MODERNIZING SANITARY AND PHYTOSANITARY MEASURES IN CAREC

AN ASSESSMENT AND THE WAY FORWARD

MAY 2019

CAREC
Central Asia Regional Economic Cooperation Program

ADB

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6 ADB Avenue, Mandaluyong City, 1550 Metro Manila, Philippines
Tel +63 2 632 4444; Fax +63 2 636 2444
www.adb.org

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ADB recognizes "China" as the People's Republic of China, "Kyrgyzstan" as the Kyrgyz Republic, and "Russia" as the Russian Federation.

Aligning sanitary and phytosanitary measures with international standards, including risk-based inspection and testing, will support expansion of agriculture trade (design by Achilleus Coronel; photo by Grigoriy Aisenshtat).

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Foreword

The Central Asia Regional Economic Cooperation (CAREC) countries share a common vision of sustainable economic growth. They aim to achieve this vision by integrating further into the global economy through increased market access, greater diversification, and stronger institutions for trade. Among the priorities identified in the new long-term strategy, CAREC 2030, is the promotion of regional trade in agriculture through alignment of sanitary and phytosanitary (SPS) measures with international standards.

SPS measures recognize the dual role of governments in protecting public health while ensuring that plant and animal health and food safety practices do not unnecessarily impede trade. For major producers of agriculture and food products like the CAREC countries, striking a balance is critical.

SPS measures in CAREC countries have yet to be considered a priority in most national development strategies and remain at a nascent stage in trade facilitation initiatives. Outdated legislation, poor laboratory capacity, and lack of coordination among border controls have heightened vulnerability to transboundary pests and diseases and undermined the potential for expanded agricultural food trade.

To help modernize the SPS systems of CAREC countries, the Asian Development Bank (ADB) commissioned an assessment of each country's plant health, animal health, and food safety measures. The assessment (conducted in 2015 and updated to 2018 with readily available information) covers laws and procedures governing the oversight and application of SPS measures, laboratory infrastructure, and border services management. Based on the assessment and taking into consideration international agreements and standards and best practices, ADB recommended several priority actions.

Early recommendations from the assessment formed the basis of the *CAREC Common Agenda for Modernization of Sanitary and Phytosanitary Measures for Trade* (CAST), which was endorsed at the CAREC Ministerial Conference in 2015. CAST seeks to (i) promote concerted reforms and modernize the implementation of SPS measures that are consistent with international standards to facilitate safe trade within and outside the region, and (ii) identify and prioritize investment needs to modernize the application of SPS measures.

As part of implementing CAST, ADB launched the Regional Upgrades of Sanitary and Phytosanitary Measures for Trade Project in 2016, with an initial investment in Mongolia. ADB also provided regional technical assistance for modernizing SPS measures to facilitate trade and to strengthen international food safety standards in agricultural value chains. ADB's Strategy 2030 continues to support improvement of market connectivity and agricultural value

chain linkages and promote agriculture trade through enhanced regional cooperation and integration operations.

We hope that this report will be a source of useful information on the CAREC SPS systems and will inspire efforts to modernize and adopt more effective legislation and procedures aligned with international standards. We encourage CAREC to invest in SPS facilities behind and at the borders, develop and enhance technical skills, and regularly engage in international cooperation and policy dialogue.

Amy S. P. Leung
Director General
East Asia Department
Asian Development Bank

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Abbreviations

ADB	Asian Development Bank
BCP	border-crossing point
CAREC	Central Asia Regional Economic Cooperation
EAEU	Eurasian Economic Union
EPPO	European and Mediterranean Plant Protection Organization
EU	European Union
FAO	Food and Agriculture Organization of the United Nations
GOST	*gosudarstvennyy standart* (state standard)
HACCP	hazard analysis and critical control points
IPPC	International Plant Protection Convention
ISO	International Organization for Standardization
ISPMs	International Standards for Phytosanitary Measures
OIE	World Organisation for Animal Health
PCR	polymerase chain reaction
PRA	pest risk analysis
PRC	People's Republic of China
PVS	Performance of Veterinary Services
RUST	Regional Upgrades for Sanitary and Phytosanitary Measures in Trade
SPS	sanitary and phytosanitary
TA	technical assistance
TAD	transboundary animal disease
TFA	Trade Facilitation Agreement
USAID	United States Agency for International Development
WHO	World Health Organization
WTO	World Trade Organization

Executive Summary

Since 2011, the Asian Development Bank (ADB) has been supporting a number of assessment and technical assistance to improve sanitary and phytosanitary (SPS) capacities within the region as part of trade facilitation initiatives under the Central Asia Regional Economic Cooperation (CAREC) Program. In 2015, CAREC ministers endorsed the *Common Agenda for Modernization of SPS Measures for Trade* (CAST), a regional framework for priority actions to upgrade SPS measures and complement customs-related initiatives under the CAREC program.

Under the CAREC 2030 Strategy, the alignment of SPS measures with international standards remains a priority for regional cooperation. The strategy promotes regional cooperation to facilitate trade, which includes agriculture trade expansion including through agriculture value chains, while controlling transboundary pests and animal diseases and developing a food safety network. Under this framework, the CAREC Integrated Trade Agenda (CITA) 2030 and its rolling strategic action plan continue to support the implementation of CAST as well as the establishment and initiatives of the national and CAREC-wide SPS working groups.

This report summarizes the outcomes of the assessments and recent updates on regulatory alignment, laboratory capacity, and border services management in relation to SPS measures in the CAREC region. It offers region-wide and sector-specific recommendations to carry out CAST thereby enhancing the capacity of CAREC countries to facilitate trade while ensuring food safety and animal and plant health protection.

Regulatory Assessment

More work needs to be done for most CAREC countries legislation to be aligned, at least at the barest minimum, with the international standards prescribed by the International Plant Protection Convention (IPPC), the World Organisation for Animal Health (OIE), and Codex Alimentarius, and recognized by the Agreement on the Application of Sanitary and Phytosanitary Measures (SPS Agreement) under the World Trade Organization. While legislation in some countries provides for the adoption of international standards or principles, their implementing rules and regulations (secondary legislation) are unclear, insufficient, or unsustainable. To align their SPS measures with international standards and implement effective reforms, each country will need a comprehensive national strategy and plan.

Plant Health. Although most CAREC countries have carried out fundamental reforms to make primary plant health laws consistent with the IPPC and the SPS Agreement, they have no secondary legislation to implement the IPPC's International Standards for Phytosanitary Measures (ISPMs). In some countries, the legislative and administrative split between plant quarantine and domestic

plant protection leads to a less effective and unpredictable application of SPS measures. Many CAREC members also have yet to prepare or update their lists of regulated pests owing to lack of expertise and potentially a large number of pests to be considered. Without these lists, risk-based phytosanitary import requirements cannot be developed and, consequently, inspection and testing requirements could be regarded as trade barriers. A regionally coordinated surveillance program for quarantine pests may be a useful initiative.

Animal Health. A wide range of OIE-listed animal diseases and zoonoses are endemic in the region and adversely affect trade in live animals and animal products. Despite amendments to veterinary legislation, most CAREC member countries also lag behind, their veterinary legislation still far from adequate to provide an appropriate level of protection from animal diseases and zoonoses. OIE's Performance of Veterinary Services (PVS) Pathway could provide a basis to address these gaps.

Food Safety. CAREC countries' food safety laws vary considerably in the way and extent to which they adopt basic food safety legal principles, risk-based approach to food safety, and mandatory hazard analysis and critical control points (HACCP). These must be addressed according to country-specific circumstances. For instance, other laws or technical regulations—certification and standardization—operate in parallel so that for countries still requiring end-product certification of conformity assessment, existing laws on food safety might not present the full picture of food regulation. The preparation and adoption of the HACCP system, which aims to minimize the risk of hazards entering the food chain, based on the recommendations of Codex Alimentarius must be considered and incorporated in food safety legislation for both imported and exported products.

Laboratory Assessment

Laboratory assessments for each CAREC country are guided by the International Organization for Standardization (ISO) 17025:2005 standard for test results to be acceptable in international trade.

Plant Health. With the exception of the People's Republic of China (PRC) and Georgia, none of the CAREC countries have the minimum capacity for protection from quarantine pests beyond relatively easy-to-identify insects and a few plant diseases by symptoms or by morphology of causal fungi.

Animal Health. Except for a few relatively well-equipped and properly organized veterinary laboratories in the capital cities of CAREC countries, most veterinary laboratories are in poor condition and unable to conduct routine surveillance, early detection of animal and zoonotic diseases, and full surveillance and testing for OIE-listed diseases. International accreditation or OIE compliance in the region remains an issue, and the capacity to detect and diagnose viral diseases in live animals and animal products is inadequate.

Food Safety. Except in the PRC and Kazakhstan, CAREC laboratories do not have the recommended standard equipment or procedures to analyze in accordance with international standards the entire series of chemical contaminants that pose actual risks to consumers. In addition, chemical contaminant limits are not harmonized with international standards such

as Codex and/or of the European Union, and outdated methods are used in analyzing pathogenic bacteria.

Assessment of Border Services Management

Many CAREC countries have initiated reforms and modernization of border services and systems although they have focused on Customs service, with other services dealt with in an ad hoc manner. CAREC countries are at an early stage of integrating trade-related services particularly at their borders. In many countries, SPS, and trade control in general, is characterized by overlapping and/or excessive inspections, delays, and/or lack of risk management.

The single-window concept has not been applied consistently in all areas of border services. Also, trade facilitation initiatives have been interpreted in a manner that may weaken SPS services (e.g., "green channel" initiatives have not been accompanied by the appropriate risk-based control systems). Advance notification (available in principle at many border-crossing points) and a proper risk assessment system are necessary. For planting materials, specialized testing or post-entry quarantine at the destination may be necessary. Several CAREC countries also lack the capacity to prevent the spread of animal diseases, such as transboundary animal diseases, as illegal and unsupervised movements of live animals and animal products pose a major threat.

Overall Recommendations

As CAREC countries implement the CAST, a comprehensive SPS national strategy must be formulated. Ideally, the strategy should cover legislative reforms; the upgrade and proper maintenance of SPS laboratory and other facilities; capacity building for specialists and inspectors, especially in risk-based assessment; interagency cooperation and coordination; improvement of border management and infrastructure; and use of information management systems and data exchange for risk profiling and assessment.

Align sanitary and phytosanitary measures with international standards. Fundamentally, primary and secondary legislation need to be updated in a more coordinated approach for legal framework reforms. In the case of plant health, pest risk analysis based on the regulated pest list is critical. Developing rules and procedures consistent with relevant ISPMs relating to import and export inspection, certification to minimize administrative and procedural barriers, surveillance, and establishment of pest-free areas are necessary.

For animal health, legal provisions to support surveillance and import risk analysis, in particular, to control the spread of transboundary animal diseases is essential. In undertaking veterinary legislative reforms, the PVS Pathway can guide countries toward compliance with OIE standards.

A risk-based approach to food safety must be adopted according to country-specific circumstances. Import requirements in secondary legislation need to be addressed. As HACCP will ease clearance of goods by obviating the need for inspection at the borders, this could be made mandatory in the national legislation and simplified for the benefit of small and medium-sized enterprises.

Invest and build capacity to implement sanitary and phytosanitary measures. In the plant health sector, countries with adequate financial resources should invest in, at least, the basic level of technology that will secure borders against quarantine pests. Technological requirements to improve diagnostic capacity will depend on the nature of regulated pests. At the border, minimum conditions for phytosanitary border inspection facilities should include written up-to-date national plant health and inspection guidelines, inspection facilities, and a reliable supply of electricity and communication system.

For surveillance and testing for OIE-listed diseases, training in modern laboratory techniques and standard operating procedures will maximize the use of upgraded laboratories in some CAREC countries. For food safety, the number of laboratories and expertise must be rationalized to expedite donor support to ISO 17025:2005 international accreditation. This assessment also recommends harmonization of standards, skills enhancement training, and training on Codex standards for sampling and guidelines on sampling techniques.

Border services management to facilitate safe trade. Border management cooperation begins even before an item or good arrives at the border. Unified border inspection service is a growing trend in some countries to facilitate trade and must be approached based on a country's circumstances. The responsibility of those setting the standards must be, to the extent possible, separate from those conducting border inspections. A border management strategy, which may include single window within the country or joint control across countries, must accompany any investment in border-crossing points.

Regular consultation and institutional mechanisms are crucial in discussing SPS issues and developing regional cooperation mechanisms. Participants of these dialogues may share information and lessons learned, discuss the possibility of mutual recognition or harmonization of standards, and coordinate the approach to risk management and prevention. Measures on quarantine pest surveillance, control of transboundary animal diseases, adoption of HACCP across CAREC member countries, and border management cooperation are best coordinated and made more effective when done regionally. The framework under CAST and establishment of the regional SPS working group to implement the CITA 2030 should support this process and continue to provide a platform for regional cooperation.

1 Introduction

Trade is well recognized as a contributor to economic growth; hence, facilitating trade is seen as a means by which countries can improve their economies. In the agriculture trade sector, sanitary and phytosanitary (SPS) measures are applied to protect human as well as animal and plant health and promote food safety. Therefore, efforts to improve agriculture trade need to take into account SPS measures.

Modernizing SPS in the Central Asia Regional Economic Cooperation (CAREC) region is expected to expand trade and improve competitiveness in CAREC countries (ADB 2014). In 2015, CAREC ministers endorsed the Common Agenda for Modernization of SPS Measures for Trade (CAST)—a regional framework for priority actions to upgrade SPS measures to complement customs-related trade facilitation initiatives under the CAREC program (CAREC 2015).

In October 2017, the 16th CAREC Ministerial Conference endorsed a new long-term strategy—CAREC 2030 (ADB 2017). The strategy promotes regional cooperation to facilitate trade, which includes agriculture trade expansion while controlling transboundary pests and animal diseases and developing a food safety network. Under the CAREC 2030 strategy, the CAREC Integrated Trade Agenda (CITA) 2030 and its rolling strategic action plan continue to support the implementation of CAST as well as the establishment of SPS working groups and development of agricultural value chains (ADB 2018a).

This report is a product of a series of assessments and consultations. In 2012, the Asian Development Bank (ADB) conducted study missions to Kazakhstan, the Kyrgyz Republic, Mongolia, the People's Republic of China (PRC), and Uzbekistan and developed an SPS plan for CAREC countries (ADB 2013a). In 2014, a technical assistance team[1] engaged by ADB conducted a comprehensive study to review the laws and procedures governing SPS measures and identify necessary reforms; evaluate laboratory equipment, infrastructure, and upgrades; and assess how SPS agencies could adopt an integrated and coordinated approach to border management in CAREC countries (ADB 2013b). In-country assessments took place in Azerbaijan, the PRC, Kazakhstan, the Kyrgyz Republic,

Trade is well recognized as a contributor to economic growth; hence, facilitating trade is seen as a means by which countries can improve their economies.

[1] The team comprised a trade facilitation and SPS lead expert; experts on plant health, animal health, and food safety; and two national consultants.

Mongolia, Tajikistan, Turkmenistan, and Uzbekistan, while desk-based research was conducted for Afghanistan and Pakistan.

At a workshop in Bishkek, Kyrgyz Republic in January 2015, participants from SPS-related agencies from nine CAREC countries identified a list of priority regional actions from the assessment which formed the basis of CAST. Subsequently, a project to improve SPS measures—the Regional Upgrades for Sanitary and Phytosanitary Measures in Trade (RUST) commenced in Mongolia in 2017. In August 2017, a scoping mission to the Kyrgyz Republic was conducted to determine the country's need for SPS upgrading under a RUST project. In May 2018, a Regional Workshop on Modernizing Sanitary and Phytosanitary Measures was held in Bishkek to kick-start the implementation of Knowledge Support Technical Assistance 9500: Modernizing Sanitary and Phytosanitary Measures to Facilitate Trade (ADB 2018b).

This report consolidates the outcomes of the assessments and consultation workshops, as well as recent information where available, on SPS legislative amendments and updates on government processes including that of Georgia, which became a CAREC member in 2016.

Agriculture is an important sector of the economy in CAREC countries, both in terms of output and employment.

1.1 Background

Agriculture is an important sector of the economy in CAREC countries, both in terms of output and employment. For instance, the share of agriculture output in gross domestic product (GDP) of CAREC countries averaged 13%, while employment in agriculture averaged about 32% of total employment in 2017—both of which are multiples of the estimates for the European Union or other groups (Table 1).

The primary agricultural crops in CAREC countries are cereals, fruit, vegetables, and coarse grain, while live animal products consist mainly of cattle, sheep, and goats (Table 2). Most countries in the region have similar agriculture products in like proportions. The CAREC region is also the world's major producer of vegetables; melons and fruit including citrus; cereals, roots, and tubers; tree nuts and coarse grains; and sheep and goats.

Table 3 shows the value of imports into CAREC countries while Table 4 lists their exports.[2] Excluding data for the PRC, the value of agriculture imports in 2016 was less than $1 billion for the Kyrgyz Republic, Mongolia, Tajikistan, and Turkmenistan, and more than $1 billion for Afghanistan, Azerbaijan, Georgia, Kazakhstan, Pakistan, and Uzbekistan. CAREC countries mainly import fats and oils, cereals, sugars and confectionery, and tobacco (sharing at least 10% of some countries' total imports).

[2] The list of agriculture products is based on the World Trade Organization (WTO) Agreement on Agriculture, specifically Annex 1 of the Agreement on Agriculture, which used the 1992 version of the Harmonized System (HS) commodity classification.

Table 1: Agriculture as a Percentage of GDP and Employment in CAREC Countries, 2017

Country	Agriculture Value Added as % of GDP[a]	Agriculture Employment as % of Total Employment
Afghanistan	21.0	62.2
Azerbaijan	5.6	37.4
PRC	7.9	17.5
Georgia	7.0	40.9
Kazakhstan	4.4	18.0
Kyrgyz Republic	12.3	26.7
Mongolia	10.4	30.4
Pakistan	22.9	42.0
Tajikistan	20.4	51.6
Turkmenistan	9.3	8.2
Uzbekistan	17.3	21.9
European Union (EU)	1.4	4.2
Europe and Central Asia (excluding high income)	5.8	15.2

CAREC = Central Asia Regional Economic Cooperation, GDP = gross domestic product, PRC = People's Republic of China.

[a] The Afghanistan and Tajikistan estimates are for 2016 while data for Turkmenistan is for 2015.

Source: World Bank. World Development Indicators. https://data.worldbank.org/ (accessed November 2018).

Meanwhile, agriculture exports in the PRC, Kazakhstan, Pakistan, and Uzbekistan exceeded $1 billion, were around the $700 million range for Afghanistan, Azerbaijan, and Georgia, and less than $500 million for the rest of CAREC member countries. In eight countries, fruit and nuts were the major exports, reaching more than 42% of total export value for Afghanistan, Azerbaijan, and Uzbekistan. Other major products are vegetables and roots and tubers for five countries (between 12% and 30% share) and raw cotton for four countries (sharing 9% to 78%). Although pasture-based livestock production is the predominant form of agriculture, commodity crops and, to some extent, meat and meat products remain the principal exports of many CAREC countries.

1.2 Agreements under the World Trade Organization and International Standards

All countries maintain SPS measures to ensure that food is safe to eat and to prevent or control the spread of pests and diseases among animals and plants. These measures may apply to various domestic agriculture and food production as well as imports and exports.

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Table 2: Agriculture Production in CAREC, 2016

Crops and Live Animals	AFG	AZE	GEO	KAZ	KGZ	MON	PAK	PRC	TAJ	TKM	UZB	CAREC Total	CAREC as % of World	World
Crops (1,000 tons)														
Cereals	5,535	2,965	432	20,411	1,764	483	43,076	582,661	1,367	1,800	7,902	668,396	23.4	2,848,662
Roots and tubers	428	902	249	356	1,388	165	4,532	176,634	898	316	2,925	188,793	22.3	846,121
Pulses	83	21	6	444	102	1	809	4,242	67	13	79	5,867	7.2	81,800
Tree nuts	43	49	34	2	16	5	41	3,973	6	2	88	4,259	25.1	16,979
Oil crops, primary	16	14	2	676	16	4	360	15,584	9	0	39	16,720	12.1	138,265
Jute and jute-like fibers							0.2	69			4	73	2.1	3,541
Fiber crops, primary							0.2	207			4	211	4.0	5,343
Vegetables and melons	2,829	1,729	202	5,852	1,298	95	5,662	638,415	2,437	1,037	12,515	672,072	54.9	1,223,393
Fruit excluding melons	1,230	991	378	346	223	1	6,113	176,830	543	518	4,573	191,746	26.7	717,687
Citrus fruit	22	53	66	1	0.1		2,270	38,393	6		8	40,819	27.9	146,429
Coarse grain	624	1160	305	4,977	1,068	16	6,658	239,874	353	70	749	255,854	18.8	1,358,240
Oilcakes equivalent	17	21	4	1,109	22	6	592	28,199	11	0	53	30,034	8.4	359,046
Live Animals (million heads)														
Cattle and buffaloes	5.2	2.7	1.0	6.2	1.5	4.1	79.4	108.3	2.3	2.4	2.4	216	12.9	1,674
Sheep and goats	20.7	8.6	0.9	18.0	6.0	53.4	100.1	311.1	5.4	16.4	16.4	557	25.6	2,176
Poultry birds	11.8	29.3	8.8	37.2	4.6	0.7	509.7	6.3	5.2	17.0	17.0	648	2.6	24,824

AFG = Afghanistan, AZE = Azerbaijan, CAREC = Central Asia Regional Economic Cooperation, GEO = Georgia, KAZ = Kazakhstan, KGZ = Kyrgyz Republic, MON = Mongolia, PAK = Pakistan, PRC = People's Republic of China, TAJ = Tajikistan, TKM = Turkmenistan, UZB = Uzbekistan.

Source: Food and Agriculture Organization of the United Nations. FAOStat. http://www.fao.org/faostat/en/#data (accessed March 2018).

