the FGI “ARRIAH” and their supplies to the Russian Federation regions, Azerbaijan, Armenia, Kazakhstan, Kyrgyzstan, Uzbekistan, Belarus, Mongolia;

- tests of pathological material and serum samples from animals from the Russian Federation, Kazakhstan, Kyrgyzstan, Tajikistan, Mongolia carried out at the FGI “ARRIAH”;

- practical training of the veterinary specialists from Kazakhstan, Kyrgyzstan, Tajikistan, Poland at the FGI “ARRIAH”;

- seminars, advanced training courses on animal foot-and-mouth disease diagnosis, prevention and control measures under modern conditions (the Russian Federation, Belarus, Kazakhstan, Kyrgyzstan, Moldova) [15–24].

As part of implementation of one of the programme items, in accordance with the Decision of the Intergovernmental Council for Cooperation in the Veterinary Field of 27 October 2010, joint foot-and-mouth disease response simulation exercises of the veterinary services of the Republic of Belarus, the Russian Federation and Ukraine were held on 16–18 June 2011. The exercises were also attended by the representatives of the veterinary services of Moldova and Tajikistan. The simulation exercises took place in the Gomel Oblast (Belarus), the Bryansk Oblast (the Russian Federation), the Chernigov Oblast (Ukraine), where preventive vaccination of animals against foot-and-mouth disease was not practised.

On 15–17 June 2011, the FGBI “ARRIAH” hosted a seminar led by Professor N. Belev, the President of the OIE Regional Commission for Europe. The seminar was aimed at giving insight into the World Animal Health Information System (WAHIS) operation principles (Fig. 2). The seminar was attended by the representatives (national coordinators) of 23 countries of Europe, Central Asia and Transcaucasia. The seminar was prompted by the introduction of new requirements for the submission of information on the epizootic situation in the countries to the OIE.

After the implementation of the programme, many of its activities were recognized as relevant for subsequent years. In the light of that fact, the Intergovernmental Council for Cooperation in the Veterinary Field recommended that the FGBI “ARRIAH” should develop the Set of joint measures of the CIS member states for the prevention and control of foot-and-mouth disease for the period up to 2020. The document was endorsed at the meeting of the Intergovernmental Council for Cooperation in the Veterinary Field held at the FGBI “ARRIAH” (Vladimir, 5 April 2013). Following a thorough discussion at the meeting of the CIS Economic Council on 13 December 2013, the Set of joint measures was approved by a decision of the Council of the CIS Heads of Governments (Minsk, 30 May 2014). The FGBI “ARRIAH” was designated as the coordinator of the activities.

The Set of joint measures included the in-depth analysis of the foot-and-mouth disease epizootic situation in the CIS member states and other countries of the world, the forecast of the risk of foot-and-mouth disease introduction, occurrence and spread in the CIS member states, the identification of regions with high risk of foot-and-mouth disease introduction and spread, measures for foot-and-mouth disease prevention and control in the CIS member states, proposals regarding measures

aimed to improve the professional competencies of veterinary specialists, to coordinate the joint activities of the veterinary services of the CIS member states and international organizations (the OIE, the FAO, the EU) for the control of foot-and-mouth disease in animals, the assessment of the expected effectiveness of the activities planned.

An important point in the cooperation of the CIS countries was the decision taken following the meeting of the CIS Economic Council (Minsk, 21 June 2019) to grant the Federal State-Financed Institution “Federal Centre for Animal Health” the status of the base organization of the CIS member states for advanced training and retraining of personnel in animal disease diagnosis and control.

The main tasks of the base organization were defined as follows:

- advanced training and professional retraining of specialists in diagnosis and control of animal diseases;

- studying, summing up, dissemination of experience in personnel training in animal disease diagnosis and control;

- facilitation of dissemination of modern methods for training in animal disease diagnosis and control;

- coordination of the development and implementation of joint innovative educational and research programmes with relevant research institutions of the CIS member states;

- organization of comparative and applied studies of the problems of personnel training in animal disease diagnosis and control.