Table 3: Imports of Agriculture Products into CAREC Countries, 2017 ($ million)

HS Code	Product Description	AFG	AZE	GEO	KAZ	KGZ	MON	PAK	PRC	TAJ	TKM	UZB
01	Live animals	12.0	49.4	13.8	26.1	1.3	1.8	27.1	363.8	0.9	15.5	41.8
02	Meat and edible meat offal	73.6	63.1	112.7	205.9	31.7	24.0	13.1	9,486.6	35.4	49.1	16.8
04	Dairy produce, birds' eggs, natural honey, edible products of animal origin, not elsewhere specified	190.7	124.9	64.7	365.6	56.1	28.4	182.4	5,070.0	15.8	32.3	22.4
05	Products of animal origin, not elsewhere specified or included	0.1	0.4	4.7	3.0	0.7	0.0	4.4	613.5	0.3	0.7	2.6
06	Live trees and other plants, bulbs, roots and the like, cut flowers and ornamental foliage	1.4	21.9	13.8	62.3	3.7	0.4	4.6	280.9	2.3	12.4	20.5
07	Edible vegetables and certain roots and tubers	184.5	57.1	38.5	158.3	19.8	11.8	981.2	2,015.7	3.2	56.4	52.0
08	Edible fruit and nuts, peel of citrus fruit or melons	233.1	75.3	53.2	437.2	52.1	12.3	351.1	6,395.2	2.8	38.4	16.2
09	Coffee, tea, maté, and spices	74.4	59.9	27.2	138.1	13.5	5.8	702.7	472.2	11.0	9.4	63.5
10	Cereals	204.9	291.5	120.2	16.4	58.0	24.9	92.4	6,400.9	172.5	11.3	213.6
11	Products of the milling industry, malt, starches, inulin, wheat gluten	434.1	17.8	22.4	23.6	22.3	11.2	20.0	970.5	19.1	20.3	131.8
12	Oil seeds and oleaginous fruits; miscellaneous grains, seeds and fruit; industrial or medicinal plants; straw and fodder	31.9	34.3	15.7	55.4	5.1	60.1	1,399.2	44,514.2	6.5	8.3	67.2
13	Lac; gums, resins and other vegetable saps and extracts	2.9	0.5	0.8	7.4	0.2	0.8	20.7	255.9	0.7	0.3	3.7
14	Vegetable plaiting materials; vegetable products not elsewhere specified or included	1.5	1.1	0.1	0.6	0.1	–	39.5	175.0	0.1	0.2	0.1
15	Animal or vegetable fats and oils and their cleavage products; prepared edible fats; animal or vegetable waxes	277.0	148.3	67.5	188.8	54.0	31.2	2,370.3	8,285.1	81.3	43.3	214.2
1601	Sausages and similar products of meat, meat offal, blood; food preparations based on these	3.0	8.7	6.5	59.5	0.9	0.3	0.4	3.2	0.8	0.9	0.1
1602	Prepared or preserved meat, meat offal, blood	4.1	6.7	7.4	12.0	2.0	1.6	6.4	8.7	1.9	1.7	0.7
17	Sugars and sugar confectionery	383.3	203.0	88.1	289.0	41.8	44.3	45.3	1,407.7	52.4	68.0	79.1
18	Cocoa and cocoa preparations	39.1	55.5	54.8	197.9	44.7	45.3	32.4	659.9	26.8	23.1	36.5

continued on next page

Table 3 *continued*

HS Code	Product Description	AFG	AZE	GEO	KAZ	KGZ	MON	PAK	PRC	TAJ	TKM	UZB
19	Preparations of cereals, flour, starch or milk; pastry cooks' products	157.8	77.2	66.7	272.0	52.0	56.6	156.7	5,685.8	36.4	37.2	38.1
20	Preparations of vegetables, fruit, nuts or other parts of plants	148.5	29.0	33.4	189.4	13.8	23.6	61.7	1,093.2	7.0	15.8	11.8
21	Miscellaneous edible preparations	69.3	67.2	80.3	257.8	39.0	53.7	79.9	2,388.1	18.8	40.3	52.0
22	Beverages, spirits and vinegar	27.9	66.8	82.9	219.0	42.6	36.5	11.0	5,288.4	15.1	18.6	20.0
23	Residues and waste from the food industries; prepared animal fodder	49.4	45.1	39.7	84.1	8.2	9.3	262.8	3,397.5	8.4	18.5	38.1
24	Tobacco and manufactured tobacco substitutes	501.5	166.5	113.2	174.5	74.2	54.7	13.4	1,762.7	25.4	14.7	13.6
290543	Mannitol	–	0.0	0.0	0.2	–	0.0	1.7	2.4	–	–	0.1
290544	D-glucitol (sorbitol)	0.1	0.0	0.0	0.1	0.0	0.0	0.5	2.6	–	0.0	0.3
3301	Oils; essential; concentrates; aqueous distillates, solutions; resinoids	0.9	0.2	0.2	1.3	0.4	0.0	15.0	204.4	0.1	0.1	0.2
3501 to 3505	Albuminoidal substances, modified starches, glues	0.5	3.1	2.4	14.7	1.3	1.2	11.2	767.4	1.3	2.1	12.5
380910	Finishing agents, etc., with amylaceous basis	–	0.2	0.0	0.4	0.0	–	0.1	1.9	0.0	0.3	0.0
382360	Sorbitol excl. that of 290544	–	–	–	–	–	–	–	–	–	–	–
4101 to 4103	Hides and skins	0.0	0.0	–	0.7	2.4	0.0	31.7	2,202.6	0.0	–	–
4301	Raw fur skins (excl. raw hides and skins of 4101, 4102, 4103)	–	0.0	–	–	0.1	0.0	0.0	680.8	–	–	0.3
5001 to 5003	Raw silk and silk waste	0.0	–	–	0.6	0.2	–	3.3	11.0	–	–	–
5101 to 5103	Wool and animal hair	0.3	0.0	0.0	0.4	0.1	0.6	2.8	2,897.2	–	0.0	–
5201 to 5203	Raw cotton, waste and cotton carded or combed	0.9	0.0	0.0	1.8	0.5	0.0	765.6	2,295.4	–	–	0.3
5301 to 5302	Raw flax and hemp	–	0.0	–	0.1	0.0	0.0	0.7	380.5	–	0.0	–
	TOTAL	**3,108.9**	**1,675.0**	**1,131.0**	**3,464.1**	**642.7**	**540.6**	**7,711.3**	**116,441.1**	**546.3**	**539.4**	**1,170.1**

AFG = Afghanistan, AZE = Azerbaijan, CAREC = Central Asia Regional Economic Cooperation, GEO = Georgia, HS = Harmonized System, KAZ = Kazakhstan, KGZ = Kyrgyz Republic, MON = Mongolia, PAK = Pakistan, PRC = People's Republic of China, TAJ = Tajikistan, TKM = Turkmenistan, UZB = Uzbekistan.

Notes: 0.0 means substantially below $1 million; – means no value. The estimates for Afghanistan, Mongolia, Tajikistan, Turkmenistan, and Uzbekistan are mirror data.

Source: International Trade Center Trade Map (accessed November 2018).

Table 4: Exports of Agriculture Products from CAREC Countries, 2017 ($ million)

HS Code	Product	AFG	AZE	GEO	KAZ	KGZ	MON	PAK	PRC	TAJ	TKM	UZB
01	Live animals	2.1	1.7	43.8	3.9	8.4	0.3	6.4	561.5	0.0	0.0	4.3
02	Meat and edible meat offal	0.4	1.7	30.2	21.3	1.5	70.4	212.0	916.5	–	–	–
04	Dairy produce; birds' eggs; natural honey; edible products of animal origin, not elsewhere specified	0.2	8.2	4.2	41.8	43.5	0.1	56.3	588.2	0.1	0.1	0.4
05	Products of animal origin, not elsewhere specified or included	5.8	0.7	0.4	6.2	1.7	12.1	24.6	2,309.4	0.3	0.0	4.3
06	Live trees and other plants; bulbs, roots and the like; cut flowers and ornamental foliage	0.0	0.4	1.0	10.9	4.8	0.0	1.7	338.5	0.0	–	3.2
07	Edible vegetables and certain roots and tubers	86.1	210.1	16.1	118.8	78.1	0.3	173.1	11,164.2	9.4	5.1	164.2
08	Edible fruit and nuts; peel of citrus fruit or melons	403.9	292.7	107.1	14.8	44.1	89.3	353.9	5,336.5	27.2	1.0	463.4
09	Coffee, tea, maté and spices	42.8	10.3	10.4	9.1	1.0	0.1	91.8	2,930.8	0.4	–	9.5
10	Cereals	–	0.0	5.6	829.4	0.3	0.4	1,751.5	669.8	4.1	–	1.0
11	Products of the milling industry; malt; starches; inulin; wheat gluten	0.0	0.1	11.8	487.4	0.1	0.0	111.3	574.6	–	–	0.1
12	Oil seeds and oleaginous fruits; miscellaneous grains, seeds and fruit; industrial or medicinal plants; straw and fodder	28.6	3.5	3.3	279.4	2.2	44.3	85.1	2,646.3	1.1	2.4	19.5
13	Lac; gums, resins and other vegetable saps and extracts	102.5	1.1	0.1	1.1	0.2	0.3	41.2	1,347.9	1.8	17.6	3.7
14	Vegetable plaiting materials; vegetable products not elsewhere specified or included	1.2	0.1	0.0	0.8	–	–	5.8	130.9	0.0	7.2	6.3
15	Animal or vegetable fats and oils and their cleavage products; prepared edible fats; animal or vegetable waxes	0.2	17.0	12.8	116.4	0.6	0.2	43.5	839.4	0.0	0.0	0.2
1601	Sausages and similar products of meat, meat offal, blood; food preparations based on these	–	0.0	0.0	1.0	0.1	0.0	–	184.2	0.0	–	0.0
1602	Prepared or preserved meat, meat offal, blood	–	0.3	0.1	3.5	0.8	4.2	1.4	1,666.3	–	–	–
17	Sugars and sugar confectionery	0.1	40.2	5.4	61.9	1.6	0.0	511.9	1,759.3	0.0	0.2	3.5
18	Cocoa and cocoa preparations	0.0	6.0	2.6	40.5	0.6	0.0	0.2	376.0	–	0.1	5.0

continued on next page

Table 4 *continued*

HS Code	Product	AFG	AZE	GEO	KAZ	KGZ	MON	PAK	PRC	TAJ	TKM	UZB
19	Preparations of cereals, flour, starch or milk; pastrycooks' products	0.2	1.9	2.4	48.4	10.7	0.1	57.6	1,650.1	0.1	0.1	2.4
20	Preparations of vegetables, fruit, nuts or other parts of plants	2.1	15.4	22.9	6.8	0.9	0.1	52.7	7,693.7	1.2	0.4	28.0
21	Miscellaneous edible preparations	0.1	3.3	7.4	23.2	6.8	2.0	28.2	3,259.7	0.0	0.0	0.7
22	Beverages, spirits and vinegar	0.1	21.9	417.3	40.7	5.9	0.5	382.2	2,227.1	0.2	0.0	17.5
23	Residues and waste from the food industries; prepared animal fodder	0.0	6.4	22.8	63.2	0.2	3.8	38.2	2,659.0	0.0	0.5	2.2
24	Tobacco and manufactured tobacco substitutes	0.2	15.3	46.5	92.1	22.8	–	32.2	1,326.8	1.3	–	9.2
290543	Mannitol	–	–	0.0	–	–	–	–	20.4	–	–	–
290544	D-glucitol (sorbitol)	–	–	–	–	–	–	–	38.9	–	–	–
3301	Oils; essential; concentrates; aqueous distillates, solutions; resinoids	1.4	–	0.0	–	–	–	1.6	353.4	–	–	0.0
3501 to 3505	Albuminoidal substances, modified starches, glues	–	–	0.1	0.2	0.7	1.0	5.9	615.5	0.4	0.0	0.0
380910	Finishing agents, etc., with amylaceous basis	–	–	–	–	–	–	–	3.8	–	–	–
382360	Sorbitol excl. that of 290544	–	–	–	–	–	–	–	–	–	–	–
4101 to 4103	Hides and skins	8.3	5.2	1.9	0.6	1.2	2.1	0.2	12.3	0.2	9.7	0.1
4301	Raw fur skins (excl. raw hides and skins of 4101, 4102, 4103)	3.7	–	–	0.1	0.0	–	–	1.9	–	–	0.4
5001 to 5003	Raw silk and silk waste	0.2	0.1	–	0.6	0.2	–	0.1	365.9	2.7	1.7	13.8
5101 to 5103	Wool and animal hair	5.5	0.2	0.7	5.7	0.7	193.7	4.3	49.0	–	4.8	2.4
5201 to 5203	Raw cotton, waste and cotton carded or combed	46.3	33.8	–	93.1	24.7	0.0	118.8	33.9	75.6	180.3	236.7
5301 to 5302	Raw flax and hemp	–	–	–	0.0	–	–	0.2	4.6	–	–	–
	TOTAL	**742.0**	**697.7**	**777.0**	**2,422.8**	**264.5**	**425.2**	**4,193.9**	**54,656.4**	**126.0**	**231.2**	**1,002.0**

AFG = Afghanistan, AZE = Azerbaijan, CAREC = Central Asia Regional Economic Cooperation, GEO = Georgia, HS = Harmonized System, KAZ = Kazakhstan, KGZ = Kyrgyz Republic, MON = Mongolia, PAK = Pakistan, PRC = People's Republic of China, TAJ = Tajikistan, TKM = Turkmenistan, UZB = Uzbekistan.

Notes: 0.0 means substantially below $1 million; – means no value. The estimates for Afghanistan, Mongolia, Tajikistan, Turkmenistan, and Uzbekistan are mirror data.

Source: International Trade Center Trade Map (accessed November 2018).

1.2.1 The World Trade Organization Sanitary and Phytosanitary Agreement

Article 2 of the World Trade Organization (WTO) Agreement on the Application of SPS Measures (or SPS Agreement) for food safety and animal and plant health seeks to ensure that such controls do not result in restrictions on trade, to wit (WTO 1998):

> "Members have the right to take sanitary and phytosanitary measures necessary for the protection of human, animal or plant life or health, provided that such measures are not inconsistent with the provisions of this Agreement."
>
> "Members shall ensure that any sanitary or phytosanitary measure is applied only to the extent necessary to protect human, animal or plant life or health, is based on scientific principles and is not maintained without sufficient scientific evidence." [emphasis supplied]

The SPS Agreement sets out basic rules for countries to set their own standards and take SPS measures that do not arbitrarily or unjustifiably discriminate between countries where identical or similar conditions prevail, and do not discriminate between imported and domestically produced products. The SPS Agreement lays down a number of principles and mechanisms, which should be incorporated into the regulations and systems of WTO member states:

The SPS Agreement sets out basic rules for countries to set their own standards and take SPS measures that do not arbitrarily or unjustifiably discriminate between countries where identical or similar conditions prevail, and do not discriminate between imported and domestically produced products.

(i) Harmonization of SPS measures based on international standards, guidelines, or recommendations (Article 3);

(ii) Equivalence of SPS measures applied by different countries, if they achieve the appropriate level of SPS protection (Article 4);

(iii) Risk assessment and determination of the appropriate level of SPS protection, based on scientific evidence (Article 5);

(iv) Adaptation to regional conditions (regionalization) including pest- or disease-free areas and areas of low prevalence. SPS measures shall be adapted to the SPS characteristics of the area—whether all of a country, part of a country, or all or parts of several countries—from which a product originated and to which it is destined (Article 6); and

(v) Transparency—SPS measures shall be published promptly and inquiry points shall be established to provide information on SPS regulations, control and inspection procedures, risk assessment procedures, and membership and participation in international and regional SPS bodies, arrangements, and agreements (Article 7 and Annex B).

The above WTO principles and mechanisms were used to assess the overall state of SPS-related legislation in CAREC countries. The requirements for control, inspection, and approval procedures (Article 8, Annex C) concern the practical implementation of SPS measures outlined in legislation and relate directly to trade facilitation.

Governments are encouraged to establish national SPS measures that are consistent with international standards developed by the following international organizations: the Food and Agriculture Organization of the United Nations (FAO) and the World Health Organization (WHO) Codex Alimentarius International Food Standards (Codex) for food safety; the World Organisation for Animal Health (OIE) for animal health; and the Secretariat of the International Plant Protection Convention (IPPC) based in FAO for plant health. Countries may apply less stringent standards provided that these do not affect the rights of other countries under multilateral rules.

1.2.2 Codex Alimentarius

Codex Alimentarius provides international food standards, guidelines, and codes of practice to govern the safety, quality, and fairness of the international food trade.[3] Codex standards are science-based, may be applied voluntarily, and must be translated into national legislation or regulations for them to be enforceable.

These standards may be used as a reference for resolving trade disputes when stricter food safety measures have been applied and are said to be technical barriers to trade. The Codex guidelines also provide a good framework for regional cooperation, for example, the guidelines for exchange of information between importing and exporting countries to support food trade. The Codex Alimentarius Commission currently has 185 members, which include all CAREC countries.

Codex Alimentarius provides international food standards, guidelines, and codes of practice to govern the safety, quality, and fairness of the international food trade.

1.2.3 World Organisation for Animal Health

The SPS Agreement recognizes the World Organisation for Animal Health (known by the acronym OIE), as the international organization that sets the reference standards for animal health, including zoonoses.[4] The OIE's 180 members include all CAREC countries.

The OIE maintains an official list of notifiable terrestrial and aquatic animal diseases that are important to international trade. OIE member countries have a formal obligation to submit information on the relevant animal disease present in their territories. The OIE World Animal Health Information System is an internet-based system that processes data on animal diseases and informs the international community. This system has two components: an early warning system and a monitoring system. The OIE also has a voluntary procedure to officially recognize disease-free areas[5] of countries for trade purposes.

[3] See Codex Alimentarius. http://www.fao.org/fao-who-codexalimentarius/WFSD/en/.

[4] See OIE. World Organisation for Animal Health. http://www.oie.int/.

[5] This currently applies to six diseases: African horse sickness, bovine spongiform encephalopathy, classical swine fever, contagious bovine pleuropneumonia, foot-and-mouth diseases, peste des petits ruminants, and rinderpest.

The OIE publishes the *Terrestrial Animal Health Code* and the *Aquatic Animal Health Code* as principal references. The *Manual of Diagnostic Tests and Vaccines for Terrestrial Animals* (OIE 2008) and the *Manual of Diagnostic Tests for Aquatic Animals* (OIE 2003) provide a harmonized approach to disease diagnosis. The Terrestrial Code sets out the obligations of importing and exporting countries and the OIE procedures relevant to the SPS Agreement. Measures should not be established for diseases that are not listed by the OIE unless the importing country has demonstrated through import risk analysis that the disease poses a significant risk.

The OIE Performance of Veterinary Services (PVS) Pathway is a global program for the sustainable improvement of a country's veterinary services compliance with OIE international standards. All CAREC countries (except the PRC) have undergone PVS evaluation (the first diagnostic phase) and are recommended to proceed with the OIE PVS program.

The production and supply chain of food of animal origin operates "from farm to fork" (see Box 1.1). It is therefore necessary to consider both OIE and Codex measures for a comprehensive control of food safety.

The OIE Performance of Veterinary Services Pathway is a global program for the sustainable improvement of a country's veterinary services compliance with OIE international standards.

Box 1.1: Farm-to-Fork Approach to Food Safety

Traditional systems of food safety control are based on sampling, inspection, and certification of end products (end-product control). These systems are now largely being replaced by contemporary systems based on process control at all stages of production and processing, i.e., the farm-to-fork approach. An effective farm-to-fork approach is based on the following principles:

(i) Controls and monitoring take place throughout the food production, processing, and supply chain—from farm to fork.

(ii) Traceability systems are required to guarantee the farm-to-fork approach.

(iii) Food and feed must not be placed on the market if it is unsafe.

(iv) The main responsibility for food safety controls lies with business operators at all stages of the production, processing, and supply chain, who must ensure that food and feed satisfy the requirements of the food law.

(v) Food law is based mainly on risk analysis drawing on scientific evidence with provision for following the precautionary principle when available data are insufficient for risk analysis.

(vi) An integrated control system must be established across different sectors and stages of the supply chain to bring domestic production and import/export controls within a single framework and improve consistency and efficiency by avoiding duplication of effort.

Source: Commission of the European Communities. 2000. White Paper on Food Safety. Brussels. COM (1999) 719 final.

1.2.4 International Plant Protection Convention

The IPPC is a multilateral treaty for international cooperation in plant protection.[6] The 181 signatories to the convention include nine of the 11 CAREC countries (Turkmenistan and Uzbekistan are not contracting parties but have official contact points).

Overseen by FAO, the convention requires governments to apply the measures for protecting plant health from harmful pests (i.e., phytosanitary measures), which may be introduced through international trade. The standards provide a reference point for settling trade disputes by providing the normative framework by which SPS measures are carried out.

The IPPC develops International Standards for Phytosanitary Measures (ISPMs) that include (i) procedures and references; (ii) pest surveillance, survey, and monitoring; (iii) import regulations and pest risk analysis; (iv) compliance procedures and phytosanitary inspection methodologies; (v) pest management; (vi) post-entry quarantine; (vii) exotic pest emergency response, control, and eradication; and (viii) export certification.

Measures that deviate from those established in accordance with ISPMs or those that exist in the absence of international standards must be developed by assessing the risk to plant life or health and based on scientific principles and evidence. The IPPC has also developed a national capacity development strategy. Some international requirements for food safety also relate to pesticide management. FAO's Code of Conduct and Technical Guidelines (2014) help countries meet international standards.[7]

Over the past decade, globalization, climate change, and intensification of agriculture reduced the resilience of agriculture production systems and increased their vulnerability to pests, diseases, and hazardous substances.

1.3 The Rationale for and Categorization of Sanitary and Phytosanitary Measures

Over the past decade, globalization, climate change, and intensification of agriculture reduced the resilience of agriculture production systems and increased their vulnerability to pests, diseases, and hazardous substances. As underscored by FAO and the WTO, SPS measures are needed to control these threats and their negative impacts on trade in agriculture and food products. These threats can be categorized as follows:

(i) **Transboundary plant pests and diseases** (Box 1.2);

(ii) **Transboundary animal diseases** (TADs), which are defined by FAO as epidemic diseases that are highly contagious or transmissible

[6] See FAO. IPPC News. https://www.ippc.int/en/.

[7] See FAO. Technical Guidelines for the Implementation of the International Code of Conduct on Pesticide Management. 2014. http://www.fao.org/agriculture/crops/thematic-sitemap/theme/pests/code/list-guide-new/en/.

and have the potential for very rapid spread, irrespective of national borders, causing serious socioeconomic and possibly public health consequences;

(iii) **Zoonoses or zoonotic diseases**, which are defined by WHO as a group of diseases and infections that are naturally transmitted and transmissible from vertebrate animals to humans and vice versa; and

(iv) **Foodborne diseases**, which are defined by WHO as a group of illnesses caused by enteric pathogens, parasites, chemical contaminants, and biotoxins, that are commonly transmitted through ingested food.

Box 1.2: Definition of Transboundary Plant Pests

The Food and Agriculture Organization of the United Nations defines **transboundary plant pests and diseases** as plant pests and diseases of significant economic, trade, and/or food security importance for a considerable number of countries, which can easily spread to other countries and reach proportions when their control, management, and/or exclusion require cooperation between several states. Plant pests and diseases spread in three ways—trade or other human-migrated movement; environmental forces such as weather and wind; or are insect or other vector-borne such as pathogens.

Transboundary plant pests are **regulated pests** or pests on which regulatory action (phytosanitary measures) may be taken. The two categories of regulated pests defined in the International Plant Protection Convention (IPPC) are as follows:

Quarantine pest: "a pest of potential economic importance to the area endangered thereby and not yet present there, or present but not widely distributed and being officially controlled." The consequences of adopting this definition are that

(i) quarantine pests must be declared/listed for each national territory at risk;

(ii) a pest is only a quarantine pest when (a) there is a risk of economic impact of its introduction and establishment in that territory, and (b) its categorization as a quarantine pest is justified by its distribution; and

(iii) quarantine pests are justified by pest risk analysis (PRA) and further that PRA is necessary to determine and justify phytosanitary import requirements on the basis of a specified pest risk.

Regulated non-quarantine pest: "a non-quarantine pest whose presence in plants for planting ["planting materials" in this report] affects the intended use of those plants with an economically unacceptable impact and which is therefore regulated within the territory of the importing contracting party." This type of pest is already present and widely distributed in the national territory but is subject to phytosanitary measures because it will affect the growth of plants or the quality of harvested products. Regulated non-quarantine pests are invariably plant pathogens (fungi, bacteria, viruses/viroids, and phytoplasmas) or nematodes. Regulated non-quarantine pests must also be justified by PRA (ISPM 21).

Source: Secretariat of the International Plant Protection Convention. 2011. *International Plant Protection Convention.* Article II. https://www.ippc.int/static/media/files/publications/en/2013/06/06/1329129099_ippc_2011-12-01_reformatted.pdf.

1.4 Strategic Reform in Liberalizing Agriculture Trade

Trade in agriculture products is dependent on healthy animals, plants, and safe food production in the country of origin. An outbreak of a particular animal disease or the discovery of a pest in an exporting country will result in a ban or increased precautionary conditions from an importing country. Thus, an inherent tension exists between the need to ensure appropriate human, plant, and animal health protection and the desire to facilitate trade. For instance, paragraph 9.1 in Article 7 of the WTO Agreement on Trade Facilitation (or TFA) states that "with a view to preventing avoidable loss or deterioration of perishable goods, and provided all regulatory requirements have been met, each Member shall provide for the release of perishable goods

(i) under normal circumstances within the shortest possible time; and

(ii) in exceptional circumstances where it would be appropriate to do so, outside the business hours of customs and other relevant authorities" (WTO General Council 2014).

An outbreak of a particular animal disease or the discovery of a pest in an exporting country will result in a ban or increased precautionary conditions from an importing country.

Such speedy release of goods however could potentially undermine members' rights to use measures to protect human, animal, and plant health in accordance with the SPS Agreement. The inherent tension and a lack of awareness of the role and economic significance of the SPS border and behind-border services has led to a perception of SPS measures as barriers to trade, disregarding their vital protective function. This has in turn led to underinvestment and under-resourcing in general for SPS-related services. For example, the emphasis in trade facilitation has been on pressuring governments and services to remove import requirements, which are perceived as unnecessary (Box 1.3).

Agriculture trade liberalization necessitates a strategic approach to properly functioning SPS services, among other regulatory activities. In the World Bank's 2011 report, *Border Management Modernization*, "streamlining nontariff measures (NTMs) should be viewed as part of a broader regulatory reform agenda... NTMs are and will remain an important component of trade regulations. What is needed is a clear understanding of the policy objectives sought and a constant review of their impact and appropriateness. When NTMs are needed, and often they are needed, policy makers need to constantly strive to reduce their trade distorting impact and seek ways to ensure effective administration at least cost to legitimate traders" (McLinden et al. 2011).

To establish appropriate SPS health protection measures, knowledge of the country's health situation is crucial, because measures to protect from a particular disease or pest may only be justified if a country is free or partially free from that disease or pest. If the plant or animal health service does not fully know the situation in the country, it may err on the side of caution and impose restrictions that are not really justified under the country's circumstance.

Box 1.3: Plant Health Certification

Phytosanitary Certificate

A phytosanitary certificate, according to the international model annexed to the International Plant Protection Convention (IPPC), is the sole form of certification recognized in the IPPC (Article V). The phytosanitary certificate is issued by the exporting national plant health authority in response to the requirements of the importing country. It is issued after inspection to ensure that the specified quarantine pests were not found upon inspection of the consignment to which the certificate refers. There may also be an additional declaration about other requirements, such as treatment before shipping or origin from a disease-free area or farm. Following international practice, goods that do not present any pest risk (e.g., canned vegetables, roasted nuts) should be exempt from phytosanitary certificates. Import of small quantities of plant products for personal consumption may also be exempt at the discretion of the importing authorities.

Import Permit

Traditionally, an import permit was required in addition to a phytosanitary certificate for many imported items of plant origin. The permit is issued by the importing country authority and an application for the permit made in advance of shipment. The idea was that the exporter would be made aware of the importing country requirements that would ultimately be reflected in the phytosanitary certificate.

Nowadays, an import permit is seen at best as the importing country taking the opportunity of doing pest risk analysis for unfamiliar goods or at least for goods in which a pest risk is recognized. An import permit may legitimately be refused if the risk is too high to be reduced by treatments and inspection on arrival, which effectively becomes a prohibition. However, there is no reference to any kind of permit in the IPPC. Import permits have been under suspicion for doubling up as trade permits according to quotas or restrictions on imports for non-phytosanitary reasons. It is important that import permits bear only the signature and stamp of the issuing phytosanitary authority and not some other organization that regulates trade.

Source: IPPC. https://www.ippc.int/en/core-activities/governance/convention-text.

Achieving meaningful trade facilitation requires a comprehensive approach based on effective information sharing, streamlining of procedures, and genuine collaboration among all border management agencies including customs administration.

Unnecessary restrictions that impede trade could lead to enormous economic impacts. FAO (2001) shows that the adverse effects of transboundary pests and diseases are not limited to trade and production alone. They also affect food security and nutrition; human health and environment; food prices and market adjustments, such as wages and jobs; and budgetary outlays for control measures, such as inspection, monitoring, prevention and response. Given these interlinkages and negative externalities, establishing and maintaining an effective SPS system is a good investment.

Achieving meaningful trade facilitation requires a comprehensive approach based on effective information sharing, streamlining of procedures, and genuine collaboration among all border management agencies including customs administration. McLinden et al. (2011) identified a number of issues on SPS measures as they relate to border management:

1.4.1 Capacity to Implement Sanitary and Phytosanitary Measures

Implementation of SPS measures according to the farm-to-fork approach to food safety, as well as for plant health and animal health, requires extensive infrastructure within a country as well as actions at the border. Internal measures include (i) monitoring of and reporting on the status of plant pests and diseases, animal diseases, and food safety; (ii) risk analysis; (iii) food business operators taking action to control plant health, animal health, and food safety; (iv) identification and traceability systems; (v) inspection, controls, and audits carried out by official bodies; and (vi) sampling and testing at diagnostic laboratories.

The extent and cost of internal SPS measures are generally greater than those at the border.

Implementation of these measures is also complex and requires capacity in many areas that may be lacking in countries where control systems are not yet fully established.

Implementation of SPS measures according to the farm-to-fork approach to food safety, as well as for plant health and animal health, requires extensive infrastructure within a country as well as actions at the border.

1.4.2 Market Differentiation for Food Products

Countries in which the agriculture and food sectors are still being developed and modernized may have a tiered market structure with different food safety management issues in each tier.

The first tier is the international export market, where exporters must comply with the most demanding food safety assurances to compete for premium sales. Supply chain process controls are likely to be carried out by the private companies involved, with official bodies facilitating and supervising.

The second tier is the retail chain for the emerging domestic market, comprising supermarkets, restaurants, and fast-food chains. This tier is likely to be more price-sensitive than the export market, and the official bodies will have a greater role in applying SPS measures and supporting private operators to achieve official standards. There may also be a flourishing tourism market in which the authorities would be keen to ensure food safety.

The third tier is the traditional food market sector, which is mainly informal and operates without coordinated supply chains. By nature, this sector is difficult to control, and governments may only be able to apply limited control to the major hazards.

Countries with limited capacity to implement and enforce SPS measures will be obliged to develop strategies and priorities to address the need in different market sectors. These would extend to plant and animal health as well as to food safety. For example, many countries around the world apply different SPS

measures with regard to foot-and-mouth disease (an animal disease but not a zoonosis) to the beef export market than to the domestic market. However, there may be significant imports of such food commodities as fruits and vegetables and also meat and meat products, traded both "informally" and officially. To set SPS standards for imported food while ignoring domestic products is likely to be considered discriminatory under the WTO.

1.4.3 Contradictions Faced by Border Management Officials

Border management officials face a major and apparent contradiction in their functions. Border management agencies in many countries regard trade facilitation as a secondary function to their main traditional responsibility of regulatory control of goods.

Three broad themes are put forward to address the situation: more investment in border management reform, the development of a new approach to border management, and the implications of institutional and political–economic factors for border management reform. Initiatives for streamlining border management systems include coordinated border management, one-stop border posts, and single window systems. A comprehensive border management reform requires a clear vision, and strong political will and commitment (McLinden et al. 2011).

1.5 Measuring Border Management Performance

Table 5 shows the indicators of 10 CAREC member countries in terms of World Bank Group's Trading Across Borders.[8] On average, CAREC countries incur significant costs to export than their counterparts in other regions. Border compliance costs in Kazakhstan, the PRC, Afghanistan, the Kyrgyz Republic, and Pakistan exceed the CAREC average, by order of magnitude. Documentary compliance costs are high in Afghanistan, Tajikistan, Kazakhstan, Azerbaijan, Uzbekistan, and Pakistan relative to the regional mean. Time to export on average is only slightly longer in CAREC than in other regions, and documentary compliance and border compliance take particularly long in four countries.

In the case of imports, the mean cost of documentary compliance in CAREC exceeds other regional averages, but mean border compliance cost falls below another region's average. The costs of documentary compliance in Afghanistan and Pakistan are way above the CAREC mean, while border compliance costs in Pakistan, Afghanistan, the PRC, and the Kyrgyz Republic surpass the regional mean. Average time to import is shorter in CAREC than in other regions for both documentary and border compliance. However, it takes much longer than average to comply with documentary requirements in five countries and with

In the case of imports, the mean cost of documentary compliance in CAREC exceeds other regional averages, but mean border compliance cost falls below another region's average.

[8] Data for Turkmenistan are not available. The World Bank Doing Business 2018 ranked economies on their ease of doing business, from 1 to 190 (World Bank Group 2017).

Table 5: Doing Business Indicators for Trading across Borders, 2017

Region or Country	Rank (1–190)	Distance to Frontier (0–100)	Time to Export		Cost to Export		Time to Import		Cost to Import	
			Documentary Compliance (hours)	Border Compliance (hours)	Documentary Compliance ($)	Border Compliance ($)	Documentary Compliance (hours)	Border Compliance (hours)	Documentary Compliance ($)	Border Compliance ($)
East Asia and the Pacific	**n/a**	69.57	64.60	54.11	69.44	75.89	112.77	384.96	119.80	448.85
Europe and Central Asia	**n/a**	82.66	27.75	31.38	28.63	28.14	112.81	227.85	98.75	225.63
OECD high-income countries	**n/a**	93.49	2.57	13.23	3.85	10.29	36.51	157.06	30.31	122.95
Afghanistan	**175**	30.63	228	48	344	453	324	96	900	750
Azerbaijan	**83**	73.56	33	29	300	214	38	30	200	300
PRC	**97**	69.91	21.2	25.9	84.6	484.1	65.7	92.3	170.9	745
Georgia	**62**	82.43	2	48	35	383	2	15	189	396
Kazakhstan	**123**	63.19	128	133	320	574	6	2	0	0
Kyrgyz Republic	**84**	73.34	21	20	145	445	36	72	200	512
Mongolia	**110**	66.89	168	62	64	191	115	48	83	210
Pakistan	**171**	41.94	55	75	257	406	143	129.3	735	936.6
Tajikistan	**149**	57.17	66	75	330	313	126	107	260	223
Uzbekistan	**168**	44.31	174	112	292	278	174	111	292	278
Average for 10 CAREC Countries			**90**	**63**	**217**	**374**	**103**	**70**	**303**	**435**

CAREC = Central Asia Regional Economic Cooperation, n/a = not available, OECD = Organisation for Economic Co-operation and Development, PRC = People's Republic of China.

Notes: Documentary compliance includes the time and cost of (a) obtaining documents; (b) preparing documents; (c) processing documents, e.g., waiting for the relevant authority to issue a phytosanitary certificate; and (d) submitting documents. Border compliance includes the time and cost of (a) complying with customs and other regulations relating to mandatory inspection, e.g., SPS inspection, needed for the shipment to cross the border; and (b) handling at the border.

Source: The World Bank Group. 2017. *Doing Business 2018: Understanding Regulations for Small and Medium-Size Enterprises*. Washington, DC.

border requirements in six countries. Thus, while some CAREC countries have achieved progress in facilitating trade, the results for many indicate that much work needs to be done in reducing the number of documents required and the number of days needed for export and import as well as the cost of these processes.

2 Assessment of the CAREC Region

This chapter provides an assessment of the sanitary and phytosanitary (SPS) capacity of CAREC countries in relation to (i) compliance and alignment of their regulations with international agreements and standards; (ii) laboratory capacity including accreditation; and (iii) border services management. It also identifies areas for regional cooperation and coordination to improve and modernize SPS and trade facilitation measures in the CAREC region.

2.1 Regulatory Assessment

2.1.1 Membership in International Organizations

CAREC countries' membership in the World Trade Organization (WTO) and the three international standard setting bodies are summarized in Table 6.

Table 6: Membership in the World Trade Organization and International Organizations or Conventions

CAREC Country	WTO	IPPC	OIE	Codex
Afghanistan	yes (2016)	yes	yes	yes
Azerbaijan	observer	yes	yes	yes
People's Republic of China	yes (2001)	yes	yes	yes
Georgia	yes (2000)	yes	yes	yes
Kazakhstan	yes (2015)	yes	yes	yes
Kyrgyz Republic	yes (1998)	yes	yes	yes
Mongolia	yes (1997)	yes	yes	yes
Pakistan	yes (1995)	yes	yes	yes
Tajikistan	yes (2013)	yes	yes	yes
Turkmenistan	no	no	yes	yes
Uzbekistan	observer	no	yes	yes

CAREC = Central Asia Regional Economic Cooperation, Codex = Codex Alimentarius, IPPC = International Plant Protection Convention, OIE = World Organisation for Animal Health, WTO = World Trade Organization.

Sources: Codex Alimentarius. http://www.fao.org/fao-who-codexalimentarius/members-observers/members/en/; IPPC. https://www.ippc.int/en/countries/all/list-countries/; OIE. http://www.oie.int/index.php?L=3&id=103; and WTO. https://www.wto.org/english/thewto_e/whatis_e/tif_e/org6_e.htm.

The People's Republic of China (PRC) has adopted relatively advanced SPS principles and standards in its regulatory framework and processes. A catalog lists all imports and exports subject to statutory inspection by the entry and exit inspection and quarantine authorities before their commercialization in or exit from the PRC. The PRC has also introduced an e-certification system and embarked on cooperation with several countries. The General Administration of Quality Supervision, Inspection and Quarantine (AQSIQ) is the PRC's national inquiry point for SPS, and the China Inspection Quarantine (CIQ) under AQSIQ was previously in charge of import and export inspection and quarantine. In 2018, functions of trade-related agencies were integrated and the CIQ responsibilities were incorporated into PRC Customs. PRC Customs now manages taxation and entry of all goods including quarantine matters. This means that there will be a single declaration and inspection upon entry and quarantine will be part of the post-entry audit process.

The PRC has also introduced an e-certification system and embarked on cooperation with several countries.

Georgia has gradually developed its national regulatory system in line with the European Union (EU) standards, in view of their preferential trade regime under the Deep and Comprehensive Free Trade Area. Georgia's alignment with the EU Acquis means that its SPS-related legislation is more closely aligned with the WTO SPS Agreement than any other CAREC country (Box 2.1).

Box 2.1: Georgia's Success in Sanitary and Phytosanitary Reforms

Among Central Asia Regional Economic Cooperation (CAREC) member countries, Georgia may have the longest history of external assistance to its agricultural base after the collapse of the Soviet Union. In 1998, a Government of the United Kingdom-funded projec assisted the development of a plan for strengthening institutional and legislative capacity of the plant protection and quarantine services. After a period of instability, numerous sanitary and phytosanitary (SPS) projects were initiated mostly oriented toward closer partnership with the European Union (EU). The most intense efforts of SPS reforms have been toward the achievement of a Deep and Comprehensive Free Trade Area between Georgia and the EU.

The results so far have been the enactment of primary and secondary SPS legislation more closely and deliberately approximating the EU Acquis, especially the "farm-to-fork" approach. Georgia is now able to export honey, one of the most regulated products of animal origin, to the EU.

There has also been institutional rationalization after a period of re-regulation with the National Food Agency under the Ministry of Agriculture as the sole competent authority for food safety, phytosanitary, and veterinary controls. SPS border inspections are the responsibility of the Revenue Service ("Customs") of the Ministry of Finance. In addition, progress in cross-border cooperation between Georgia and Azerbaijan (through the Red Bridge project) and customs data exchange between Georgia and several of its trading partners have been achieved and proposals were made to integrate SPS management at the borders.

Sources:
Europe Foundation. 2017. Food Safety Regulation in Georgia: Assessment of the Government's Reform Efforts in 2016. http://www.epfound.ge/wp-content/uploads/2017/06/2016-SPS-Report-in-English.pdf;
Georgia's Action Plan for the Implementation of the Deep and Comprehensive Free Trade Agreement, 2014–2017. Draft. http://www.economy.ge/uploads/dcfta/DCFTA_Action_Plan_ENG.pdf; and
United Nations Development Programme. Support to the Development of Red Bridge Border Crossing Point between Azerbaijan and Georgia. http://www.az.undp.org/content/azerbaijan/en/home/operations/projects/democratic_governance/RedBridge.html.

Kazakhstan, Mongolia, the Kyrgyz Republic, and Tajikistan have at least formally included SPS Agreement principles into their primary legislation. However, SPS requirements and practices are still not fully harmonized with international SPS standards. Kazakhstan and the Kyrgyz Republic are also members of the Eurasian Economic Union (EAEU) together with Armenia, the Russian Federation, and Belarus. Their SPS legislation and measures have been made consistent and/or compliant with the EAEU legislation.

Other CAREC members have made limited progress in aligning their regulations and systems with international standards recognized under the WTO's SPS Agreement. In some cases, many CAREC countries have not made the initial steps or reforms even after many years of WTO membership. Most if not all of Pakistan's principal SPS-related legislation predate the WTO SPS Agreement. The government's plan to establish a national food safety and an animal and plant health regulatory body to strengthen its SPS and quality inspection services has been put on hold since 2012. Afghanistan, which became a WTO member in 2016, has notified the WTO of its relevant SPS legislation.

Meanwhile, three CAREC countries have yet to accede to the WTO and its SPS agreement. As Azerbaijan, Turkmenistan, and Uzbekistan heavily rely on mineral resources, they are less focused on agriculture production and exports. However, with a flourishing commercial horticulture that reflects a non-nomadic traditional culture, the adoption of the norms of the SPS Agreement is highly relevant particularly for Uzbekistan.

SPS measures will work effectively and efficiently when they are part of a coordinated and integrated system.

2.1.2 Policy, Institutional, and Legislative Framework

SPS measures will work effectively and efficiently when they are part of a coordinated and integrated system. Therefore, reforms including modernization should follow a strategic approach. All the elements of the system—plant health, animal health, food safety as well as laboratory and border-post infrastructure—should be holistically considered. Piecemeal interventions—even if technically advisable—risk making the situation worse if they are not coordinated with other changes. SPS systems must also be given adequate resources and technical capacity by demonstrating their economic and social significance within the governments of many CAREC countries, particularly at policy- and decision-making levels.

2.1.3 Plant Health

a. Phytosanitary Measures Inconsistent with International Norms

Many CAREC countries do not have accurate and up-to-date information about which plant pests are present in their countries. It is also generally not known if the identified pests are quarantine or regulated non-quarantine pests for the country itself, and/or if they are regulated pests for their trading partners. A lack of expertise in pest risk analysis (PRA) to determine accurate, valid lists of

quarantine pests and regulated non-quarantine pests; poor diagnostic skills; and the potentially large number of pests to be considered have contributed to this information constraint.

Several barriers hinder legislative reforms to align with the SPS Agreement and the international standard-setting bodies. First, plant production and protection are often not a priority in national development strategies. Second, while the knowledge and expertise of plant health scientists is generally excellent, SPS-related agencies lack personnel with appropriate technical and scientific experience combined with legal expertise for drafting appropriate legislation. Third, administrative authority and control between domestic and cross-border plant protection controls are complicated.

Some sort of primary plant health law exists in all the CAREC countries. Usually, secondary legislation are used to issue pest lists based on PRA, rules of inspection and sampling, and documentary requirements that follow the International Standards for Phytosanitary Measures (ISPMs) of the International Plant Protection Convention (IPPC) consistent with the SPS Agreement. However, only few secondary phytosanitary legislation reflecting the IPPC requirements have been prepared and/or enforced in the CAREC region and the capacity to implement the relevant legislation is inadequate.

Several barriers hinder legislative reforms to align with the SPS Agreement and the international standard-setting bodies.

Another issue is the delineation of authority and legislation between plant quarantine and phytosanitary border controls on the one hand and domestic plant protection and pesticide management on the other hand. The separation of functions between these two groups, common in the former Soviet Union system, may no longer be relevant given that domestic and cross-border control activities for plant protection and quarantine are essentially the same, requiring the same resources and expertise. The problems are compounded, for example, when quarantine activities are taken away from the agriculture ministry and transferred to a unified inspection service that has no scientific expertise.[9]

A single plant health law covering plant health and plant protection with one body implementing all the provisions of the law may be ideal. This would, to the extent possible, avoid duplication as well as administrative anomalies and provide for more efficient use of resources. It would also bring CAREC countries in line with international practices. Table 7 summarizes phytosanitary legislation of CAREC countries. Primary and secondary laws were examined to see if they cover what could be considered the "barest minimum standards"[10] under the IPPC's ISPMs as follows:

(i) ISPM 4—Requirements for the establishment of pest-free areas

(ii) ISPM 5—Glossary of phytosanitary terms

[9] This was seen in the Kyrgyz Republic earlier although the quarantine inspection service was restored to the Ministry of Agriculture and Melioration in 2016.

[10] For purposes of this report, "barest minimum" was defined by the TA 9500 experts to examine the alignment of primary and secondary legislation with the IPPC's ISPMs.

(iii) ISPM 6—Surveillance
(iv) ISPM 7—Phytosanitary certification system
(v) ISPM 11—PRA for quarantine pests
(vi) ISPM 12—Phytosanitary certificates
(vii) ISPM 15—Regulation of wood packaging material in international trade
(viii) ISPM 23—Guidelines for inspection
(ix) ISPM 27—Diagnostic protocols for regulated pests
(x) ISPM 32—Categorization of commodities according to their pest risk

The draft Law on Plant Protection and Quarantine of Afghanistan adopts the principles of the SPS Agreement and mirrors the 1997 IPPC very closely. Approved in 2017, the law provides for the implementation of some important ISPMs, except for ISPMs 15 and 32. The *Pesticides Law* of 2015 is also in force. Azerbaijan has gone one step further in unifying plant health, plant protection, and chemical control into one law. This is not international practice but recognizes that efficient and safe use of pesticides—following good agricultural practices ensures that pesticide residues do not exceed maximum limits and takes into account environmental impact and other adverse effects. The updated *Law on Phytosanitary Control* in 2018 provides for the implementation of important ISPMs, except ISPMs 23 and 32. As regards ISPM 32, a related resolution, the Cabinet Ministers Resolution No. 231 dated 17 June 2016 provides for a unified list of commodities subject to veterinary, phytosanitary, and sanitary control.

Kazakhstan and the Kyrgyz Republic have separate legislation for plant quarantine and plant protection including the use of chemicals against pests.

The *Law of the People's Republic of China on the Entry and Exit Animal and Plant Quarantine* (1992 as amended) is somehow unique where phytosanitary matters are framed without reference to even the original version of the IPPC. There is no mention of risks or of quarantine certificate—although the phytosanitary certificate is an example of a "quarantine certificate." Notwithstanding, the PRC has implemented several ISPMs. Georgia's *Code on Safety of Foodstuffs and Animal Feed, Veterinary Services and Plant Protection* (Law 6155-c of 2014) is firmly based on risk analysis across all three SPS sectors. It was updated in 2017 and provides for the implementation of all ISPMs considered as "barest minimum standards."

Kazakhstan and the Kyrgyz Republic have separate legislation for plant quarantine and plant protection including the use of chemicals against pests. The current *Law on Plant Quarantine* of the Kyrgyz Republic dates from 2015. For Kazakhstan, the *Law on Plant Quarantine* of 1999 has been updated by Ministerial Decree No. 1730 validating the Regulation on Protection of the National Territory against Quarantine Objects and Alien Species 2009.[11] This has been updated in 2017, but important ISPMs have yet to be implemented. As members of the EAEU, Kazakhstan's and the Kyrgyz Republic's phytosanitary

[11] Food and Agriculture Organization of the United Nations (FAO). FAOLEX Database. http://www.fao.org/faolex/results/details/en/c/LEX-FAOC095468/.

import measures follow the EAEU's technical regulations as well as decisions on import requirements and pest lists of EAEU (Table 8).

Mongolia's *Law Regulating Animals and Plant Products Traded Nationwide, Quarantine and Transportation* makes reference to the principle of risk assessment of the SPS Agreement and PRA for phytosanitary but the country has not adopted any ISPMs. The Mongolian *Law on Plant Protection* also covers plant quarantine as well as pesticides but only in very general terms. In Pakistan, the *Plant Quarantine Rules* (1967) and the *Plant Quarantine Act* (1976) provide the basic phytosanitary framework although are not updated to more recently published phytosanitary requirements (FAO and IPPC 2016).

The 2011 *Law about Plant Quarantine* No. 787 in Tajikistan sets out the legal and institutional framework in the field of plant quarantine and includes phytosanitary quarantine measures necessary to protect plants against entry and spread of pests, diseases, and weeds. It is broadly in line with the IPPC (1997 version). Concepts such as PRA are referred to in more detail compared with some other CAREC countries. Turkmenistan's *Law on Plant Quarantine* No. 54-IV of 2009 appears to be most compliant with the SPS Agreement and the IPPC (1997) among the CAREC countries. The terminology for quarantine pests for example, fully reflects the IPPC even though the country has not signed the IPPC and has not initiated WTO accession process. The *Law on Plant Quarantine of Uzbekistan* (No. 9 of 1995) dates from the pre-WTO era and before the IPPC incorporated risk-based principles of phytosanitary control. Draft legislative amendment has yet to provide for the implementation of any ISPMs. Recently, the President of Uzbekistan established the State Inspectorate on Plant Quarantine under the Cabinet of Ministers and decreed additional measures to improve the efficiency of the State Service on Plant Quarantine.