The granting of the base organization status to the FGBI “ARRIAH” contributed to the development of professional competencies of veterinary specialists and assurance of animal disease freedom in the CIS member states.

The meeting of the Intergovernmental Council for Cooperation in the Veterinary Field (Minsk, 11 October 2019) commended the outcomes of the programme activities. It was decided to extend the activities listed in the Set of joint measures until 2025, and the FGBI “ARRIAH” was tasked with the preparation of the relevant draft document taking into account the proposals of the member states.

The draft document was endorsed at the meeting of the Intergovernmental Council for Cooperation in the Veterinary Field and approved by a decision of the Council of the CIS Heads of Governments (Minsk, 28 May 2021). At the same time, it was stated that the progress made in the previous years allowed for the continuation of efforts to achieve foot-and-mouth disease freedom and eradicate the disease in the CIS countries. The implementation of the Set of joint measures of the CIS member states for the prevention and control of foot-and-mouth disease for the period up to 2025 will ensure the stability of the epizootic situation in the CIS member states, the effectiveness of implemented veterinary and sanitary measures and foot-and-mouth disease freedom of the CIS member states, the development of livestock industry and unhindered international trade.

On the whole, the Set of joint measures envisages the progressive expansion and enhancement of cooperation between the veterinary services of the CIS countries in the implementation of joint activities for the prevention and eradication of foot-and-mouth disease. During the entire period of consistent execution of this Set of

measures, the following main stages should be implemented:

- improvement of regulatory and communication framework for the activities;
- organization of the implementation of adopted regulatory documents and exchange of information concerning changes in the foot-and-mouth disease epizootic situation in each CIS member state;
- implementation of joint activities for foot-and-mouth disease monitoring, prevention and eradication in the CIS member states.

A separate aspect of the CIS countries' cooperation on foot-and-mouth disease is the interaction between the Eurasian Economic Union (EAEU) member states in the prevention, diagnosis, containment and eradication of outbreaks of highly dangerous, quarantinable and zoonotic animal diseases. The EAEU member states are Armenia, Belarus, Kazakhstan, Kyrgyzstan, Russia; Moldova, Uzbekistan, Cuba are observers. The Treaty on the Eurasian Economic Union, which entered into force on 1 January 2015, provides for the free movement of commodities, services, capital and labour, the implementation of coordinated, agreed or unified policy in economic sectors. The draft Procedure for the application of common principles and rules for the prevention, containment and eradication of foot-and-mouth disease outbreaks in the Eurasian Economic Union member states was developed (2017–2022).

As early as in the initial period after the dissolution of the USSR, in addition to cooperation with the CIS countries, the question came up regarding the establishment of a more intense interaction on foot-and-mouth disease with the European countries, the development of close-knit international cooperation with the main European institutions dealing with the foot-and-mouth disease issue within the framework of the FAO European Commission for the Control of Foot-and-Mouth Disease (EuFMD), as well as under the auspices of the OIE.

A fundamental event in this regard was the international scientific conference "Towards a new foot-and-mouth disease control strategy" with participation of the leading European foot-and-mouth disease experts, which was held in Vladimir and Suzdal in October 1991. The conference demonstrated the progress made by the researchers of the All-Union Foot-and-Mouth Disease Research Institute in foot-and-mouth disease vaccine improvement, giving grounds to really talk about a new strategy for combating the disease [25]. The conference allowed for the establishment of scientific contacts with specialists from Great Britain, France, Italy, Denmark, which became the prologue for granting the Institute an international status.

At the third meeting of the Intergovernmental Council for Cooperation in the Veterinary Field (Krasnodar, April 1993), it was decided that it would be appropriate to establish the OIE Reference Centre for Foot-and-Mouth Disease for Eastern Europe. In view of that, an application for the establishment of such centre at the FGBI "ARRIAH" was submitted to the International Committee of the OIE.

Taking into account the huge contribution of the Institute to the development and implementation of the set of measures to eradicate foot-and-mouth disease in the Russian Federation and the CMEA member countries, the OIE, at the 63rd General Session (1995), acknowledged the Institute's services as a scientific and methodological centre

and granted it the status of the OIE Regional Reference Laboratory for Foot-and-Mouth Disease for Eastern Europe, Central Asia and Transcaucasia.

In August 2013, the FAO Animal Health Service designated the Institute as the FAO Reference Centre for Foot-and-Mouth Disease for Central Asia and Western Eurasia. In November 2020, this status was changed to a broader one – the FAO Reference Centre for Foot-and-Mouth Disease. Previously, only four research centres had been granted such status for foot-and-mouth disease by both the OIE and the FAO: the Plum Island Animal Disease Center (the USA), the Pirbright Institute (the UK), the University of Brescia (Italy) and the Onderstepoort Veterinary Institute (South Africa).

The following were the OIE FMD Experts in different years: Zh. A. Shazhko, Professor, Doctor of Science (Veterinary Medicine), 1995; S. A. Dudnikov, Candidate of Science (Veterinary Medicine), 1996–1997; V. M. Zakharov, Professor, Doctor of Science (Veterinary Medicine), from 1998 to the present.

The Institute's functions as the OIE/FAO Reference Centres for Foot-and-Mouth Disease include:

- assessment and standardization of test methods for foot-and-mouth disease;
- storage and distribution of reference biologicals and other reagents used for foot-and-mouth disease diagnosis and control;
- development of new foot-and-mouth disease diagnosis and control methods;
- collection, processing, analysis and dissemination of information on the epizootology of the disease;
- provision of expert consultants to the OIE/FAO;
- scientific and technical training of personnel from the OIE/FAO member countries;
- organization of scientific meetings on behalf of the OIE/FAO;
- coordination of scientific and technical research activities in cooperation with other laboratories (organizations);
- publication and dissemination of any information on foot-and-mouth disease that may be useful for the OIE/FAO member countries.

Reports on the activities of the OIE/FAO Regional Reference Laboratories and Collaboration Centres, which include the main outcomes of their activities, the number of workshops and conferences held, as well as the staff members' publications over the past year, are submitted annually.

An example of execution of these functions is cooperation carried out in 2006–2007 under the Altandi 1 and 2 international agreement with the Veterinary and Agrochemical Research Centre (Belgium) to study the correlation between blood antibody titres in foot-and-mouth disease vaccinated animals and their resistance to challenge with type O, A and Asia-1 foot-and-mouth disease virus. Based on the results of the studies, several papers were published in foreign journals, and the identified estimates are currently used in the European Pharmacopoeia [26–28].

Under the agreement between the FAO and the FGBI "ARRIAH" (Agreement PO No. 303836 – EuFMD of 19 June 2013, valid until 31 December 2013), the Institute received funding for experiments to study the clinical signs of foot-and-mouth disease in wild boars, determine the virus carrier state duration in foot-and-mouth



Fig. 3. Commemorative Medal of the FAO European Commission for the Control of Foot-and-Mouth Disease

disease-recovered animals, validate non-invasive sampling methods for foot-and-mouth disease virus genome detection.

Between 2002 and 2013, a large number of research activities were carried out together with the US scientific institutions through the International Science and Technology Center (ISTC), an intergovernmental organization. They were aimed at studying recovered foot-and-mouth disease virus isolates and some other viral animal disease agents. The experience of joint research activities, our staff members' visits to the leading foreign laboratories, joint publications of the results obtained contributed to the professional development of the ARRIAH specialists.

In connection with the termination of the ISTC activities in April 2015, a memorandum was signed on the transfer of the equipment obtained for use in the research activities within all the projects to the FGBI "ARRIAH" as gratuitous technical assistance, which allowed strengthening the Institute's capacities for conducting research at the state-of-the-art methodological level.

In view of the periodic occurrence of foot-and-mouth disease in the Siberian and Far Eastern regions, cooperation with China and Mongolia within the FAO Programme of technical cooperation "On cross-border trade and reduction of the risk of transboundary animal diseases (with a particular focus on foot-and-mouth disease)" was very important for the Russian Federation.