As most CAREC countries have certain commonality in their existing legislation and plant health situation, a cooperative approach to reform and modernization of legal frameworks would be advantageous.

b. Priority Reforms to Plant Health Regulations to Facilitate Trade

There is a general consensus that primary and secondary legislation on plant health must be kept relevant and updated among CAREC countries. Increasing the awareness of policy makers and convincing them to allocate resources are necessary. A checklist to identify which primary phytosanitary legislation require priority for amendments, and assessment of inadequacy of secondary legislation which may have consequences on phytosanitary border management may be undertaken. Secondary phytosanitary legislation should cover the recommended "barest minimum standards" under the IPPC's ISPMs (see section 2.1.3). Adoption of PRAs, pest identification and diagnosis, risk-based inspection services, and technical and legal expertise to support legislative changes will be crucial.

As most CAREC countries have certain commonality in their existing legislation and plant health situation, a cooperative approach to reform and modernization of legal frameworks would be advantageous. Such a cooperative approach will also help them meet the provisions for harmonization and equivalence which are Articles 3 and 4 of the SPS Agreement, respectively.

Table 7: Plant Protection and Phytosanitary Legislation in CAREC Countries

Country	Most Recent Plant Health Instrument	Year of Publication (Latest Amendment)	Adoption of or Alignment with 1997 IPPC	Integrated Plant Health and Internal Plant Protection	Online Source	Other Legislation/ Notes
Afghanistan	Law on Plant Protection and Quarantine	2017	Provides for the implementation of ISPMs 4, 5, 6, 7, 11, 12, 23 but not ISPMs 15 and 32	yes	https://www.wto.org/english/thewto_e/acc_e/afg_e/WTACCAFG12_LEG_2.pdf	Law on Pesticides (2015)—Updated in 2016 Regulation on Import, Distribution and Use of Agriculture Pesticides (2000)
Azerbaijan	Law about Phytosanitary Control No. 102-IIG	2006 (2018)	Provides for the implementation of ISPMs 4, 6, 7, 11, and 12	yes	http://www.fao.org/faolex/results/details/en/c/LEX-FAOC160356/	Pesticides included. The Rules on Phytosanitary Quarantine adopted by the Food Safety Agency in May 2018 provides for the implementation of ISPMs 5 and 15.
People's Republic of China	National People's Congress. Order No. 53. Law of the People's Republic of China on the Entry and Exit Animal and Plant Quarantine	2012 (2016)	...	No	http://www.npc.gov.cn/englishnpc/Law/2007-12/12/content_1383874.htm	
Georgia	Law 6155-Ic. Code on Safety of Foodstuffs and Animal Feed, Veterinary Services and Plant Protection	2014 (2017)	Provides for the implementation of ISPMs (4, 5, 6, 7, 11, 12, 15, 23, 27, and 32) considered barest minimum standards	yes	http://www.fao.org/faolex/results/details/en/c/LEX-FAOC137710/	Law on Pesticides and Agrochemicals (1998)—Updated in 2017
Kazakhstan	Law on Plant Quarantine	1999 (2017)	ISPMs considered barest minimum standards are not yet implemented	No	https://www.wto.org/english/thewto_e/acc_e/kaz_e/WTACCKAZ20_LEG_4.pdf	EAEU Technical Regulations apply. Rules on Protection of the Territory of the Republic of Kazakhstan from Quarantine Objects and Alien Species (2009; updated in 2015)
Kyrgyz Republic	Law on Plant Quarantine	2015	Provides for the implementation of ISPMs considered as barest minimum standards	No	http://www.fao.org/faolex/results/details/en/c/LEX-FAOC161502/	EAEU Technical Regulations apply

continued on next page

Table 7 *continued*

Country	Most Recent Plant Health Instrument	Year of Publication (Latest Amendment)	Adoption of or Alignment with 1997 IPPC	Integrated Plant Health and Internal Plant Protection	Online Source	Other Legislation/ Notes
Mongolia	Law Regulating Animals and Plant Products Traded Nationwide, Quarantine and Transportation	2002	No ISPMs adopted	No	http://www.fao.org/faolex/results/details/en/c/LEX-FAOC167139/	Law on Plant Protection (2007) covers plant quarantine and pesticides in very general terms
Pakistan	Pakistan Plant Quarantine Rules (Pakistan Plant Quarantine Act)	1967 (1976)	...	No	http://www.fao.org/faolex/results/details/en/c/LEX-FAOC004008	Agricultural Pesticides Ordinance 91971
Tajikistan	Law on Plant Quarantine No. 787	2011	Provides for the implementation of ISPMs 5, 6, 7, 12, and 23 of the barest minimum standards	No	https://www.wto.org/english/thewto_e/acc_e/tjk_e/WTACCTJK21A1_LEG_3.pdf	Law on Plant Protection includes pesticides management. Government Provisions on Food Safety Committee allow implementation of ISPMs 4 and 11; Government resolution provides for implementation of ISPM 32.
Turkmenistan	Law on Plant Quarantine	2009	Provides for the implementation of all ISPMs (4, 5, 6, 7, 11, 12, 15, 23, 27, and 32) considered as barest minimum standards		http://www.fao.org/faolex/results/details/en/c/LEX-FAOC105927/	Law on Plant Protection (2016) includes pesticides management
Uzbekistan	Law on Plant Quarantine	1995 (2014)	Current legislation does not adopt ISPMs	No	http://www.fao.org/faolex/results/details/en/c/LEX-FAOC034568/	Law on Protection of Plants Against Pests, Disease and Weeds (2000) Ministerial Decrees covering pesticides

... = no information available, CAREC = Central Asia Regional Economic Cooperation, EAEU = Eurasian Economic Union, IPPC = International Plant Protection Convention, ISPMs = International Standards for Phytosanitary Measures.

Source: Asian Development Bank (compiled from official sources and consultants reports under Technical Assistance 8386 and Knowledge Support Technical Assistance 9500).

Table 8: Technical Regulations of the Eurasian Economic Union Relating to Phytosanitary Measures

Title	Date Published or Notified to WTO	Online Source
Decision of the Customs Union No. 318 on Assurance of Customs Union	18 June 2010	https://www.wto.org/english/thewto_e/acc_e/kaz_e/WTACCKAZ92_LEG_4.pdf
The Common Rules and Standards to Ensure Plant Quarantine on the Customs Territory of the Eurasian Economic Union	30 November 2016	https://gain.fas.usda.gov/Recent%20GAIN%20Publications/WTO%20Notification%20on%20EAEU%20Common%20Phytosanitary%20Rules_Moscow_Russian%20Federation_4-13-2017.pdf
The Common Quarantine Phytosanitary Requirements of the Eurasian Economic Union	30 November 2016	https://gain.fas.usda.gov/Recent%20GAIN%20Publications/WTO%20Notifications%20on%20EAEU%20Phytosanitary%20Requirements_Moscow_Russian%20Federation_4-6-2017.pdf
Draft Amendments to The Common Quarantine Phytosanitary Requirements of the Eurasian Economic Union	3 April 2017	
The Common List of Plant Quarantine Objects of the Eurasian Economic Union	30 November 2016	https://www.tarim.gov.tr/GKGM/Belgeler/Bitki%20Sağlığı%20Hizmetleri/bitki_bitkisel_urun/faaliyet/Bitki_Bitkisel_Urun_Ihracat_158_Sayili_AEK_Kararnamesi.pdf
Draft Amendments to The Common List of Plant Quarantine Objects of the Eurasian Economic Union	3 April 2017	

WTO = World Trade Organization.

Source: Asian Development Bank (compiled from official sources and consultants reports under TA 8386 and KSTA 9500).

CAREC countries may further explore partnership with the European and Mediterranean Plant Protection Organization, the European Union, and other development partners under the World Trade Organization's Standards and Trade Development Facility.

A regional surveillance program for key quarantine pests will need to be coordinated. This is the case of unification of phytosanitary measures in the EAEU. It will require (i) quarantine pest lists for each country determined by pest risk analysis on a provisional basis, pending surveillance; and (ii) a diagnostic capacity for each important quarantine pest. With the prerequisites in place, the next steps would be to (i) prioritize key quarantine pests that pose the greatest threat to the region; (ii) put in place surveillance programs to determine the distribution of these pests—such surveillance programs are best coordinated regionally to share expertise and resources; and (iii) refine quarantine pest lists according to the results of the surveillance.

CAREC countries may further explore partnership with the European and Mediterranean Plant Protection Organization (EPPO), the European Union

(EU), and other development partners under the WTO's Standards and Trade Development Facility.

EPPO has had a leading role in developing user-friendly software systems for pest risk analysis such as the Computer Assisted Pest Risk Analysis (or CAPRA, through the PRACTIQUE project) and has been assisting its members to adopt the software. This is important because ISPM 11 does not provide the methodology for PRA but only the conceptual framework. Hence, to achieve interface between legislation and scientific or laboratory practice, EPPO's continuing support for advanced training on PRA would be very useful. Plant protection experts in the Kyrgyz Republic have already benefited from EPPO's training in CAPRA. Afghanistan, Mongolia, Tajikistan, and Turkmenistan would benefit from becoming members of EPPO, which now includes Azerbaijan, Georgia, Kazakhstan, the Kyrgyz Republic, and Uzbekistan. The Asia-Pacific Plant Protection Commission, of which Pakistan and the PRC are members, is another regional forum for cooperation that promotes regional plant protection systems through improved capacity for pest surveillance, PRAs, and pest risk management.

2.1.4 Animal Health

International trade in live animals and products of animal origin is important to many CAREC economies.

International trade in live animals and products of animal origin is important to many CAREC economies. However, the animal health situation is generally poor and a wide range of OIE-listed animal diseases and zoonoses that affect trade are endemic within the region. Appendix 2 lists such diseases that adversely affect international trade. In most CAREC countries, veterinary legislation is still far from adequate to provide an appropriate level of protection from animal diseases and zoonoses. Primary and secondary laws were examined to check if they cover what could be considered as "barest minimum standards" from the following OIE chapters of the Terrestrial Animal Health Code (2018, hereinafter "OIE Code"):[12]

(i) 1.1 Notification of diseases, infections, and infestations; and provision of epidemiological information

(ii) 1.3 Diseases, infections, and infestations listed by OIE

(iii) 1.4 Animal health surveillance

(iv) 1.5 Surveillance for arthropod vectors of animal diseases

(v) 2.1 Import risk analysis

(vi) 4.1 General principles on identification and traceability of live animals

(vii) 4.2 Design and implementation of identification systems to achieve animal traceability

[12] For purposes of this report, "barest minimum" was defined by the TA experts to examine the alignment of primary and secondary legislation with the chapters of the OIE Terrestrial Animal Health Code (2018), which is the principal reference for WTO members relating to animal health.

(viii) 4.3 Zoning and compartmentalization

(ix) 5.1 General obligations related to certification

(x) 5.2 Certification procedures

(xi) 5.3 OIE procedures relevant to the WTO's SPS Agreement

The review also covered some chapters of Section 5 of the OIE Code, which are crucial to trade as follows:

(i) 5.4 Animal health measures applicable before and at departure

(ii) 5.5 Animal health measures applicable during transit from the place of departure in the exporting country to the place of arrival in the importing country

(iii) 5.6 Border posts and quarantine stations in the importing country)

(iv) 5.7 Animal health measures applicable on arrival

(v) 5.8 International transfer and laboratory containment of animal pathogenic agents

(vi) 5.9 Quarantine measures applicable to non-human primates)

(vii) 5.10 Model veterinary certificates for international trade in live animals, hatching eggs, and products of animal origin

(viii) 5.11 Model veterinary certificate for international movement of dogs, cats, and ferrets originating from countries considered infected with rabies

(ix) 5.12 Model passport for international movement of competition horses

(x) 5.13 Model veterinary certificate for international trade in laboratory animals

Table 9 shows the most recent veterinary legislation in CAREC countries and preliminary checklist of provisions to implement the OIE chapters that are considered "barest minimum standards."

In Afghanistan, the *Animal Health Act* (2016) provides for the implementation of OIE Code Chapters 1.1, 1.3, 1.4, 1.5, and 2.1, but not Chapters 4.1 to 4.3. The law also adopts Section 5 of OIE Code, except for Chapter 5.12.

The *Veterinary Act of Azerbaijan* of 2005 was amended in 2014 and repeals the *Law on Veterinary Medicine* of 1994. It is broadly consistent with OIE standards and requirements while retaining some Soviet-era terminologies. The updated law in 2018 provides for the implementation of OIE Code Chapter 4.1 only. A related law, the *Law on Animal Breeding*, which refers to international standards in preparing breeding passports, is the basis for implementing OIE Code Chapter 4.2. Related primary and/or secondary laws adopt Section 5 of OIE

Table 9: Veterinary-Related Legislation in CAREC Countries

Country	Most Recent Veterinary Instrument	Year (latest amendment)	Available Online Sources
Afghanistan	Animal Health and Veterinary Public Health Act (2012); Animal Health Act	2012 (2016)	https://www.wto.org/english/thewto_e/acc_e/afg_e/WTACCAFG19_LEG_1.pdf
Azerbaijan	Veterinary Act 922-IIQ	2005 (2014)	http://www.fao.org/faolex/results/details/en/c/LEX-FAOC158953/
People's Republic of China	National People's Congress. Order No. 53. Law of the People's Republic of China on the Entry and Exit Animal and Plant Quarantine	2012 (2016)	http://www.npc.gov.cn/englishnpc/Law/2007-12/12/content_1383874.htm
Georgia	Law 6155-Ic. Code on Safety of Foodstuffs and Animal Feed, Veterinary Services and Plant Protection	2014 (2017)	http://www.fao.org/faolex/results/details/en/c/LEX-FAOC137710/
Kazakhstan	Law on Veterinary	2002 (2018)	http://cis-legislation.com/document.fwx?rgn=3142
Kyrgyz Republic	Law on Veterinary Medicine	2014 (2017)	http://agriexchange.apeda.gov.in/marketreport/Reports/Law%20on%20Veterinary%20Medicine%20Notified%20to%20WTO_Moscow_Kyrgyzstan%20-%20Republic%20of_1-26-2016.pdf
Mongolia	New Law on Animal Health	2017	effective from 1 June 2018
Pakistan	Pakistan Animal Quarantine (Import and Export of Animal and Animal Products) Act	1979 (1985)	http://www.fao.org/faolex/results/details/en/c/LEX-FAOC080335/
Tajikistan	Law 674 on Veterinary	2010 (2016)	https://www.wto.org/english/thewto_e/acc_e/tjk_e/WTACCTJK21A1_LEG_5.pdf
Turkmenistan	Law on Veterinary Practice	2014	http://www.fao.org/faolex/results/details/en/c/LEX-FAOC145337/
Uzbekistan	Law on Veterinary	1993 (2015)	

CAREC = Central Asia Regional Economic Cooperation.

Source: Asian Development Bank (compiled from official sources and consultants reports under TA 8386 and KSTA 9500).

Code, except for Chapters 5.3, 5.9, 5.12, and 5.13. The *Law on Veterinary Control* (2005) adopts Chapters 5.1, 5.2, 5.4, 5.5, and 5.7, which are implemented through rules stipulated in the Cabinet Ministers Resolution No. 66 (2009). Resolution No. 66 also provides for OIE Code Chapters 5.10 and 5.11. Presidential Order No. 12 on Application of One Window (2008) and Presidential Order No. 1681 (2017) adopt OIE Code Chapter 5.6. Resolution of Cabinet Ministers No. 255 (2006) reflects OIE Code Chapter 5.8.

Georgia's *Code on Safety of Foodstuffs and Animal Feed, Veterinary Services and Plant Protection* takes into account the country's intention to approximate EU laws on SPS (See Box 2.1). The law, which was updated in 2017 provides for the implementation of OIE Code Chapters 2.1, 4.1, and 4.2. In addition, government resolutions provide for the implementation of OIE Code Chapters 1.1, 1.3–1.5, and 4.3. Government Decree No. 429 (Rule of Carrying Out the Phytosanitary Border Quarantine and Veterinary Border-Quarantine Control) and No. 430 (Veterinary Certification of Export Products Subject to Veterinary Control) adopt Section 5 of the OIE Code.

Georgia's *Code on Safety of Foodstuffs and Animal Feed, Veterinary Services and Plant Protection* takes into account the country's intention to approximate EU laws on SPS.

The *Law of the People's Republic of China on the Entry and Exit Animal and Plant Quarantine* referred to in Table 7 is the primary law for veterinary SPS measures. This law in addition to three others—the *Law on Animal Production* (2006),[13] the *Law on Quality and Safety of Agricultural Products* (2006),[14] and the *Law on Animal Epidemic Prevention* (2008)[15]—is the most complete and OIE-consistent package of veterinary primary legislation within the CAREC region. Especially notable is the attention given to risk assessment. Together with the comprehensive set of secondary legislation, these could be a model for the rest of the CAREC region to follow.

Kazakhstan's *Law on Veterinary* was amended in 2018 and it provides for the adoption of all important OIE Code chapters considered as barest minimum standards. As a member of the EAEU, the common legal framework of the EAEU applies in implementing veterinary and sanitary measures in Kazakhstan.[16] The primary law also adopts OIE Code Chapters 5.4 to 5.7. Numerous secondary legislation adopt the entire Section 5 of the OIE Code, with Decision No. 607 on the Forms of Unified Veterinary Certificates for Goods Under Control to the EAEU Customs Territory from Third Countries (2011) reflecting OIE Chapter 5.9

[13] National People's Congress. Order of the President of the People's Republic of China No. 45. The Animal Husbandry Law of the People's Republic of China. 1 July 2006. http://www.npc.gov.cn/englishnpc/Law/2007-12/13/content_1384134.htm

[14] National People's Congress. Order of the President of the People's Republic of China No. 49. The Law of the People's Republic of China on Quality and Safety of Agricultural Products. 1 November 2006. http://www.npc.gov.cn/englishnpc/Law/2008-01/02/content_1387986.htm.

[15] National People's Congress. Order of the President of the People's Republic of China No. 71. The Law of the People's Republic of China on Animal Epidemic Prevention. 1 January 2008. http://www.npc.gov.cn/englishnpc/Law/2009-02/20/content_1471591.htm.

[16] Commission of the Customs Union. Agreement of the Customs Union on Veterinary and Sanitary Measures. 11 December 2009. St. Petersburg. https://ec.europa.eu/food/sites/food/files/safety/docs/ia_eu-ru_sps-req_agreement_sanitary_measures_vet_en.pdf.

while Decision No. 317 on the Application of Veterinary and Sanitary Measures in the Customs Union (2010) provides for OIE Code Chapters 5.11 and 5.12.

Earlier legislation of the Kyrgyz Republic make reference to risk assessment and other principles derived from the WTO. Epizootic zoning is provided under the Governmental Decree No. 555 of 2015.[17] The *Law on Veterinary Medicine* (2017) provides for implementation of OIE Code Chapters (except Chapters 1.3 and 2.1) that are considered barest minimum. Together, the *Law on Veterinary Medicine*, the Treaty of the EAEU, and numerous decisions of the Commission of the Customs Union and the Eurasian Economic Commission (EEC) govern the adoption of Section 5 of the OIE Code, except for Chapters 5.8 and 5.11 to 5.13. Chapter 5.8 is adopted through the rules for the organization of the laboratory studies approved by the EEC (2017). Chapter 5.12 is adopted through the unified veterinary and sanitary requirements of the EAEU approved by a decision of the Commission of the Customs Union (2010).

The *Law Regulating Animals and Plant Products Traded Nationwide, Quarantine and Transportation* (2002) referred to in Table 7 together with the *Law Protecting Animal Health and the Gene Pool* (originally dating from 1993) together represent Mongolia's primary veterinary legislation. Reflecting the strong nomadic traditions, the veterinary law follows OIE standards although the PVS mission in 2012 noted the need for serious reforms (OIE, Mongolia Update Legislative Developments). Government guidelines implement the barest minimum standards of the OIE Code. In December 2017, the Parliament approved the new *Law on Animal Health*, which took effect 1 June 2018.

As with the plant health law, the Pakistan *Animal Quarantine (Import and Export of Animals and Animal Products)* Act of 1979 predates the WTO SPS Agreement. The Act, which was amended in 1985 regulates import, export and quarantine of animals and animal products in Pakistan including certification procedures. The law adopts Section 5 of the OIE Code and reforms are planned to reflect the provisions of the WTO SPS Agreement and OIE Code.

The Tajikistan *Law on Veterinary* (No. 674 of 2010) has limited provision for risk assessment and do not give full authority to the state veterinary service. A PVS evaluation was conducted in 2017, which found that Tajikistan legislation and a number of government orders implement OIE's barest minimum standards, particularly Section 5 of the OIE Code except Chapter 5.5.

The *Law on Veterinary Practice* of Turkmenistan is well structured and establishes goals, objectives, and powers of the state in veterinary health, such as structure, competencies, rights, and responsibilities of the state veterinary service, and other general provisions for the regulation of veterinary control, including the protection of animal health and veterinary public health. The law adopts Chapters 5.1 to 5.6 of OIE Code.

The *Law on Veterinary Practice* of Turkmenistan is well structured and establishes goals, objectives, and powers of the state in veterinary health, such as structure, competencies, rights, and responsibilities of the state veterinary service, and other general provisions for the regulation of veterinary control, including the protection of animal health and veterinary public health.

[17] FAO. FAOLEX Database. Governmental Decree No. 555. Validating the Regulation on Veterinary Zoning of the National Territory in Relation to Infectious Animal Diseases. http://www.fao.org/faolex/results/details/en/c/LEX-FAOC161186/.

Box 2.2: Guidelines for Evaluation of Veterinary Legislation

Veterinary legislation should, at a minimum, provide a basis for competent authorities to meet their obligations as defined in the World Organisation for Animal Health (OIE) Terrestrial Animal Health Code (hereafter OIE Code) and the relevant recommendations of the Codex Alimentarius Commission.

A first step in reforming legislation is to conduct an inventory of current veterinary legislation in each Central Asia Regional Economic Cooperation country and assess the content of that legislation. This includes the following statements with regard to animal health and veterinary public health[a] (in accordance with Section 6 of the OIE Code, Chapter 3.4):

(i) **Competent authorities**. The powers of state veterinary services in all fields of animal health and veterinary public health are sufficient and clearly defined for the implementation of veterinary legislation at central, regional, district, and all other levels.

(ii) **Contents of veterinary legislation**. Definition of sources, levels, and conditions of funding required for the implementation of official veterinary controls in all fields covered by veterinary legislation in the country and at the border.

(iii) List of notifiable diseases complies with that of the OIE (as in the case of the Kyrgyz Republic, Mongolia, Tajikistan, and Uzbekistan).

As a follow-up to an evaluation of the Performance of Veterinary Services (PVS) using the OIE PVS Tool, and at the request of members, the OIE conducts missions to help governments that wish to modernize their national veterinary legislation and thereby help the veterinary services meet the OIE standards. After an initial "identification" mission, the country may request a longer-term collaboration with the OIE, under a formal agreement, with the objective of modernizing the national veterinary legislation.

[a] Veterinary Public Health was defined by the World Health Organization consultation on "future trends in veterinary public health" held in 1999 as "the sum of all contributions to the physical, mental and social well-being of humans through an understanding and application of veterinary science." http://apps.who.int/iris/bitstream/handle/10665/42460/WHO_TRS_907.pdf?sequence=1.

Source: World Organisation for Animal Health. http://www.oie.int/fileadmin/Home/eng/Support_to_OIE_Members/docs/pdf/A_Update_2012_Chapter_3.4._Vet_legislation.pdf and http://oie.int/fileadmin/pdfs/Overview_of_the_VLSP_Electronic_version.pdf

The Uzbek *Law on Veterinary* of 1993 (amended in 2009) does not allow an appropriate level of protection to be established against internal and external risks to animal health and veterinary public health or compliance with OIE. In December 2015, the President of Uzbekistan signed a new veterinary law (UzDaily.com 2016), which provides for the implementation of only OIE Code Chapter 1.1. Government Resolution No. 139 on import and export requirements of products of animal origin subject to veterinary control adopted Section 5 of the OIE Code, except for Chapters 5.3, 5.5, 5.8, 5.9, and 5.13.

The OIE PVS Pathway includes guidance on developing veterinary legislation, summarized in Box 2.2.[18] So far, PVS Pathway missions to Azerbaijan, Kazakhstan,

[18] World Organisation for Animal Health. The OIE PVS Pathway. http://www.oie.int/support-to-oie-members/pvs-pathway/. Only OIE-certified PVS experts can carry out external PVS evaluations of countries' veterinary services.

the Kyrgyz Republic, Mongolia, and Tajikistan indicate that veterinary legislation has received attention.[19]

2.1.5 Food Safety

The regulatory assessment of food safety in the CAREC region starts with information on basic legal criteria for safe/unsafe food (Box 2.3), hazard analysis and critical control points (HACCP) (Box 2.4), and the *gosudarstvennyy standart* (state standard) or GOST and Sanitary Rules and Norms or SanPin (Box 2.5). A country cannot require mandatory HACCP compliance for imports so long as HACCP is not mandatory in the national legislation. Once HACCP compliance has become mandatory in national food safety legislation, CAREC countries can impose the same demands on imported goods. In this regard, CAREC legislation were examined to determine whether HACCP and certification are mandatory.

The *Law on Food Safety* (2016) of Afghanistan has no direct provision that makes HACCP mandatory but includes reference to risk and hazard management. Certification is required for all foodstuff produced, processed, imported to, exported from, and stockpiled or supplied to Afghanistan. The *Law of the Republic of Azerbaijan on Foodstuffs* published on 17 November 2013 does not make reference to HACCP or a HACCP-like system for process control according to the principles of Codex. The amended law (2018), while not directly providing for mandatory HACCP, requires registration of entities and individuals participating in all stages of the food supply chain, following the farm-to-fork approach. Mandatory certification is also applied to imported food products.

The regulatory assessment of food safety in the CAREC region starts with information on basic legal criteria for safe/unsafe food.

Box 2.3: Legal Definitions and Criteria for Safe Food

1. Food that is unsafe must not be placed on the market, or must be withdrawn from the market if found to be unsafe.

2. Food is unsafe if it is:

   (i) injurious to health because of contamination with microbiological, chemical or physical hazards; and

   (ii) unfit for human consumption because the food is unacceptable for human consumption according to its intended use, it is contaminated, or spoiled.[a]

[a] Further clarification of unsafe or unfit for human consumption:
(a) misleading information provided to consumer (through label or advertising); (b) defective or damaged packaging; and (c) expired according to label.
Such provisions are necessary in order to move away from the circular definition of food safety as "conformity with the requirements of (technical regulations)" in parallel with end-product certification.

Source: Food Standards Agency. General Food Law. https://www.food.gov.uk/business-guidance/general-food-law.

[19] World Organisation for Animal Health. OIE PVS Pathway for Effective Veterinary Services: PVS Gap Analysis Missions. http://www.oie.int/support-to-oie-members/pvs-gap-analysis/status-of-missions/.

Box 2.4: General Information about Hazard Analysis and Critical Control Points

Hazard analysis and critical control points (HACCP) is a scientific approach and methodology to identify root causes of potential food safety hazards and take the necessary corrective actions to control or prevent these hazards. Prerequisite programs[a] provide the conditions for the manufacturing of a safe product. Basically, HACCP is an administrative exercise. If through this exercise, it appears that a company has to make modifications in the infrastructure, the prerequisite programs have not been implemented correctly. HACCP is the next phase of implementation after the prerequisite programs.

There is a wide misconception that implementing HACCP is expensive and beyond the budget of food plants in developing countries. The major part of any investment in HACCP involves upgrading to comply with the requirements of the prerequisite programs, such as improving the infrastructure, applying proper cleaning and sanitation programs, monitoring effectiveness of cleaning and sanitation, and implementing pest control systems.

In implementing the prerequisite programs, the Codex Guideline for General Principles of Food Hygiene CAC/RCP 1-1969, sections IV to X, should be followed. For specific product categories, specific hygiene guidelines are applicable. However, Codex does not need to be cited in legislative provisions for HACCP because HACCP is already underpinned by the application of Good Hygienic Practices prerequisites.

[a] Prerequisite programs are the universal steps or procedures that control the operational conditions within a food establishment. For sanitary and phytosanitary purposes, the most important are Good Agricultural Practice and Good Manufacturing Practice for primary production and food processing/manufacturing, respectively. Good Hygienic Practices is another underpinning prerequisite program.

Source: Food and Agriculture Organization of the United Nations. 2003. *Manual on the Application of the HACCP System in Mycotoxin Prevention and Control.* Rome. http://www.fao.org/docrep/005/y1390e/y1390e00.htm.

"Food safety standards shall be standards for mandatory execution. No mandatory food standards other than food safety standards may be developed."

The text of the PRC's *Food Safety Law* (2015) has been consolidated with amendments from the original legislation (2009). Food safety principles are not stated directly. Article 25 significantly departs from a compositional approach to food standards by stating that "Food safety standards shall be standards for mandatory execution. No mandatory food standards other than food safety standards may be developed." Article 26 then lists the content of food safety standards according to limits for microorganisms, contaminants, and nutritional requirements for vulnerable consumers and labeling and recognizes the importance of hygienic requirements for food processing. The Administrative Provisions on Sanitary Registration and Enrollment of Export Food Producing Enterprises[20] under Article 33 of the Food Safety Law states that unless an entity plans to export food, HACCP is not required under the PRC law, but it is encouraged. For imports of food, all products should conform with corresponding PRC food standards, which are rather high for imports. The *Law of the PRC on Agricultural Product Quality and Safety* (2006) provides

[20] China Inspection and Quarantine Services. Administrative Provisions on Sanitary Registration of Export Food Producing Enterprises. http://en.ciqcid.com/Laws/Department/sp/45910.htm.

Box 2.5: GOST and SanPin

Gosudarstvennyy standart (state standards, referred to as GOST) were originally developed by the governments of the former Soviet Union as part of Soviet standardization strategies. After the disintegration of the former Soviet Union, GOST acquired a new status as regional standards for the Commonwealth of Independent States (CIS) but with each country having its own. Goods that did not conform to GOST were generally not allowed on the market.

Sanitary Rules and Norms of Russia (referred to as SanPin) are types of sanitation and hygienic regulations containing mandatory requirements for safety and identification that are applied in border control for public health protection. SanPin set the requirements while GOST provides the standards to test compliance with the SanPin.

In its most extensive form, GOST included over 20,000 titles used considerably in conformity assessment activities in 12 countries. Serving as the regulatory basis for government and private sector certification programs throughout the CIS, GOST covered food processing among other industries. What puts GOST at variance with the internationally recognized hazard analysis and critical control points (HACCP) system is that it provides end-product certification whereas HACCP is a process-based system to minimize the risk of hazards entering the food chain in the first place. Furthermore, GOST traditionally contained food standards in which descriptive, compositional standards predominated over risk-based criteria and such risk-based standards tended not to reflect sanitary and phytosanitary (SPS) norms currently prevailing (e.g., standards for obsolete pesticides). SanPin controls applied at the borders were more "science-based" but nonetheless often mirrored equivalent standards in GOST.

Six CAREC countries adopted all or some of GOST in addition to their own nationally developed standards: Azerbaijan, Kazakhstan, the Kyrgyz Republic, Tajikistan, Turkmenistan, and Uzbekistan.

However, as the Eurasian Economic Union (EAEU) evolved its current institutions, and consequent on the Russian Federation joining the World Trade Organization (WTO), the inconsistencies between the approach to SPS controls exemplified by GOST on the one hand and WTO norms on the other have been substantially reduced:

(i) A much-reduced number of technical regulations on SPS[a] are now the source of import rules in the SPS sectors (including phytosanitary measures) with abolition of GOST itself.

(ii) The Kyrgyz Republic adopted the *Law on Technical Regulation* (2011) that sets the basis for "compulsory requirements" for trade of produce, adopting the term "compulsory" from the WTO Agreement on Technical Barriers to Trade (TBT Agreement).[b] The amendment to this law in 2015 has provisions for the "mandatory requirements for pesticides, veterinary products and foodstuffs" in the TBT sense even though these are clearly SPS measures.[c]

(iii) The technical regulations are administered by the Commission of the EAEU and apply uniformly in all member states, but national legislation is still needed to implement and enforce them.

(iv) The dual system of GOST for market access and SanPins for border controls has consequently been abolished, at least for food products.

(v) There has been a gradual move away from descriptive and compositional indicators required for conformity with the standards toward risk-based criteria but this process is very much incomplete.

(vi) For companies registered for trading into the EAEU, or exporting to the EAEU, certificates of conformity (end-product testing) are usually only required on initial submission of samples of goods to be traded.

continued on next page

Box 2.5 *continued*

(vii) Countries of the former Soviet Union that are not in the EAEU, together with Mongolia which had adopted the Soviet approach to trade standards, have reformed GOST to different degrees. Companies based in countries outside the EAEU may find it difficult to register in the EAEU. More generally, the partial retention of descriptive criteria in current EAEU technical regulations still pose barriers to trade. Mandatory certification of conformity assurance to end-product specifications still persists to a varying degree in non-EAEU countries that inherited GOST.

[a] The Russian Federation was allowed to retain the use of Technical Regulations for SPS measures in spite of technical regulations and SPS being mutually exclusive according to fundamental provisions of WTO agreements.
[b] Food and Agriculture Organization of the United Nations (FAO). FAOLEX Database. Law No. 67 on Technical Regulation. http://www.fao.org/faolex/results/details/en/c/LEX-FAOC132183/.
[c] FAO. FAOLEX Database. Law No. 230 amending Law No. 67 on Technical Regulation. http://www.fao.org/faolex/results/details/en/c/LEX-FAOC161074/.

Source: Food and Agriculture Organization of the United Nations. 2003. *Manual on the Application of the HACCP System in Mycotoxin Prevention and Control*. Rome. http://www.fao.org/docrep/005/y1390e/y1390e00.htm.

very general guarantees on the quality and safety of agriculture products to maintain the health of the general public. In Georgia, HACCP has been made mandatory but with some exceptions under the *Amended Code on Safety of Foodstuff and Animal Feed, Veterinary Services and Plant Protection* (2017). The law provides that the government establish a list of foodstuff and animal feed production and processing activities for which HACCP requirements are obligatory.

"For production that meets the requirements of this Technical Regulation, food business operators should organize, implement and maintain a system of production control based on the following principles."

Kazakhstan's *Law on Safety of Foodstuffs* (2016) defines "hazardous foodstuff" as "products, use of which might result in unacceptable risk for human life and health and the environment," but Article 12 (requirements for food safety) indicates that food safety shall be provided inter alia by "assessment of conformity of food products to the requirements established by the legislation of the Republic of Kazakhstan on technical regulation." It makes no reference to HACCP but Article 19 requires export food products to meet the requirements of the importing country. However, as a founding member of the EAEU, the key food safety instrument is the Technical Regulation of the EAEU on Food Safety (TR TS 021/2011), regulating food trade between member states of the EAEU.[21] The technical regulation makes reference to mandatory application of HACCP, but at the same time cites a general requirement for end-product conformity assessment based on risk. Certification of conformity assurance may only be required upon first registration of a particular product.

The nearest equivalent to a food safety law in the Kyrgyz Republic is *Law No. 88 Technical Hygiene of Processing Foodstuffs* (2013), which states that "For production that meets the requirements of this Technical Regulation, food business operators should organize, implement and maintain a system

[21] USDA Foreign Agricultural Service. Global Agricultural Information Network. Customs Union Technical Regulation on Food Safety. https://gain.fas.usda.gov/Recent%20GAIN%20Publications/Customs%20Union%20Technical%20Regulation%20on%20Food%20Safety_Moscow_Russian%20Federation_23.05.2012.pdf.

of production control based on the following principles," meaning hygiene principles without specific mention of HACCP. There are other Kyrgyz legislative instruments relevant to food safety, including *Law No. 86 on Labelling of Foodstuffs*[22] and *Law No. 230 Amending Law No. 67 on Technical Regulation*, which is applicable to "elaboration, validation and enforcement of the mandatory requirements for veterinary drugs, pesticides and foodstuffs."[23] Technical Regulation TS 012/2011 of the EAEU also applies to the Kyrgyz Republic. In both Kazakhstan and the Kyrgyz Republic, new food safety laws are being considered.

Without specifically stating the basic legal principles of food safety, the Mongolian *Food Law* (2012) does provide a somewhat modern approach to food safety with reference to hygiene and good manufacturing practice, and without reference to conformity assurance. However, it does not mention risk assessment, and HACCP is covered but not mandatory. The *Food Law* 2012 definitions do not match those of Codex Alimentarius and, in some cases, contradict the definitions used in the *Law for Ensuring Safety of Food Products* (2012). The definitions in both laws may need to be rewritten and harmonized with Codex and inspection by the competent authorities must be risk-based and assessed for effectiveness of the food safety management.

In Pakistan, food safety standards were first established and published in the *Pure Food Law* of 1963 (amended in 2007). It is the only federal legislation and is the basis of existing trade-related food quality and safety legislative framework in the country. Some of the provinces, most notably the Punjab, have more up-to-date and relevant legislation.

In Pakistan, food safety standards were first established and published in the *Pure Food Law* of 1963 (amended in 2007). It is the only federal legislation and is the basis of existing trade-related food quality and safety legislative framework in the country.

Tajikistan's *Law on Quality and Safety of Food 2012* makes reference to the WTO SPS Agreement and is based on principles (Article 5) that echo the approach to food law in the EU, including producer responsibility, risk assessment, precautionary principle, and the food chain. Articles 10 and 11 explicitly state the basic principles of food safety law, and HACCP is mandatory. In Turkmenistan, the *Law on Quality and Safety of Foodstuffs* is very similar in approach to the equivalent law in Tajikistan. In the updated law in 2015, HACCP is not adopted but legal entities and individual entrepreneurs are obliged to determine critical control points at the production stages of food in places with a likely occurrence of risks to human life and health. Certification is required for all products manufactured in or imported into Turkmenistan. In Uzbekistan, *Law 483-1 on Quality and Safety of Foodstuffs* (originally 1997) is one of the less reformed applicable laws in the CAREC region. There is no reference to basic food safety law principles or risk assessment and no direct or indirect reference to HACCP even with the 2017 updated legislation.

In summary, the manner of and extent to which CAREC countries' food safety laws adopt basic food safety legal principles, risk-based approach to food safety,

[22] FAO. FAOLEX Database. Law No. 86 on Labeling of Foodstuffs (in Russian). http://www.fao.org/faolex/results/details/en/c/LEX-FAOC132267/.

[23] FAO. FAOLEX Database. Law No. 230 Amending Law No. 67 on Technical Regulation (in Russian). http://www.fao.org/faolex/results/details/en/c/LEX-FAOC161074/.

and mandatory HACCP vary considerably. These must be addressed according to country-specific circumstances. For instance, other laws or technical regulations—certification and standardization—operate in parallel so that for countries still requiring end-product certification of conformity assessment, existing laws on food safety might not present the full picture of food regulation. Some flexibility will likewise be needed in making food safety laws fully compatible with the SPS Agreement and Codex. Several CAREC countries need to address the legal basis for risk-based food safety inspections with consequent lack of implementation through import requirements in secondary legislation (Table 10).

2.2 Assessment of Laboratory Capacity

2.2.1 Accreditation

In the CAREC region, most of the existing national accreditation bodies (typically the national standards authority or committee) may not be recognized internationally. To obtain international accreditation, laboratories would have to be accredited by a foreign accreditation body (Box 2.6).

In the CAREC region, most of the existing national accreditation bodies (typically the national standards authority or committee) may not be recognized internationally.

2.2.2 Plant Health Laboratories

a. Overview

The governing principle for phytosanitary measures consistent with the SPS Agreement is that they should relate only to regulated pests (quarantine pests and non-quarantine regulated pests) of specified regulatory status and of defined taxonomic identity.

For instance, with some pests, identification to genus may be sufficient (e.g., fruit flies in the genus *Bactrocera*) because a country may lack all species in the genus and all species could be of economic importance. With leaf miners in the genus *Liriomyza* on the other hand, some species are more widely distributed than others, so some species might already be present in the national territory. For fungal and bacterial plant pathogens, some species in a genus might not be pathogenic to plants at all, and there are likely to be host specificities. In the extreme case, a quarantine pest is defined by reference to a lower taxonomic category such as a subspecies, strain, or pathotype, hence, the importance of diagnostic and identification technology appropriate to the pest organisms in question.

Unfortunately, laboratory capacity for phytosanitary issues appear to be the least developed of the three SPS sectors in the CAREC region. There are two problems underlying this situation. First, laboratories lack the diagnostic capacity particularly to detect and identify fungi, bacteria, phytoplasmas, and viruses that cannot be reliably diagnosed by culturing and/or microscopy as reported

Table 10: Primary Food Laws in CAREC Countries and Status of Hazard Analysis and Critical Control Points

Country	Most Recent Instrument	Year (latest amendment)	Food Safety Principles	Product Certification Required for Placing Food on Market	Risk Assessment for Interventions	Reference to HACCP or HACCP-Like System	Available Online Source
Afghanistan	Law on Food Safety	2016	Yes	Yes, required for all foodstuff produced, processed, imported to, exported from, stockpiled or supplied to Afghanistan.	Yes	No	
Azerbaijan	Law of Foodstuffs	2013 (2018)	Yes	Yes, mandatory certification is applied to imported food products.	No	No direct reference to HACCP but requires registration of entities and individuals participating in all stages of the food supply chain, following the farm-to-fork approach	
People's Republic of China	Food Safety Law (consolidated)	2015	Indirectly	No	Yes	In regulations, required for export	https://www.hfgip.com/sites/default/files/law/food_safety_-_16.02.2016.pdf
Georgia	Code on Safety of Foodstuff and Animal Feed, Veterinary Services and Plant Protection	2014 and updated in 2017	Yes	Yes	No	Provides for mandatory HACCP with some exceptions. Government establishes a list of foodstuff and animal feed production and processing activities for which HACCP requirements are obligatory.	
Kazakhstan	Law on the Safety of Foodstuffs	2009 (amended 2016)	Indirectly	Only on registration for EAEU producers	Yes	No	https://ec.europa.eu/food/sites/food/files/safety/docs/ia_eu-ru_sps-req_kz_law_301_food_safety_20070721_en.pdf
Kyrgyz Republic	Law No. 88 Technical Hygiene of Processing Foodstuffs	2013	No	Only on registration for EAEU producers	Risk (not risk assessment) is mentioned in legislation	Indirectly	http://www.fao.org/faolex/results/details/en/c/LEX-FAOC132265/[a]

continued on next page

Table 10 *continued*

Country	Most Recent Instrument	Year (latest amendment)	Food Safety Principles	Product Certification Required for Placing Food on Market	Risk Assessment for Interventions	Reference to HACCP or HACCP-Like System	Available Online Source
Mongolia	Law for Ensuring Safety of Food Products; Food Law	2012	Indirectly	No	No	Indirectly	
Pakistan	Pakistan Pure Food Laws	1963 (2007)	No	...	No	No	
Tajikistan	Law No. 890 on the Quality and Safety of Food	2012	Yes	Yes	Yes	Mandatory	https://www.wto.org/english/thewto_e/acc_e/tjk_e/WTACCTJK24A2_LEG_1.pdf
Turkmenistan	Law 105 on Safety and Quality of Foodstuffs	2014 (2015)	Yes	Yes, required for all products manufactured in Turkmenistan or imported into Turkmenistan	Yes	HACCP is not adopted but legal entities and individual entrepreneurs are obliged to determine critical control points at the stages of production of food raw materials and foodstuffs in places with likely occurrence of the risks that can pose a threat to human life and health.	
Uzbekistan	Law 483-1 on Safety and Quality of Foodstuffs	1997 (2017)	No	Mandatory	No	No	http://www.fao.org/faolex/esult/details/en/c/LEX-FAOC081614/[a]

CAREC = Central Asia Regional Economic Cooperation, EAEU = Eurasian Economic Union, HACCP = hazard analysis and critical control points.

[a] Available in Russian only. For available information on Georgia, see Table 7.

Source: Asian Development Bank (compiled from official sources and consultants reports under TA 8386 and KSTA 9500).

Box 2.6: Accreditation of Laboratories and Certification of Conformity

A laboratory is accredited when it is independently recognized as competent to issue test certificates or certificates of conformity according to a recognized standard.

The international standard for laboratory accreditation is ISO 17025—General requirements for the competence of testing and calibration laboratories—which specifies the general requirements to carry out tests and/or calibrations, including sampling. Accreditation under ISO 17025 applies to specific tests submitted for accreditation, and not to laboratory practices in general. This principally involves submitting standard operating procedures for all relevant operations according to the predefined scope of the accreditation. In addition, normative standards for laboratory management must be met (ISO 17025 incorporates ISO 9001).

The national accreditation body itself should be recognized internationally for the accreditation it offers. International accreditation in sanitary and phytosanitary matters is necessary for regulatory action on the basis of a test result to have legal validity and to be accepted by trading partners. If regulatory action is taken, e.g., refusal of entry of goods, on the basis of a test result from a non-internationally accredited laboratory, the owners of the goods could challenge the action and the test result.

Source: International Organization for Standardization. ISO/IEC 17025:2005. https://www.iso.org/standard/39883.html.

below. Second, information is imperfect as to what pests are to be the target of phytosanitary border inspections. The first pest lists for the EAEU appeared in 2016, subsequently updated[24] with separate lists for "A1" pests (absent from the entire territory of the EAEU) and "A2" pests (limited distribution in EAEU). However, these should be subject to scrutiny because systematic pest surveillance in the CAREC region was last carried out in 2004 with support from FAO. CAREC countries outside the EAEU lack reliable lists of quarantine pests—the EAEU lists being the best guide, at least for countries of the former Soviet Union. Nonetheless, a listed pest is not necessarily a quarantine pest for a particular territory.

CAREC countries outside the EAEU lack reliable lists of quarantine pests—the EAEU lists being the best guide, at least for countries of the former Soviet Union.

The other aspects of laboratory infrastructure to consider are basic laboratory accommodation and budgetary provision in particular. The laboratory assessment looked at the availability of budget for expensive consumables such as reagents, standards, primers, and disposable tubes, and also whether there were plans for testing a certain number of samples on a monthly or yearly basis. In fact, only a laboratory using relatively sophisticated but expensive techniques (in terms of consumables) such as enzyme-linked immunosorbent assay (ELISA) or polymerase chain reaction (PCR) is likely to have such a plan. With the exception of Kazakhstan and the PRC, no CAREC phytosanitary laboratory is accredited internationally but some are accredited nationally to ISO 17025.

[24] Table 7 gives reference sources for these lists where these lists are discussed in more detail with application to the Kyrgyz Republic (Box 2.2).

b. Assessment of Diagnostic Capacity

Underlying the conclusions and recommendations are the following assertions. First, advanced laboratory capacity at border inspection posts is neither desirable nor necessary as (i) the risk of quarantine pests escaping from fruit, vegetables, and other products intended for consumption or processing while in transit from the border inspection post to inland testing station is very low; (ii) the risk of escape of quarantine pests and regulated quarantine pests (plant pathogens) from dormant planting material in similar circumstances is even lower; and (iii) multiple laboratories at borders would crowd out resources including the high level of diagnostic expertise available (for example, molecular diagnostics), which is thus best concentrated at a single inland laboratory. Second, the required "laboratory" at border inspection posts is actually an inspection and sampling facility. Third, special considerations apply to planting material (germplasm).

None of the CAREC countries assessed[25] had basic capacity to protect from quarantine pests beyond relatively easy-to-identify insects and a few plant diseases by symptoms or by morphology of the causal fungi. The Kyrgyz Republic has been able to upgrade phytosanitary capacity in the two main locations (Bishkek and Osh) with external support; but at the time of publication of this report, the new facilities have yet to be commissioned. Laboratory capacity in Georgia across the SPS sectors has improved, largely through activities connected with the Biological Threat Reduction Program of the United States (US).[26] The main laboratory of the Ministry of Agriculture has been modernized and upgraded but, the improvements so far relate mainly to the food safety and veterinary fields (Ministry of Agriculture of Georgia 2015). However, the Institute of Plant Immunity in Kobuleti has capacity for PCR as a result of another externally funded project.[27] In some countries, identification of genus of nematodes has been achieved but this may be inadequate for valid regulatory action. Capacity to detect and identify viruses and phytoplasmas is almost lacking entirely.