Intense cooperation with Mongolia in the field of foot-and-mouth disease control began back in 2011, when, pursuant to Decree of the Government of the Russian Federation No. 1427-rp of 12 August 2011, humanitarian assistance was provided to Mongolia by supplying 37 million doses of foot-and-mouth disease vaccine. The epizootological study of foot-and-mouth disease in Mongolia over an extended period of time allowed for the country's territory zoning based on the infection introduction risk level. The zoning was approved by Decree of the Government of Mongolia No. 247 of 7 August 2011. The country adopted the Programme for improving the health of livestock and expediting the work of the veterinary service of Mongolia. The Programme stipulated that foot-and-mouth disease-related activities would be implemented in three stages: the first stage – 2012, the second stage – from 2017 to 2018, the third stage – from 2019 to 2021. The activities included foot-and-mouth disease vaccine supplies on a contractual basis and immunity monitoring tests [29].

In 2019, the Ministry of Agriculture of the Russian Federation received a proposal from the Ministry of Food, Agriculture and Light Industry of Mongolia regarding the activities within the third stage of the programme for 2019–2021, which included:

- foot-and-mouth disease vaccine supplies;
- animal serum tests for the detection of possible foot-and-mouth disease virus circulation;
- provision of advice on the organization of operation of the Sangino biofactory (Mongolia);
- training of the biofactory's foot-and-mouth disease specialists at the FGBI "ARRIAH" postgraduate school;
- short-term training seminars for Mongolian specialists;
- periodic meetings of Mongolian and Russian specialists.

At the meeting of the heads of the veterinary services of the countries with participation of the FAO representatives (Vladimir, 23–25 January 2013), an Agreement of intent for cooperation in the field of animal health and quarantine was signed, which provided for the following:

- establishment of a mechanism for exchange of information on animal health situation;
- cooperation in the field of prevention and control;
- joint research activities for the improvement of methods for animal disease diagnosis.

In the period from 11 to 13 October 2016, the FGBI "ARRIAH" hosted the 6th Meeting on cross-border trade and reduction of the risk of transboundary animal diseases, which was held between China, Mongolia and Russia under the auspices of the FAO. The meeting was attended by the high-ranking representatives of the veterinary authorities of China, Mongolia and Russia, as well as highly professional teams from each country comprising laboratory experts, epizootologists, technical experts and representatives of aimags/provinces. It focused on strengthening cooperation and information exchange between the three participating countries: China, Mongolia and Russia. During the meeting, particular attention was given to five transboundary diseases: foot-and-mouth disease, African swine fever, highly pathogenic avian influenza, peste des petits ruminants and lumpy skin disease.

The information above only covers the history of the main areas of the Institute's international cooperation on foot-and-mouth disease. At present, intense cooperation is carried out on a multilateral, as well as bilateral basis in relation to the introduction into practice of the Institute's scientific developments with respect to foot-and-mouth disease and the marketing of foot-and-mouth disease diagnostics and vaccines.

The Institute's active international cooperation on foot-and-mouth disease has repeatedly been acknowledged by the agricultural authorities of the country, the World Organisation for Animal Health (WOAH, founded as OIE), the FAO Veterinary Service, the CIS Intergovernmental Council for Cooperation in the Veterinary Field. In particular, following the 19th Russian Agro-Industrial Exhibition "Golden Autumn" held in Moscow in October 2017, the Institute was awarded a gold medal for the development and implementation of the international project "The Set of joint measures of the CIS member states for the prevention and control of foot-and-mouth disease for the period up to 2020". But of particular significance is the commemorative medal dedicated to the 50th anniversary of the FAO European Commission for

the Control of Foot-and-Mouth Disease, awarded to the Institute as one of the world's five leading foot-and-mouth disease institutions in November 2004 with the wording "in appreciation of the outstanding contribution to the control of foot-and-mouth disease in Europe through leadership in technical areas and for the provision of services that helped combat the disease in the regions of the world where the foot-and-mouth disease situation posed a great threat to European countries" (Fig. 3).

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