In some countries, identification of genus of nematodes has been achieved but this may be inadequate for valid regulatory action.

Little attention to phytosanitary diagnostic capacity is partly due to very recent emergence of horticulture in most CAREC countries (except Tajikistan and Uzbekistan) and skewed focus on animal health because of the region's long

[25] Covers Azerbaijan, Georgia, Kazakhstan, the Kyrgyz Republic, Mongolia, Tajikistan, Turkmenistan, and Uzbekistan.

[26] The Biological Threat Reduction Program is a part of the Department of Defense Cooperative Threat Reduction Program (also known as the Nunn-Lugar Program) of the US, which was launched to secure and dismantle weapons of mass destruction and their associated infrastructure in the states of the former Soviet Union. The Biological Threat Reduction Program aimed to protect the US from biological risk posed by facilities, which were directly and/or indirectly involved in biological weaponry programs of the former Soviet Union and were inherited by countries after the Soviet Union's collapse. According to available information on the compilation of this report, among countries of the CAREC region, the Biological Threat Reduction Program of the Defense Threat Reduction Agency was known to be active in Azerbaijan, Georgia, Kazakhstan, and Uzbekistan.

[27] Institute of Plant Immunity and Food and Environment Research Agency. Building Capability for Improving Agricultural Plant Health across Georgia through UK Assistance and Cooperation. Joint presentation. https://www.unog.ch/80256EDD006B8954/(httpAssets)/084CF27DA25D74C9C125762400531FAE/$file/BWC_MSP_2009_MX-Statement-090826-PM-Georgia-UK.pdf.

tradition of animal husbandry and veterinary services. There are, however, opportunities for export trade in fruits and vegetables as well as high value supply to the domestic market, given rising incomes. It is important, therefore, to invest in improving phytosanitary diagnostic services going beyond the basic biosecurity requirement. For instance, the fertile Fergana Valley, an area shared between the Kyrgyz Republic, Tajikistan, and Uzbekistan, is recognized for its potential for intensive fruit and vegetable production. In addition, the reopening of the border crossing between Uzbekistan and the Kyrgyz Republic in 2017 at Dostuk (Osh Oblast) creates potential for high volume trade in these commodities.

An inventory of necessary phytosanitary laboratory equipment is listed in Appendix 1.1. There is no formula for determining the number of phytosanitary laboratories in relation to population or geographic areas. The intention is to aim for one laboratory for each country with basic capacity for all essential diagnostic facilities to service phytosanitary border operations and surveillance for quarantine pests.

Planning at the outset for laboratories outside and in addition to a central laboratory within a country could undermine the high level of expertise—which is better concentrated in a single location. Some countries may have border or provincial laboratories but these are usually plant-clinic-supporting facilities devoted to serving farmers with their ordinary non-quarantine pest problems.

There is no formula for determining the number of phytosanitary laboratories in relation to population or geographic areas.

The central laboratory in Kazakhstan plans to install PCR while the two main phytosanitary laboratories in the Kyrgyz Republic will have advanced diagnostic capacity. But at present no phytosanitary laboratory has more than microscopy and basic microbial culturing in use. Existing microscopes—mostly Russian with excellent optics (although some may be obsolete)—have to be assessed for adaptability to special purposes (e.g., fluorescence, digital output) and for serviceability, when funds become available for upgrading.

Some CAREC countries have the financial resources to upgrade their phytosanitary laboratory capacity in the form of buildings, equipment, staff training, and maintenance costs. In this regard, some recommendations are as follows:

(i) Create awareness of the value of horticultural products for domestic consumption and for export to gain priority for investment financing in phytosanitary laboratory capacity;

(ii) Invest in developing phytosanitary diagnostic capacity to provide at least the basic level of technology to secure borders against quarantine pests. A linkage should be made between diagnostic capacity[28] and regulated pests; and

[28] Diagnostic technology requirements depend on the type of organism (insect virus, etc.) and the level of taxonomic specificity needed for each regulated pest.

(iii) Provide pocket diagnostic kits for preliminary testing of plant diseases in the field. These are available for a wide range of plant pathogens. They are primarily used in surveillance for quarantine pests in the country but they also have limited application at borders. Field kits should not be used as replacement for full laboratory testing where available; but in the interim, they provide reliable indications of the need for more definitive testing. Pocket diagnostics using PCR are also becoming available (e.g., loop mediated isothermal amplification or LAMP).

Most countries in the region claim to have or wish to have "laboratories" at border inspection posts. Basic equipment such as a stereo microscope or a mounted magnifying glass should be available in a room with good lighting and a purpose-built table for examination. This should not be seen however as a laboratory but as an inspection and sampling facility. At the border, the minimum conditions for phytosanitary border inspection facilities are (i) written up-to-date national plant health and inspection guidelines, (ii) reliable electricity supply, (iii) communication system, and (iv) inspection facilities.

Nowadays, construction of large quarantine greenhouses and supporting laboratories is reserved for plant breeding institutions that regularly import cuttings or other traditional forms of planting material.

Traditionally, facilities for post-entry quarantine have been very expensive to construct and maintain. Many installations worldwide are abandoned and derelict. Nowadays, construction of large quarantine greenhouses and supporting laboratories is reserved for plant breeding institutions that regularly import cuttings or other traditional forms of planting material. However, the widespread use of tissue culture (micropropagation) has reduced the risk of transferring plant pathogens and has lessened the scale of post-entry quarantine facilities considerably.

Additionally, the following recommendations are offered:

(i) Border facilities should include inspection facilities (laboratories) that adapt to the minimum conditions as a guide (Appendix 1.2). These facilities should have reliable electricity supply and communication facilities;

(ii) Pest risk analysis should be done (preferably coordinated by region) for importation of planting material according to (a) actual needs in relation to development of agriculture and horticulture; (b) sourcing to reduce pest risks; and (c) any importation requirement for post-entry quarantine and diagnostic capacity; and

(iii) Each country should develop basic tissue culture capacity as a prerequisite for safe handling of imported germplasm.

c. Shared Phytosanitary Laboratories for the CAREC Region

Consideration has been made on whether investment is necessary on an individual country basis or that of a shared CAREC-wide regional laboratory or laboratories. Ideally, a regional laboratory that achieved a standard of excellence

could serve as a reference laboratory for validating results as well as center for training and demonstration of state-of the-art diagnostic technology. However, regional laboratories require sustained commitment that will ensure funds for operating costs, equipment maintenance, and renewal of accreditation. Thus, regional phytosanitary laboratories are not generally proposed.

Operating regional laboratories may be feasible when samples, such as DNA and RNA extracts, may be sent by courier for rapid testing. However, there are two main issues. First, technically, a national laboratory capable of extracting DNA and RNA should also be capable of conducting diagnostic tests such as a PCR, thereby negating the need to send DNA and RNA extracts to a regional laboratory for testing. Second, if import restrictions causing delays are not addressed, it might be futile to send to a regional laboratory, say food samples, in the case of food contaminant analysis using advanced chromatographic techniques, because extracts cannot be easily stabilized (ADB 2013a).

2.2.3 Animal Health Laboratories

a. Overview

The shortage of veterinary laboratories capable of routine surveillance and early detection of animal diseases and zoonotic diseases is a common problem in most countries in the CAREC region. Veterinary laboratories were established as part of the state veterinary infrastructure and act within or under the ministries of agriculture or SPS or food safety agencies. Each country in the CAREC region has a veterinary laboratory network comprising central and at least provincial laboratories.

The shortage of veterinary laboratories capable of routine surveillance and early detection of animal diseases and zoonotic diseases is a common problem in most countries in the CAREC region.

In recent years, veterinary laboratories (central, provincial or those at the borders) in several countries in the CAREC region have been refurbished by various international projects, most notably under the Avian Influenza Control and Human Pandemic Preparedness Project of the World Bank and Biological Threat Reduction Program of the Defense Threat Reduction Agency.

As a result, a number of veterinary laboratories have facilities to diagnose many OIE-listed diseases, while some of them also have biological containment facilities to work with highly contagious and dangerous pathogens. Those that were upgraded by the DTRA operate the Pathogen Asset Control System and/or Electronic Integrated Disease Information System (EIDSS),[29] while some

[29] Both the EIDSS and the pathogen asset control system have been developed under the auspices of the Defense Threat Reduction Agency and represent components of the Cooperative Threat Reduction Program of the US and Azerbaijan. Both systems are intended to be used for disease surveillance, early detection and response, however oriented to the control of biological hazards, rather than veterinary control. The EIDSS and the pathogen asset control system were introduced to veterinary and public health authorities of Azerbaijan in the frame of the Biological Threat Reduction Program and further installed in veterinary and public health laboratory networks.

alternative systems for disease data collection and reporting (such as TADinfo) were introduced by the World Bank and other international donors.[30]

In most CAREC countries, the central veterinary laboratory has the status of national reference diagnostic center for animal health and veterinary public health (in some countries also for food safety).[31] Laboratories at provincial and lower levels function as branches or satellites of central laboratories. These laboratories cooperate to some extent with regional or international reference laboratories.

In general, most laboratories are still unable to implement full surveillance and testing for OIE-listed diseases.[32] Appendix 1.3 lists the recommended veterinary laboratory equipment while Appendix 1.4 provides further recommendations.

b. Diagnostic Capacity Assessment

The veterinary laboratory infrastructure in most CAREC countries deteriorated during the 1990s, resulting in the decline of diagnostic capability, unsafe working conditions, and decreased reliability of test results. Central laboratories are more likely to be well-equipped and properly organized, but most provincial and border veterinary laboratories are still in poor condition. Laboratory network in all CAREC countries is still in the process of recovery, except in the PRC, where it is already well-established and operates in almost all veterinary fields.

Laboratory network in all CAREC countries is still in the process of recovery, except in the PRC, where it is already well-established and operates in almost all veterinary fields.

Afghanistan's veterinary laboratories have been upgraded through an EU-funded project in 2016 (Landell Mills 2016). Central and regional laboratories in Azerbaijan have benefited from the Biological Threat Reduction Program. The Laboratory of the Ministry of Agriculture of Georgia is accredited internationally to ISO 9001 (Quality Management) and has implemented the molecular diagnosis of rabies and introduced a new serological test for diagnostics of brucellosis.

Through an EU twinning project, Kazakhstan plans to turn the National Veterinary Reference Centre into an OIE reference laboratory for brucellosis, providing scientific and technical support to the other Central Asian countries

[30] TADinfo is the acronym for Transboundary Animal Disease Information System, which has been developed by the Food and Agriculture Organization of the United Nations (FAO) to support management of animal diseases in developing countries. It is a GIS-based database package with an easy-to-understand user interface and a query interface, which allows collecting animal health and/or veterinary public health data and producing processed information (tables, maps, reports, etc.) to support risk assessment and decision-making processes in veterinary health.

[31] Along with active surveillance, monitoring, and detection of diseases in animals, competencies of the central veterinary laboratory in most CAREC countries include also detection of pathogens in primary products of animal origin. In some countries, these competencies were extended further to detection and/or monitoring of pathogens and residues of other hazards in processed, and to a lesser extent, manufactured products and food of animal origin.

[32] The OIE distinguishes two categories of diagnostic tests: prescribed and alternative. Prescribed tests are required by the OIE Terrestrial Animal Health Code for the international movement of animals and animal products and are considered optimal for determining the health status of animals. Alternative tests are those that are suitable for the diagnosis of disease within a local setting, and can also be used in the import/export of animals after bilateral agreement.

(IZSAM 2015). All laboratory facilities of this center are nationally accredited in accordance with the ISO 17025:2005 standard. The center has the diagnostic capacity to perform all OIE-listed tests (both prescribed and alternative) and diagnose all endemic animal diseases (including TADs), zoonotic diseases, and foodborne diseases. Along with diagnostic activities, this center also examines technical documentation on animal health and veterinary public health and develops general and specific standard operating procedures.

The two main veterinary laboratories in the Kyrgyz Republic (Bishkek and Osh) have been upgraded as a consequence of the country's EAEU membership, but these facilities had not been commissioned (with accreditation) at the time of publication of this report. In Mongolia, the National Reference Laboratory for Food Safety is a modern and well-equipped laboratory, with technical capacity to perform almost all OIE-listed tests (both prescribed and alternative) in relation to veterinary hygiene and safety of raw and processed products of animal origin. This laboratory was established in 2013—serving as a reference laboratory for foodborne diseases of animal origin and conditional pathogens. It is able to detect and diagnose a number of foodborne diseases caused by zoonotic pathogens (such as *Campylobacter* spp., *Salmonella* spp., and *Clostridium* spp.) and is internationally accredited in accordance with ISO standard 17025:2005. The Mongolia State Central Veterinary Laboratory has the capacity to conduct OIE-listed tests and detection and preliminary diagnosis of almost all endemic transboundary, zoonotic, and other animal diseases of public interest.

From published academic articles, veterinary laboratories in Pakistan appear to have acquired some advanced diagnostic capacity for key TADs (Hussain, Irshad, and Khan 2008). No updated information is available on veterinary laboratories in Tajikistan, but as of 2015, none of the veterinary laboratories were either internationally accredited in accordance with the ISO 17025:2005 standard, or compliant with OIE requirements for quality management in veterinary testing laboratories. Turkmenistan and Uzbekistan require development in veterinary laboratories.

Turkmenistan and Uzbekistan require development in veterinary laboratories.

2.2.4 Food Safety Laboratories

a. Overview

This section describes the capacity of laboratories in each CAREC country to analyze microbiological and chemical contaminants in food and gives an overview of the extent to which food safety standards are harmonized with international standards.[33]

[33] Specific reference to Codex guideline CAC/GL 61-2007: Guidelines on the Application of General Principles of Food Hygiene to the control of *Listeria monocytogenes* in foods; Codex Standard 193–1995 Revision 2013: General Standard for Contaminants and Toxins and Food and the Codex guidelines on sampling; and Regulation (EC) No. 2073/2005 on microbiological criteria for foodstuffs, and its amendments as countries (including Georgia) have referred to it to develop and harmonize microbiological food safety parameters.

b. *Analytical and Diagnostic Capacity Assessment*

Table 11 gives an overview of the level of harmonization of food safety parameters and shows which countries have ISO 17025:2005 accredited laboratories. Tables 12 and 13 indicate where testing upgrades are needed to analyze essential pathogenic bacteria and the water activity. Appendixes 1.5 and 1.6 contain specific lists of recommended equipment.

Various countries still have a fragmented structure with regard to the number of laboratories and their mandates.

c. *Laboratories for Chemical Contaminants*

Various countries still have a fragmented structure with regard to the number of laboratories and their mandates. Most key laboratories are not able to analyze the entire series of chemical contaminants.

Different laboratories in each of the CAREC countries are able to conduct different types of chemical analyses. The countries however are not able to analyze the entire series of chemical contaminants as required in the Codex General Standard for Contaminants and Toxins in Food and Feed (Codex Stan 193–1995, revision 2013)[34] and EU Regulation (EC) No. 1881/2006 on Chemical

Table 11: Food Safety Parameters and ISO 17025:2005 Laboratory Accreditation in CAREC Countries

Country	Is any kind of horizontal legislation applied, such as for food safety parameters?	Are food safety limits fully harmonized with international standards such as Codex?	Is there full-scale evidence that Codex standards are applied for sampling procedures?	ISO 17025:2005 Internationally Accredited Laboratories	
				Chemical Analysis	Food Microbiology
Afghanistan	...	...	...	...	...
Azerbaijan	No	No	No	No	No
PRC	Yes	Yes	No	Yes	Yes
Georgia	Yes	With EU	...	In Progress	In Progress
Kazakhstan	Yes	With EAEU	No	Yes	Yes
Kyrgyz Republic	No	With EAEU	No	Planned	Planned
Mongolia	Yes	No	No	No	No
Pakistan	...	...	...	...	...
Tajikistan	No	No	No	No	No
Turkmenistan	No	No	No	No	No
Uzbekistan	No	No	No	No	No

... = no information available, CAREC = Central Asia Regional Economic Cooperation, EU = European Union, EAEU = Eurasian Economic Union, ISO = International Organization for Standardization, PRC = People's Republic of China, TA = technical assistance.

Source: Asian Development Bank (compiled from TA 8386 Consultant's Report).

[34] FAO. Codex General Standard for Contaminants and Toxins in Food and Feed (Codex Stan 193–1995, revision 2013). http://www.fao.org/fileadmin/user_upload/livestockgov/documents/1_CXS_193e.pdf.

Table 12: Food Testing Laboratory Upgrades Needed in CAREC Countries

Country	Equipment Needed to Analyze Essential Pathogenic Bacteria and Water Activity		
	VIDAS Equipment and Accessories	Water Activity Meter	Accreditation for at Least Two Analyses
Afghanistan	...	...	...
Azerbaijan	Yes	Yes	Yes
PRC	Yes	...	No
Kazakhstan	Yes	Yes	No
Kyrgyz Republic	No	Yes	Yes
Mongolia	Yes	Yes	Yes
Pakistan	...	...	...
Tajikistan	Yes	Yes	Yes
Turkmenistan	Yes	Yes	Yes
Uzbekistan	Yes	Yes	Yes

... = no information available, CAREC = Central Asia Regional Economic Cooperation, PRC = People's Republic of China, TA = technical assistance, VIDAS = an automated food pathogen detection system (commercial name).

Source: Asian Development Bank (compiled from TA 8386 Consultant's Report).

Table 13: Investment Needs for Food Chemical Analysis Upgrade per Country[a]

Country	Equipment for Food Chemical Analysis									
	LC-MS/MS	ELISA	GS-MS/MS	GC-MS	ET-AAS	HRGC-HRMS	LC-MS	GC–ECD/NPD	Gamma Spectrometer	Accreditation for at Least One Analysis
Afghanistan	...	...	...	...	...	...	...	...	...	...
Azerbaijan	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
PRC	No	No	No	No	No	No	No	No	No	No
Kazakhstan	No	No	No	No	No	No	No	No	No	No
Kyrgyz Republic	Yes	No	Yes	Yes	Yes	No	No	Yes	Yes	Yes
Mongolia	No	No	No	No	No	No	No	No	Yes	Yes
Pakistan	...	...	...	...	...	...	...	...	...	...
Tajikistan	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Turkmenistan	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Uzbekistan	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

... = no information available, ELISA = enzyme-linked immunosorbent assay, ET-AAS = electro thermal atomic absorption spectrometry, GC-ECD/NPD = gas chromatography with electron-capture and nitrogen-phosphorus detection, GC-MS = gas chromatography-mass spectrometry, GS-MS/MS = gas chromatography–tandem mass spectrometry, HRGC HRMS = high resolution gas chromatography–high resolution mass spectrometry, LC-MS = liquid chromatography/mass spectrometry, PRC = People's Republic of China, TA = technical assistance.

[a] Based on data available in 2015.

Source: Asian Development Bank (compiled from TA 8386 Consultant's Report).

Contaminants and its Amendments.[35] Emerging chemical contaminants such as polyaromatic hydrocarbons, 3-monochloropropane-1-2 diol (3-MCPD), and/or polychlorinated biphenyl are not yet analyzed. Some key laboratories do not have the capacity to analyze antibiotics. For fruits and vegetables, the key contaminants are pesticides. Upgraded laboratories may eventually have the capacity to analyze residues in these products, together with staff training, but these facilities will not achieve full SPS relevance without the political will to include modern, relevant pesticides in the technical regulations for import requirements and consequent targeting of risk-based inspections toward these contaminants rather than obsolete pesticides such as DDT.

The quality of CAREC laboratories and the age of their equipment vary substantially. For example, the National Reference Laboratory for food safety in Mongolia is a state-of-the-art laboratory equipped with modern analyzing equipment. In other countries, classical methods such as thin-layer chromatography are still applied for analyzing chemical contaminants such as mycotoxins and pesticides. While there is little evidence of their impact on food safety, it is worth noting that several CAREC countries have molecular diagnostic capacity, even to the level of real-time PCR, exclusively for the detection of genetically modified food ingredients.

The quality of CAREC laboratories and the age of their equipment vary substantially.

The chemical contaminants are not harmonized with international standards such as Codex and the principal EU food regulations. The categories of chemical contaminants, type of contaminants, maximum residue levels, unit of measures, and moment of sampling differ from international best practices. Lack of harmonization may cause potential obstacles to trade. Some of the countries still check antibiotics in fermented dairy produce such as yogurt. There is no indication that Codex standards for sampling procedures such as the Principles for the Use of Sampling and Testing in International Food Trade (CAC/GL 83/2013) and General Guidelines on Sampling (CAC/GL 50-2004) are applied.

Based on the assessment, recommendations for laboratories for chemical contaminants in CAREC countries are as follows:

(i) Rationalize and concentrate the number of laboratories and expertise;

(ii) Design regional capacity-building programs to harmonize the categories, types, and the maximum residue levels of the various contaminants with the relevant standards of Codex Alimentarius and other international standards;

(iii) Ensure that skills enhancement training for selected participants teach about emerging chemical contaminants such as polyaromatic hydrocarbons, 3-MCPD, polychlorinated biphenyl, and dioxins. The

[35] Official Journal of the European Union. Commission Regulation (EC) No. 1881/2006 of 19 December 2006 setting maximum levels for certain contaminants in foodstuffs. https://health.gov.mt/en/environmental/Documents/Legislations/Pharmacologically/17regec1881_2006e.pdf.

skills enhancement training should result in harmonization of chemical food safety parameters in CAREC countries; and

(iv) Conduct training on the Codex standards for sampling and guidelines for sampling techniques (Appendix 1.7).

d. Food Microbiology Laboratories

Classical methods—which take 3–4 days to produce results—are applied in most CAREC countries for the analysis of pathogenic bacteria. The use of modern equipment could help expedite the testing procedure. The veterinary laboratory at Osh in the Kyrgyz Republic is equipped with advanced equipment for identifying foodborne bacteria, including real-time PCR.

A list of recommended food microbiology laboratory equipment is in Appendix 1.5.

Emerging pathogenic bacteria such as the pathogenic strains of *E. coli* and strains of *Salmonella* are not analyzed. The scope of pathogenic bacteria analysis must be expanded and include these pathogenic strains. There is also limited capacity to analyze *Campylobacter* and toxins of *Staphylococcus* aureus.

Classical methods—which take 3 to 4 days to produce results—are applied in most CAREC countries for the analysis of pathogenic bacteria.

Coliforms are analyzed as a hygiene indicator organism. *Enterobacteriaceae* include a wider spectrum of pathogenic bacteria. Limited analyses of *Enterobacteriaceae*, which is more commonly applied as a hygiene indicator than coliforms, are conducted.

Kazakhstan applies total count, mold, yeast, and coliforms as food safety parameters—which may cause a potential barrier to trade.[36] Detailed analyses of some countries' food safety parameters (e.g., the Kyrgyz Republic and Mongolia) confirm the difference in the food safety parameters in terms of categories, types, maximum residue levels, and sampling.

In terms of food microbiological parameters, Kazakhstan and Mongolia have been able to develop horizontal legislation. Their application and approach, however, differ. Mongolia applies food safety and process hygiene criteria while Kazakhstan applies microbiological food safety standards (pathogenic) in the annex on microbiological food safety standards. The annex, however, includes both pathogenic bacteria and quality parameters such as mold, yeast, total count, and coliforms. Different bacteria for the same product category, e.g., frozen vegetables, are monitored. In Mongolia, the harmonization of food microbiology with the EU Commission Regulation (EC) No. 2073/2005 did not meet its objectives.[37] If harmonization with the regulation is not properly

[36] The presence of coliforms does not automatically confirm the presence of pathogenic bacteria. Total count, mold, and yeast are quality parameters.

[37] Official Journal of the European Union. Commission Regulation (EC) No. 2073/2005 of 15 November 2005 on Microbiological Criteria for Foodstuffs. http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32005R2073&from=EN.

applied, food processors are bound to conduct additional microbiological analyses and thus, cause additional obstacles to trade.

Several CAREC countries are not familiar with the various Codex guidelines on sampling. Laboratory personnel also need a thorough understanding of food products' intrinsic values such as pH,[38] moisture contents, and water activity (Aw). Generally, pH is known, but Aw is not (see Box 2.7). None of the laboratories assessed have an Aw meter, except for the Regional Veterinary Diagnostic Center in Bishkek, Kyrgyz Republic, which however does not use its instrument. There was no history of measuring Aw in the GOST system.

Food microbiology laboratories must understand the relation of Aw to the development and/or presence of pathogenic bacteria. For instance, food processing companies must be able to validate a drying process by measuring moisture content and Aw. Food inspectors must be able to verify this validation

Several CAREC countries are not familiar with the various Codex guidelines on sampling.

Box 2.7: Water Activity

Water activity (Aw) refers to water in food which is not bound to food molecules. This unbound water can support the growth of bacteria, yeasts, and molds or fungi. Aw is one of the intrinsic values of food products; the others are pH, moisture content, nutrient content (e.g., sugars, proteins), and antimicrobial constituents (e.g., essential oils in spices and lactoferrine in milk). Step 2 of the 12 steps of hazard analysis and critical control points according to Codex Alimentarius requires the description of the final product specification. This description requires the inclusion of the intrinsic values of a food product including defining Aw if relevant.

The Aw scale ranges from 0 (bone dry) to 1.0 (pure water). Most foods have an Aw level in the range of 0.2 for very dry foods to 0.99 for moist fresh foods. Aw is, in practice, usually measured as equilibrium relative humidity (ERH) and can be measured with an Aw meter, with results from 0 to 1.00.

Aw is most useful in predicting the growth of (pathogenic) bacteria, yeasts, and molds. For a food to have a useful shelf life without relying on refrigerated storage, it is necessary to control either its acidity level (pH) or the Aw level or a suitable combination of the two. Different pathogenic bacteria grow from Aw 0.85 to Aw 1.00. Mold and yeast can still grow at an Aw level of 0.65. Below Aw 0.60, there is no bacteriological proliferation. The risk of food poisoning must be considered in low acid foods (pH > 4.5) with an Aw greater than 0.86. *Staphylococcus aureus*, a common food poisoning organism, can grow down to this relatively low Aw level. Dried fruit and nuts that are not properly dried may develop mold and subsequently mycotoxins may also develop.

Source: Safefood 360°. White Paper: Water Activity in Foods. http://safefood360.com/resources/Water-Activity.pdf.

[38] pH is a term used to describe the acidity or alkalinity of a solution. pH has profound effect on the growth of microorganisms. Most bacteria grow best at about pH 7 and grow poorly or not at all below pH 4.

process as part of an HACCP program, which requires an understanding of Aw. Most food inspectors have a background in veterinary science or medicine, but Aw is not part of the curriculum for these subjects. Countries must have the capacity to analyze Aw and key laboratories must be equipped with an Aw meter.

It is important to be familiar with the different purposes for analyzing the various indicator organisms such as *E. coli*, coliforms, and *Enterobacteriaceae*. Enhanced capacity on how and where to apply the indicator organism and which ISO methodology should be applied for the respective analysis is needed.

The application of total plate, count, mold, yeast, and coliforms as food safety parameters must be reconsidered, as these parameters could be potential barriers to trade. Instead, harmonization of microbiological food safety parameters within CAREC is recommended.

In summary, the following training programs for food microbiology are recommended:

The application of total plate, count, mold, yeast, and coliforms as food safety parameters must be reconsidered, as these parameters could be potential barriers to trade.

(i) In-depth and thorough skills enhancement training through regional capacity-building programs for selected participants on food microbiology in general, and on Aw and pathogenic strains of *E. coli* and *Salmonella* in particular;

(ii) Training on modern techniques of analyzing pathogenic bacteria, quick tests such as adenosine triphosphate, Codex standard for Guidelines on the Application of General Principles of Food Hygiene to the Control of Listeria Monocytogenes in Foods (CAC/GL 61-2007), and Regulation (EC) No. 2073/2005 on food microbiology and their amendments with emphasis on food safety and process hygiene parameters and the consequences if the regulation is not properly applied; and

(iii) Training on the Codex guidelines for sampling techniques, which should result in the harmonization of microbiological food safety parameters in the CAREC countries.

2.2.5 ISO 17025:2005 International Laboratory Accreditation

The discussions during the assessment of laboratory accreditation indicated that laboratories lacked strategic planning and awareness of which food safety parameters should be accredited.

The cost and maintenance of laboratory accreditation is highly underestimated. The laboratories do not consider risk, national health situation, cost, trade, and

cross-cutting benefits[39] as criteria for the selection of food safety parameters to be ISO 17025:2005 internationally accredited.

Among CAREC countries, only Kazakhstan and the PRC have ISO 17025:2005 accredited laboratories for selected parameters. Some countries, such as the Kyrgyz Republic, have advanced equipment and expertise to analyze antibiotics and mycotoxins. The National Reference Laboratory for food safety in Mongolia has state-of-the-art facilities and has the potential to be accredited for selected food safety parameters.

The recommendations for ISO 17025:2005 accreditation are as follows:

(i) All CAREC countries should have some selected food safety parameters internationally accredited to ISO 17025:2005 to strengthen their capacity and credibility in laboratory analysis.

(ii) The criteria for selecting food safety parameters to be ISO 17025:2005 internationally accredited should include trade, potential risk, cost and maintenance of the accreditation, national public health situation, and the quality and type of the laboratory depending on its mandate to conduct the analysis.

(iii) The Kyrgyz Republic and Kazakhstan, with their central strategic locations in the CAREC region, could function as regional reference laboratories for selected analysis or at least for the EAEU. Based on its expertise, the Regional Veterinary Diagnostic Center in Bishkek in the Kyrgyz Republic should receive support to become accredited for the analysis of antibiotics and mycotoxins.

The National Reference Laboratory for food safety in Mongolia has state-of-the-art facilities and has the potential to be accredited for selected food safety parameters.

2.3 Assessment of Border Services Management

2.3.1 Principles of International Cooperation in Border Management

International cooperation among agencies involved in border issues exists at various levels and forms of collaboration. Cooperation between neighboring countries cover joint efforts such as border surveillance, coordination at border

[39] Examples of cross-cutting benefits are as follows:

(i) To export honey to the European Union, a country must have the capacity to analyze antibiotics in an ISO 17025:2005 internationally accredited laboratory. Once the laboratory has the capacity to analyze antibiotics and is accredited accordingly, the accreditation also benefits from analyzing antibiotics in other products of animal origin.

(ii) To export fish to Japan, heavy metals are required to be analyzed in the process water in the fish industry to ensure potable water is applied. This analysis must be done in an ISO 17025:2005 internationally accredited laboratory. Having the capacity to analyze heavy metals in water will also benefit the country's population since potable drinking water in a country is of prime importance.

crossing points (BCPs), and information exchange (European Commission 2010) which could be in the form of interagency, interministerial, or intergovernmental working groups.

At the local or BCP level, one of the most important areas of cooperation is one-stop control, which has the following features (Kieck 2010):

(i) Offices of both states are relocated in close proximity, necessitating only "one stop" for border crossings.

(ii) A control zone (or zones) is demarcated within which officers from both states conduct controls according to their respective laws.

(iii) The control zone comprises offices, inspection areas, and related facilities, and is usually located within the national territory of only one state.

(iv) Immigration and import and export formalities are handled as a seamless transaction between the two countries.

(v) Inspections and searches of cargoes or vehicles are generally conducted in the presence of officers from both states.

The PRC and Mongolia have pilot-tested joint customs control (Box 2.11). One of the challenges of one-stop control involves sovereignty and jurisdictional issues, which arise when border officers have to work together in the territory of another (McLinden et al. 2011). Not only should inspection posts be built at the same BCP on each side of the border, but tasks and responsibilities of border officers should be coordinated and harmonized. In this case, coordination of the status of BCPs, their prioritization and related upgrading, and the synchronization of opening hours could be discussed.

For phytosanitary and veterinary border services, bilateral agreements should cover conditions for the reintroduction of rejected consignments; use of standardized forms and documentation to be provided and procedures to be followed when import conditions are not met; frequency of checks according to the health status of the country of origin, among other things (European Commission 2010). The establishment of a regional interagency coordination mechanism can facilitate exchange of experience and further coordination of national strategies.

Comprehensive reengineering of systems and procedures is crucial and should be designed to modernize border management and integrate effective control and trade facilitation.

2.3.2 Border Management Infrastructure

The *Transport and Trade Facilitation Strategy 2020* (ADB 2014) offers a framework for cooperation and coordination of infrastructure investments. More recently, SPS infrastructure investments at the border and behind the borders were proposed in the *CITA 2030 and RSAP 2018–2020* (ADB 2018a). Comprehensive reengineering of systems and procedures is crucial and should be designed to modernize border management and integrate effective control and trade facilitation (McLinden et al. 2011).

2.3.3 Phytosanitary Border Controls

The prerequisites for effective and IPPC-consistent phytosanitary border measures are (i) quarantine pest lists (and ideally lists of regulated non-quarantine pests) for each national territory (or territory under unified rules such as the EAEU); and (ii) phytosanitary import requirements for each type of commodity, reflecting both the particular quarantine pest(s) of concern and the geographic location of those risks.

In both cases, the information should have been subject to PRA and published in secondary phytosanitary legislation. Generally, the CAREC region lacks an up-to-date primary phytosanitary law as well as the authority for risk-based secondary legislation in accordance with ISPMs. The quarantine pest lists for the Commonwealth of Independent States have not been backed up by any coordinated surveillance since 2004. The same applies to the A1 and A2 pest lists of the EAEU; however, there is still emphasis on easily identifiable pests but not on bacteria, viruses, and some fungi that require sophisticated laboratory technology to be identified.[40] Furthermore, the EAEU members in which A2 pests are to be found are not stated.

Published phytosanitary requirements have suffered from the imposition of import requirements on goods that bear no risk.

Published phytosanitary requirements have suffered from the imposition of import requirements on goods that bear no risk. In these cases, even a phytosanitary certificate should not be required. These issues have been addressed to some extent but there is lack of distinction between controls on fruit and vegetables for consumption or processing and plants for growing as ornamentals such as potted plants and propagative material such as seeds, seedlings, bulbs, and cuttings.[41] Box 2.8 gives some examples of risk categorization and other aspects of EAEU-published phytosanitary requirements. Box 2.9 lists examples of problems in phytosanitary trade relations within the EAEU and between the EAEU and non-EAEU members.

In general, products of plant origin may be cleared inland. For planting materials, specialist testing or post-entry quarantine may be necessary at the point of destination. When systems are in place, phytosanitary inspectors need not be permanently at the border to prevent arbitrary decision making on imports. Advance notification of commercial quantities and a proper formal risk assessment mechanism are necessary aspects of an efficient and effective system.

[40] The pathogenic bacterium *Ralstonia solanacearum* features in the EAEU lists as an A1 pest of single identity whereas in reality it comprises several pathogenic types with different host range and pathology, which can only be distinguished by advanced diagnostic techniques. It is highly unlikely that race 1 (cause of bacterial wilt) is entirely absent in the territory of the EAEU.

[41] This applies equally to the phytosanitary requirements of the EAEU and the non-EAEU members of the Commonwealth of Independent States.

Box 2.8: Examples of Phytosanitary Requirements of the Eurasian Economic Union (Technical Regulation 318)

In the updated Technical Regulation 318, both tomato fruit and dried fruit are classified as "high risk" with mandatory documents and inspections for named pests irrespective of whether the imports would be for direct consumption, processing, or planting (in the case of tomato fruit imported for seed). In fact, the only dried fruit for which a pest is specified (*Ceratitis capitata*) is dried grapes, apparently rendering the inspection of such products as dried apricots as unnecessary. Freedom from khapra beetle (*Trogoderma granarium*) does not apply to grapes or other dried fruit (HS Codes 0806 and 0813). Tomato fruit destined for immediate processing may not pose any significant pest risk as there is no risk of pest escape from sealed, refrigerated transport.

Tomato seed is to be inspected for *Ralstonia solanacearum* (bacterial wilt/potato brown rot) but this bacterium is not seed-borne in the tomato. There is a need also to distinguish the different races of this bacterium according to hosts and phytosanitary requirements. Race 1 has a wide range among *Solanaceae* and other plant families and is widespread. Race 3 is a major problem for potato (*Solanum tuberosum*) and is transmitted in seed tubers.

Genuine high risk: Phytosanitary certificates are issued for exports to Uzbekistan from the Eurasian Economic Union (EAEU) after samples are taken for laboratory investigation. Samples for insects and fungi, and nematodes in soil take 3–4 hours for processing, 3–4 days being required for bacteria and viruses. The main quarantine pests inspected for are golden potato nematode, potato tuber moth, and potato wart disease. Phytosanitary laboratories in the Kyrgyz Republic were able to detect nematodes in plants imported from Kazakhstan. Tomato leaf miner *Tuta absoluta* (A1 pest for EAEU) has recently been detected in the Kyrgyz Republic and other countries in the region and reportedly officially (EPPO Global Database 2017).

There could be further discrimination according to country of origin. For example, citrus fruit from countries with fruit flies as quarantine pests would be prohibited. On the other hand, fruit that could be treated, e.g., mangoes by hot water, could be allowed subject to treatment according to agreed standards before export.

Source: Authors.

For risk categorization of commodities, a simple "traffic light" system is proposed for phytosanitary authorities transmitting basic risk information to Customs:

(i) Green flag: those not requiring phytosanitary documentation or inspection. Green channel technology (see Box 2.10) should be combined with approved traders' schemes to ensure that a risk-based system of controls is maintained.

(ii) Orange flag: those that require documentation and inspection.

(iii) Red flag: prohibited goods that must be turned back or destroyed.

Box 2.9: Examples of Phytosanitary Control Problems in the CAREC Region

Exports from the Kyrgyz Republic to the Eurasian Economic Union (EAEU) (through Kazakhstan): In June 2017, Kazakhstan announced that it was ready to introduce restrictions on the export and transit of plant products from the Kyrgyz Republic because of violation on prohibition against Comstock's mealy bug (*Pseudococcus comstocki*, citrus pest), oriental fruit moth (*Cydia molesta*), and an unspecified fruit fly.[a]

Exports from Kazakhstan to the Russian Federation: Despite only minimal cases of noncompliance with phytosanitary requirements, the Kazakhstan sanitary and phytosanitary (SPS) authorities have confirmed their interest in improving effectiveness of **movement control** of commodities through the Russian Federation–Kazakhstan border in "order to provide epizootic, phytosanitary and food safety in the countries." It is likely that this will mirror the European Union's *plant passport* system although in the former Soviet Union and Communist Eastern Europe, movement controls of plant products were as much for economic as for strict phytosanitary control; and there were official controls whereas plant passports are issued by the enterprise under official supervision (co-regulation).[b]

Uzbekistan: In attempting to apply the GOST requirements (GOST 6882-88 implemented on 1 January 1989) for the export of raisins to the EAEU, Uzbekistan used phytosanitary certificates as a means of certifying conformity with the "absence of pests" requirement without specifying any quarantine pests. This appears to be a merger of the World Trade Organization technical barriers to trade and SPS agreements in a manner unacceptable outside of the EAEU. In any case, there are unlikely to be any quarantine pests associated with raisins. The "absence of pests" requirement was perhaps considered an indicator that the quality of the raisins had not suffered from pest attack (which would be grounds for refusal as "unfit for human consumption").[c]

[a] AKIpress. 2017. Kazakh Phytosanitary Service Ready to Introduce Restrictions for Export, Transit of Kyrgyzstan's Products in Case of Regular Violations. 17 June. http://akipress.com/news:597946/.

[b] Rosselkhoznadzor News. 2017. Meeting with Representatives of Veterinary and Phytosanitary Services of Western-Kazakhstan Oblast, Republic of Kazakhstan. 19 September. http://www.fsvps.ru/fsvps/news/22846.html?_language=en.

[c] United Nations Economic Commission for Europe. Business Processes Analysis: Export of Uzbek Raisins. Presentation. Tashkent. 2016. https://www.carecprogram.org/uploads/08-Experience-Sharing-KAZ.pdf.

Source: Authors.

Box 2.10: Green Channel and Advance Notification in Kazakhstan

The Green Channel project has been operating since 23 December 2013 at the Kazakhstan–People's Republic of China (PRC) border-crossing points (BCPs)—Bakhti in Kazakhstan and Pokitu in Xinjiang Uyghur Autonomous Region, PRC. This project was initiated as a result of an agreement between the prime ministers of both countries in December 2012. Further details of the project were developed during the visit of Kazakhstan's customs services to the PRC in December 2013.

A new separate channel and reconstruction work facilitated by new automated systems of customs control were undertaken at the Bakhti BCP to expedite procedures and customs clearance time. Before the project was implemented, it took an average of 270 minutes to cross the border to Bakhti, and now it takes only 74 minutes to cross and clear customs.

Despite this progress, some important issues remain unresolved. The interpretation of the single-window approach would mean the subordination of sanitary and phytosanitary (SPS) services to customs, which could be problematic because SPS doesn't fall within the technical competencies of customs (although it has been the case recently in the PRC with the merger of SPS function in the PRC Customs). Food and goods of animal and non-animal origin are not checked at the border but sent to customs warehouse for processing. The "green channel" approach is expected to speed up border processing but aspects of traceability (due to reloading requirements), lack of phytosanitary treatment, and food safety controls are not fully settled.

Advance Notification

In accordance with the Decision of the Customs Union (now Eurasian Customs Union) Commission No. 899 dated 9 December 2011 pertaining to mandatory prior notification of products entering by trucks to the territory of the Customs Union, systems were introduced at the Customs Union territory starting 17 June 2012.

Prior notification about goods that are destined for the same country can be based on the copy of electronic transit declaration, provided there are no discrepancies between information in notification and transit documents used for transit declaration. Participants of foreign trade operations do not need to approach representatives of customs (brokers), thus reducing financial cost and time spent for exports/importers. Prior notification can also be done through the web page of Kazakhstan's customs offices at pi.customs.kz, which export/import operators can use to register smoothly.

The Customs Committee of the Ministry of Finance of Kazakhstan is working further to improve the effectiveness of the prior notification concept, in accordance with the decision of the Collegium of Eurasian Economic Commission from 17 September 2013 No. 196 on "Implementation of mandatory prior notification about the products entering by rail transport to the territory of Customs Union." Since 2015, prior notification has also applied to goods shipped by air transport.

Source: Authors.

2.3.4 Veterinary Border Controls

An efficient veterinary surveillance and control at the border is vital for cross-border trade in live animals and products of animal origin. Implementing veterinary controls at the border has, however, always been problematic for most CAREC countries. Technical deficiencies, such as the unwieldy nature of trade, customs procedures, divergence between veterinary rules and other sectoral rules, hinder the efficiency of border veterinary control. There is also a lack of necessary border infrastructure and facilities and experienced personnel, accompanied by overlapping and/or excessive inspections, delays, and/or inadequate general management. These gaps make cross-border trade in live animals and products of animal origin time-consuming, costly, and uncompetitive. Illegal and uncontrolled movements of live animals and animal products also present a major threat, increasing the risk of spread of major infectious diseases of economic importance.

An efficient veterinary surveillance and control at the border is vital for cross-border trade in live animals and products of animal origin.

Afghanistan and Pakistan: There is no assessment of risks prior to import of live animals and/or products of animal origin into Afghanistan. Illegal trade in live animals and products of animal origin is a major problem for the veterinary services of both countries and needs to be addressed.[42] Movement of animals between them has occurred for centuries and is the main source of endemic circulation of TADs, such as foot-and-mouth disease (FMD), *peste des petits ruminants* (PPR), sheep and goat pox, contagious bovine pleuropneumonia (CBPP), contagious caprine pleuropneumonia (CCPP), Newcastle disease (NCD), and avian influenza, in both countries. The volume of illegal trade is reported to be very high and under these circumstances the state veterinary services of both countries are not able to ensure animal health and veterinary public health protection. Introducing mechanisms for coordinated bilateral veterinary control would be a first step to remedy this situation.

The Kyrgyz Republic and Kazakhstan: Kazakhstan does not currently recognize Kyrgyz veterinary certificates, partly as a result of genuine technical concerns but also because of political factors. The Kyrgyz Republic's veterinary authorities are hopeful that the situation will be resolved during the next EAEU audit. In the meantime, large-scale smuggling of live animals across the river forming the border with Kazakhstan has escalated. Smuggled animals are then slaughtered in a dedicated abattoir and the meat sold as Kazakh meat. A contributory factor is the limited extent of animal identification in the Kyrgyz Republic, currently confined to dairy cows. If the Kyrgyz Republic could overcome these technical constraints, there is a potentially lucrative market for live sheep in some Arab countries. The Kyrgyz Republic used to export live sheep to Iran but this trade stopped when sanctions were imposed on Iran.

[42] This situation is aggravated also by illegal movement of animals from Iran and India, where live animals are smuggled into Pakistan mainly through Sindh borders followed by onward transmission to Afghanistan, Iran, and then vice versa. Reportedly, after the fencing of the international border by India, this practice has practically stopped; however, available information suggests that smuggling of both live animals and products of animal origin between India and Pakistan in areas along the border still occurs.

The Kyrgyz Republic and Tajikistan: Veterinary controls in both countries—largely based on structures and practices inherited from the former Soviet Union—have been unable to protect against risks to veterinary health. Smuggling of live animals and products of animal origin between the two countries, as well as uncontrolled movement of goods in free economic zones established by the Organization for Security and Co-operation in Europe in 2012 along the border between Tajikistan and Afghanistan encourage the spread of some major TADs (CCPP, CBPP, lumpy skin disease) from South Asia to Central Asia and circulation of others (FMD, sheep and goat pox, classical swine fever, NCD, etc.) throughout the region. The state veterinary services of Tajikistan and the Kyrgyz Republic are unable to ensure animal health and veterinary public health protection. Multilateral coordinated veterinary controls, implemented together with veterinary services of Afghanistan and possibly other countries would improve the capability to control these diseases. Illegal trade will also need to be addressed.

Azerbaijan and Uzbekistan: Available information suggests that veterinary services of both countries are able to provide a certain level of protection against internal risks to animal health and veterinary public health. Veterinary border control of these countries—partly a result of less contact with the epicenters of major TADs, together with strong military control along the border—reduces the volume of illegal trade. Nevertheless, both countries need to establish and maintain an appropriate level of protection against risks posed by trade with other CAREC countries.

Veterinary services are capable of providing an appropriate level of veterinary controls at the border to protect against internal risks to animal health and veterinary public health.

Turkmenistan and Mongolia: Both countries have capable and motivated veterinary services but suffer inadequate infrastructure and lack of resources. There are no quarantine facilities at the border and both countries use inland facilities for quarantine, exposing them to the risk of introducing diseases into the interiors of the countries. Improved coordination and communication with neighboring countries should be considered as options to improve veterinary border control. Mongolia has already taken steps in this direction with an agreement on joint control of TADs with the PRC and the Russian Federation. Turkmenistan has not taken such initiatives and has virtually no contact with Afghanistan on border matters.

Kazakhstan and the PRC: Veterinary services are capable of providing an appropriate level of veterinary controls at the border to protect against internal risks to animal health and veterinary public health. Additionally, the countries would be able to lead regional activities on prevention of TADs and zoonotic diseases. This capability should be taken into consideration when elaborating plans for specific actions to facilitate trade in live animals and products of animal origin.

To improve veterinary control at the borders of CAREC countries, the following are recommended:

(i) Improvement in infrastructure that is proportionate to the volume of trade and the risk level of diseases. At the same time, the control

of movements of live animals and products of animal origin should be strengthened to combat smuggling and illegal trade. Upgrading of inspection posts in BCPs is also needed in all CAREC countries (with the exception of the PRC and Kazakhstan), such as (i) laboratory capacity for TADs at specified borders (e.g., those with TAD-infected countries); and (ii) quarantine facilities at the beginning and end of corridors and on one side of BCPs.

(ii) Enhancement of awareness and capacity building for relevant SPS agencies (particularly, the national veterinary authorities) in terms of

a. Development and adoption of risk assessment for importation of live animals and products of animal origin in accordance with principles of the OIE Code (relevant for all countries other than the PRC). At the regional level, a program could be developed to include (i) a unified list of diseases of importance to international trade; (ii) a unified list of goods subject to official veterinary control; (iii) unified veterinary certificates for export, import, and transit; and (iv) unified standard operating procedures for official veterinary inspection of each category of goods subject to veterinary control in the CAREC region;

b. Training for veterinary inspectors on the (i) application of the CAREC animal health program, and (ii) introduction of multilateral agreements between CAREC countries with respect to the application of the CAREC animal health program and complementary official veterinary controls along relevant CAREC corridors.

(iii) Public awareness campaigns including the risks of spread of TADs posed by illegal trade.

Effective inspection and certification of live animals in the country of origin based on health and vaccination history cannot be overemphasized.

Effective inspection and certification of live animals in the country of origin based on health and vaccination history cannot be overemphasized. Upon arrival in the country of destination, inspection by a qualified animal health specialist may be necessary. For products of animal origin, in most cases, inspection before release at an inland terminal is acceptable. However, risk-based sampling and inspection at the border or an inland terminal is advised. To the extent possible, personal use and other exemptions for cross-border trade of meat and meat products must not be allowed.

2.3.5 Border Controls for Food Safety

The assessment of border services management for food products should be based on the following questions:

(i) Is the system of control at the border specified clearly in legislation and in procedures?

(ii) What types of checks on food are done at the border and at inland terminals where consignments are directed under bond?

(iii) Are the border controls based on risk?

(iv) What non-risk-based controls are undertaken at the border?

(v) What action is needed to bring the checks done at the border, in line with international standards?

In the case of Mongolia, risk-based inspections at borders are applied even if this may not have been necessary if HACCP was adopted by all trading partners. Mongolia takes samples at the border, which are subject to analysis in situ. Classical methods for microbiological testing are conducted which result in long waiting times for trucks at the border.

With HACCP in place, there would only be a need for sampling and analysis in cases of a specific alert about a product or a past history of contravention of standards. Even then, a certificate of analysis from an accredited laboratory should obviate the need for border-based sampling. For example, for honey imports from non-member countries into the EU, the producer must not only have HACCP but must also supply a certificate of analysis required to meet the stringent antibiotic residue requirements.

The need for laboratories at the borders should be considered based on the potential risk in the event a food product enters the country and is brought to an in-country laboratory. There is no potential risk for consumers if a product contaminated with *Salmonella*, for example, is transported to a central area for customs clearance as it is either returned to the country of origin or destroyed and must not be distributed to the market.

The need for laboratories at the borders should be considered based on the potential risk in the event a food product enters the country and is brought to an in-country laboratory.

For high-risk products such as those potentially contaminated with TADs, analyses at the border could be justified, but the first question is whether biosecurity during transportation to an inland laboratory could be guaranteed even in the case of these products. The other issue is whether the imports of food of animal origin are certified to come from disease-free zones or the producing animals have been vaccinated against FMD, for example.

Following are some recommendations for border control for food safety in CAREC countries:

(i) Establish risk-based categories for various food products and consider a regional approach to identify these categories.

(ii) Make HACCP mandatory in legislation. Mandatory HACCP would simplify the process of issuing a HACCP compliance certificate and obviate the need for end-product certification for export purposes.

(iii) Follow Codex guidelines and undertake training on the various Codex documents relevant to border control.

2.3.6 Border Management Cooperation

An integrated border management requires coordination and cooperation among relevant border agencies in terms of:

(i) Coordinated processing at BCPs involving the SPS and other agencies operating at the border;

(ii) An integrated information system, ideally making use of information and communication technology (ICT), that jointly collects information, shares information collected by one agency at the first instance and stores such information for further processing; and

(iii) Joint and delegated responsibilities, by which specific control tasks may be undertaken by an authorized agency.

For most CAREC countries with multiple agencies operating at the borders, interagency cooperation arrangements could facilitate coordination and sequencing of business processes at the borders.

For most CAREC countries with multiple agencies operating at the borders, **interagency cooperation** arrangements could facilitate coordination and sequencing of business processes at the borders. An interagency working group can be established to provide a clear institutional framework for cooperation among these border management agencies. The working group may be tasked to develop and execute a national border management strategy and action plan, and additionally, categorize and designate BCPs, develop a common risk approach, and monitor the implementation of the action plan, as follows (European Commission 2010):

(i) **Border management strategy**. The aim is to balance the twin goals of modern SPS border management—i.e., animal, plant, and human health protection, with facilitated movement of persons and goods. To achieve these goals efficiently and effectively, the following requirements must be satisfied: (a) strong legal basis according to the various sectors involved in trade across borders, (b) appropriate equipment and facilities, (c) well-trained and motivated staff, (d) clear division of tasks and responsibilities, (e) streamlined processes, and (f) efficient exchange of information.

(ii) **Border control procedures and operational instructions**. To facilitate the implementation of coordinated border and inland control policy, operational instructions and plans should be developed for each agency and for each BCP. The border control operational instructions should be distributed as manuals to inspectors, containing detailed instructions and guidelines regarding business processes for each BCP.

(iii) **Selection of border-crossing point**. The BCP to be modernized and developed should be selected based on clearly defined, transparent, and jointly agreed selection criteria, and based upon a common and coordinated decision of the relevant agencies within the interagency working group, as well as with the neighboring countries. This will avoid, for instance, modernizing only one side of the border or one side with an inspection office but without a counterpart.

As part of trade facilitation initiatives, there has been a trend toward a **unified border inspection service** which transfers responsibility for border inspections including SPS inspection functions to Customs (as in the case of Azerbaijan, the PRC and Georgia). For countries considering similar arrangements, the issue of "competent authority" responsible for policy and the implementing rules on SPS matters may need to be carefully clarified since these have been traditionally undertaken by the ministries of agriculture for phytosanitary and veterinary, and health for food safety.

Furthermore, while not necessarily at the border, another issue is the clarification between standards and SPS services. Ideally, laboratory services should be independent of the inspectorate, and the national standards institution must not act as the competent authority responsible for "standards."[43] In Mongolia, the Generalized Agency for Specialized Inspection is responsible for border inspections and laboratory tests.[44]

For countries considering similar arrangements, the issue of "competent authority" responsible for policy and the implementing rules on SPS matters may need to be carefully clarified since these have been traditionally undertaken by the ministries of agriculture for phytosanitary and veterinary, and health for food safety.

It is worth mentioning that the WTO Trade Facilitation Agreement (TFA) requires each WTO member to establish and/or maintain a National Committee on Trade Facilitation or designate an existing mechanism to facilitate both domestic coordination and implementation of TFA provisions (Article 23.2 of the TFA). This is expected to positive impetus for cooperation of all relevant border agencies and their connectivity through an integrated border management.

Border management also extends beyond national authorities. An example and advanced form of international cooperation is the **joint border control**. The principle of joint processing is to reduce the number of stops incurred in a cross-border movement by combining the activities of the border organizations of both countries at either a single common location or at a single location in each direction in accordance with Transitional Standards 3.4 and 3.5 of the Revised Kyoto Convention of the World Customs Organization and Articles 6 and 7 of the Harmonization Frontier Controls Convention (UNECE, Trade Facilitation Implementation Guide) from the United Nations Economic Commission for Europe. The Asian Development Bank adopted this concept in its 2003 report on Joint Border Processing at Regional Border Crossings, with several different models available depending on infrastructure at BCPs (ADB 2003).

[43] Standards under the SPS Agreement distinguished from "voluntary" standards that underlie technical regulations under the WTO's TBT Agreement. It is inappropriate for the national standards organization to be regulating SPS-based standards because these standards are measures in themselves.

[44] Currently, two main institutions in Mongolia are involved in the application of SPS measures: (i) the General Agency for Specialized Inspection, reporting to the Office of the Deputy Prime Minister, which is responsible for inspecting exports and imports of food and products of animal and plant origin, and for border inspection generally; and (ii) the Veterinary and Animal Breeding Agency under the Ministry of Food and Agriculture, which is responsible for disease prevention and control, laboratory services, and accrediting and licensing veterinarians. In December 2017, the Parliament approved the new Law on Animal Health, effective from 1 June 2018, to streamline the state inspection functions on animal originated products and remove duplication of responsibilities among the agencies. The Veterinary and Animal Breeding Agency will be renamed as Mongolian Veterinary Agency.

The PRC and Mongolia have already pilot-tested joint customs control (Box 2.11). Azerbaijan and Georgia are negotiating joint customs control at selected borders and considering the inclusion of SPS functions for joint control in railway BCPs (ADB 2018).

Another crucial element of integrated border management is information management. Data collection, retrieval, and sharing in government operations related to import and export business processes could be made more efficient when gathered at a single instance and shared with other processing authorities subject to the usual confidentiality provisions. Data transmission has become burdensome with the requirement of presenting the signed and/or stamped original document in hard copy form in various physical locations. Duplication may be reduced by ensuring that

(i) Data that remain constant are not requested for each transaction but stored by the relevant agency;

(ii) Commonly needed data submitted as part of a trade transaction are shared between agencies; and

(iii) Transmission of data is digitalized and channeled through a single portal.

A comprehensive approach to communication, information, and data exchange should be agreed upon by all agencies within the forum of the interagency working group.

A comprehensive approach to communication, information, and data exchange should be agreed upon by all agencies within the forum of the interagency working group. A variety of solutions to the sharing of data may be considered. In some cases, it may be beneficial to set up a common database maintained centrally and permitting multiagency access and sharing of information with different levels of access. When designing new information technology solutions, the possibility of integration or interoperability with systems of other services should be taken into account from the beginning. Incompatibility of systems such as that of the SPS risk analysis software with Customs data management systems and different concepts of "risk management" in SPS and Customs will create more problems rather than achieve the goal of facilitating trade.

The concept of the **single electronic window** was developed as a "facility that allows parties involved in trade and transport to lodge standardized trade-related information and/or documents to be submitted once at a single entry point to fulfill all import, export, and transit-related regulatory requirements."[45] It provides a platform for a paperless exchange of trade information between participants in the trade process, largely accomplished through a single electronic lodgment. Modern single window solutions facilitate integrated electronic processes between the private sector and the state bodies and between government agencies, which ensure harmonization and transparency.

[45] Recommendation No. 33 of the United Nations Economic Commission for Europe (UNECE). While originally the concept did not include the ICT aspect as stated in the UNECE paper, "Ten years of single window implementation: Lessons learned for the future," "in our digital and internet-fuelled age, all implementations of the 'Window' have invariably been coupled with the use of ICT to help automate and create a paperless trading environment. For practical purposes, the establishment of 'Single Window' today can only be done through the use of ICT and the Internet."

Box 2.11: Joint Customs Control Project between the People's Republic of China and Mongolia

Customs cooperation has been at the core of the trade facilitation component of the Central Asia Regional Economic Cooperation Program since its establishment in 2001. Among the priority areas of customs cooperation was joint customs control (JCC), defined as the coordinated conduct of border procedures by adjacent Customs administrations based on an agreement to synchronize operations and other aspects of border control which could be through document harmonization, mutual recognition of inspection results, and joint border operation.

In September 1993, Mongolia and the People's Republic of China (PRC) signed an Agreement on Customs Mutual Assistance and Cooperation to promote good relations, facilitate the flow of goods and passengers, and cooperate against Customs offenses. This provided the legal basis for a JCC pilot to address serious delays at the border-crossing points (BCPs) of Zamyn-Uud (Mongolia)–Erenhot/Erlian (PRC) and Gashuunsukhait (Mongolia)–Gantsmod/Ganqimaodao (PRC). A steering group composed of high-level officials from the Mongolia Customs General Administration (MCGA) and the General Administration of China Customs (GACC), and technical working groups composed of field office personnel, were established at the BCP level.

The first phase of document harmonization took the form of a unified cargo manifest (UCM), which standardized essential cargo information, taking 25 data elements from the MCGA Customs declaration and GACC cargo manifest. The UCM was introduced at Zamyn-Uud (Mongolia)–Erenhot/Erlian (PRC) in 2009 and at Gashuunsukhait–Gantsmod/Ganqimaodao in 2011, requiring all trucks to use it. A PRC–Mongolia JCC Operation Process was written to guide implementation and a specific printing system was devoted to producing a unified format.

The introduction of the UCM at the two BCPs eliminated the difficulties of translation and repetitive filling out. A feedback mechanism that verifies entries ensures the consistency of exchanged information, thereby cutting down processing time. MCGA reduced its procedures from 11 to 7 steps and as a result, average waiting time for trucks dropped. Both the PRC and Mongolia customs administrations indicated improved consistency in the implementation of Customs control measures. The number of reported irregularities (e.g., false declarations, undervaluation, underweighting, forged documents) decreased and compliance was strengthened.

The JCC initiative also paved the way for intensified cooperation: GACC and MCGA established a regular meeting schedule to evaluate control operation data and communicate and solve problems as soon as possible. The two countries signed in 2010 a Protocol on Cooperation and Reciprocal Assistance in the Field of Customs, and, in June 2017, the Agreement to Improve Cooperation on Risk Management. Among the planned next steps of cooperation are expansion of UCM to other BCPs, data sharing and paperless clearance, and the mutual recognition of Customs control or inspection result. High-level support from GACC and MCGA has been critical. The phased approach has also been pragmatic and recognizes that the PRC and Mongolia are at different stages of modernization of procedures and facilities.

Source: Authors based on CAREC. 2015. Trade Facilitation Sector Progress Report and Work Plan (November 24–September 2015). https://www.carecprogram.org/uploads/2015-SOM-September-Reports-TRADE-FACILITATION.pdf; UNESCAP (2018).

Furthermore, electronic processes are more secure, and the use of ICT results in less opportunity for individual officers to infringe or influence the decision-making process. It can also lead to a central repository of trade statistics and data for use by both public and private sectors.

The single window was initially applied to export facilitation coupled with electronic submission of forms. The single-window concept is in varying stages of implementation. In Azerbaijan, a 2008 Presidential Decree stipulated its use and stated that when inspecting goods and vehicles moved across state BCPs, the authority of phytosanitary, veterinary, sanitary, and quarantine services has been delegated to customs authorities. A year after, a single system called Azerbaijan Single Automated Management System was installed. Uzbekistan's customs code provides for the concept and in 2017, it established its unified customs single-window information system. Pakistan is in the process of setting up its single window within its web-based one customs system called WeBoc. Thus far, other CAREC countries have automated customs information systems with varying functionalities aside from electronic declaration. Afghanistan, Georgia, Kazakhstan, and Turkmenistan use the Automated System for Customs Data (ASYCUDA) software developed by the United Nations Conference on Trade and Development (UNCTAD). The rest developed their own systems: Mongolia's Customs Automated Information System and the Unified Automated Information System of the Kyrgyz Republic, Tajikistan, and Uzbekistan (UNESCAP 2018).

It is important to highlight that the potential of the single window cannot be considered achieved by SPS services merely sitting close together at the border post (depending on physical arrangements) or by subordinating SPS services to another border service such as customs.

It is important to highlight that the potential of the single window cannot be considered achieved by SPS services merely sitting close together at the border post (depending on physical arrangements) or by subordinating SPS services to another border service such as customs. However, a step in the right direction is prior notification of consignments by short message service, mobile apps, or e-mail. At airports, prior notification is achieved in the form of the cargo manifest sent by the airline. An example where use of technology has improved SPS services handling between agencies and among trading partners is the PRC's introduction of its e-CIQ system.[46] In most CAREC countries, electronic exchange of SPS certificates has been among the least implemented in terms of cross-border paperless trade measures (UNESCAP 2018).

Despite its many benefits, the adoption of the single-window approach should not be considered a panacea for all the procedural issues around the export and import processes. It addresses many of the efficiency and administrative issues but not the effectiveness issues. Its introduction will only work if it is part of a systematic review and reform process that deals with the food chain from farm to fork, and which is based on modern risk- and process-based approaches. Each country should introduce the single electronic window system as a key element of the strategic SPS reform process.

[46] General Administration of Customs, People's Republic of China. China Inspection and Quarantine E-Cert System. http://ecert.eciq.cn/.

Georgia has advanced in data exchange in trade facilitation through the SPS-related projects primarily addressing close partnership with the EU—such as a cross-border data exchange with Azerbaijan, Kazakhstan, Turkey, and Ukraine; use of pre-arrival data in risk assessment and future risk profiling and transfer to the ASYCUDA; use of an X-ray scanner that can distinguish the quantities of different commodities to compare with commercial documentation; and a trusted trader scheme to move from transaction-based control to compliance-based control.

Cross-border data exchange is usually hindered by the multiplicity of different systems such as those used by some CAREC countries and their trading partners. The difficulties can be overcome by standardizing the format for data files. The PRC has entered into cooperation agreements for data exchange and system connected with New Zealand, Australia, the Netherlands, and Chile, and continues to expand with other countries.

Cross-border data exchange is usually hindered by the multiplicity of different systems such as those used by some CAREC countries and their trading partners. The difficulties can be overcome by standardizing the format for data files.

3 Conclusion and Action Plan for Modernizing Sanitary and Phytosanitary Measures in CAREC Countries

The report recognizes significant improvement in sanitary and phytosanitary (SPS) capacity in the CAREC region since the 2012 ADB study and the adoption of the Common Agenda for Modernization of SPS Measures for Trade (CAST) in 2015. However, more can be achieved toward modernizing SPS measures and enhancing SPS capacities among CAREC members. Agriculture production and trade are stymied by the lack of appropriate level of protection from entry and spread of pests and animal diseases in the region. Furthermore, effective SPS measures not only improve cross-border trade but could also influence and promote public health and potentially, the tourism sector.

Trade facilitation efforts in the region have focused on customs. Meanwhile SPS measures are perceived more as trade barriers rather than legitimate systems for the protection of human, animal and plant health, and economic resources. It is important to emphasize that trade facilitation efforts including the recent trend to subsume SPS inspection under customs authorities should not undermine the scientific principle required under the World Trade Organization (WTO) SPS Agreement and must be carefully assessed.

Effective SPS measures not only improve cross-border trade but could also influence and promote public health and potentially, the tourism sector.

The lack of a coordinated, strategic, and systematic approach by national authorities, as well as the international community, often resulted in piecemeal and ad hoc interventions in SPS capacity development in CAREC countries. Consequently, some SPS services remain outdated, under-resourced, and ineffective in providing an adequate level of protection both at the national and region-wide levels.

Under CAREC 2030 Strategy as well as ADB's Strategy 2030, fostering regional cooperation and integration remains a priority. At the operational level, ADB is expected to continue to support regional cooperation and integration operations to promote agriculture trade, develop agriculture value chains, and improve cooperation in regional public goods, particularly in sanitary and phytosanitary standards and quarantine. Under the CAREC Program, progress has been achieved particularly the establishment of national and regional SPS working groups. The national SPS working groups will lead the SPS modernization process including adoption of regulations, procedures, and requirements that are aligned with international standards, and improving capacities of border agencies to implement these measures at the border-crossing points (BCPs). The regional SPS working group will be a forum to discuss policy and regional issues, including potential harmonization of SPS measures and establishment of regional mechanisms to support CAREC countries.

Sectoral interventions (i.e., according to plant health, animal health, and food safety) while maintaining sectoral linkages based on approved national strategies are likely to be much more effective. Ensuring linkage from policy regulations to implementation in SPS requirements and procedures cannot be overemphasized.

As effective compliance essentially depends on the private sector, it is important to engage them in any SPS modernization efforts, and higher economic impact is potentially achieved if the issues of the private sector are well addressed (such as improving business processes and certification accreditation).

The study identified major investment needs particularly in diagnostic laboratories for plant and animal health and food safety. At the minimum, each country must invest in a central laboratory that is compliant with international standards and to the extent possible, obtain appropriate accreditation. On the recommendations for laboratory upgrades and increase in technical laboratory capacity, SPS-related ministries and departments are concerned about the issue of financial sustainability. Governments must therefore allocate sufficient national budget to ensure that any investment in laboratories is viable in the long term and also covers maintenance and purchase of consumables. Public–private partnerships are one way to overcome financial and capacity constraints and could be a potential area for future technical assistance cooperation.

Governments must therefore allocate sufficient national budget to ensure that any investment in laboratories is viable in the long term and also covers maintenance and purchase of consumables.

This report offers general recommendations as follows:

Plant Health

(i) Increase awareness among policy and decision makers of the need to reform primary legislation and allocate government legal expertise for preparing and enacting laws or decrees on plant health measures. Unify plant quarantine and plant protection laws, together with responsible institutions, to allocate resources better.

(ii) Hold regional workshops to develop guidelines for implementing rules and regulations to adopt priority International Standards for Phytosanitary Measures (ISPMs), initiate application for membership in the European and Mediterranean Plant Protection Organization (EPPO) for countries that are not yet members, and conduct training on pest risk analysis (PRA).

(iii) Develop national quarantine and regulated non-quarantine pest lists based on PRA and risk-based phytosanitary import requirements. National priority pests would be targeted for diagnostic capacity. National priority pests should be pooled to identify common requirements for equipment and reagents, etc.

(iv) Develop quarantine or storage facilities making use of risk-based mechanism at selected BCPs.

(v) Set up a regional technical working group to design a regionally coordinated surveillance program for key quarantine pests. Develop

unified lists of quarantine pests and regulated non-quarantine pests for the CAREC region. Potential partners are EPPO and the European Union (EU) because many of these pests might be quarantine pests or harmful organisms for the EU. Priority zoning is also needed.

Animal Health

(i) Harmonize and reform primary legislation and develop implementing rules and regulations including the adoption of definitions used in the World Organisation for Animal Health (OIE) Terrestrial Code and Aquatic Code, where appropriate. An important consideration is the continuous harmonization of veterinary legislation, particularly with that of the Eurasian Economic Union (EAEU) and the EU. Most CAREC countries (except the People's Republic of China [PRC]) require technical assistance with harmonization of legislation.

(ii) CAREC countries should prepare detailed assessments and inventory of animal health laboratory facilities and equipment based on which support could be developed accordingly.

(iii) Invest in facilities for unloading and loading of animals at the border and/or premises for quarantine of live animals, and storage of products of animal origin. Inspectors require adequate equipment for examination of live animals and sampling of pathological material.

Each CAREC country should develop plans and selection criteria for food safety parameters subject to international accreditation.

(iv) Establish risk-based categories of animal diseases important to internal and external trade and risk-based categories of goods subject to veterinary control. A unified risk-based list of products is required for animal health.

Food Safety

(i) Each CAREC country should develop plans and selection criteria for food safety parameters subject to international accreditation. Risk-based food inspections and risk-based assessments should be used rather than conformity with end-product descriptive indicators.

(ii) Adopt hazard analysis and critical control points (HACCP) in relevant food safety laws and make HACCP compulsory, simplify procedures for small and medium-sized enterprises.

(iii) Develop skills of food inspectors through capacity-building and training initiatives, including training on HACCP implementation.

(iv) At least one laboratory in each relevant CAREC member country must be internationally accredited to satisfy food safety standards (ISO 17025:2005). International standards for sampling procedures need to be applied.

(v) Organize a regional technical working group on food safety, and conduct workshops to foster knowledge and share information on regional food safety priorities and recommended actions.

Border Management

(i) Fully integrate SPS measures into border management operations through data sharing, single window, and other trade facilitation initiatives. When elements of strategically modernized SPS systems (at-the-border and behind-the-border) based on risk assessment and international standards are incorporated into an integrated transparent ICT and single-window approach, protection is improved while trade is facilitated. Greater SPS integration between customs and other SPS measures, such as food safety, needs to take place behind the border.

(ii) Each CAREC country should establish a border management strategy based on inter-service cooperation that ensures the application of animal health, plant health, and food safety regulations. Each strategy should put in place a BCP investment program, which includes inspection and sampling facilities as recommended for animal health, plant health, and food safety, and supports risk-based inspection and sampling and not traditional end-product certification.

(iii) CAREC should organize a series of forums to discuss regionally relevant SPS issues, including a regional approach to BCP development, and a regional approach to bilateral and multilateral SPS agreements, as well as participation in existing forums.

(iv) The following BCPs have been identified for possible ADB technical assistance and investment for potential upgrading and joint SPS border management (with an emphasis on perishable commodities):

  (a) Dostuk–Dustlik road BCPs at the Kyrgyz Republic and Uzbekistan border

  (b) Torugart at the Kyrgyz Republic and the PRC border (the PRC supported the improvement of the highway between the BCP and Bishkek through Issyk-kul)

  (c) Kushtegirmon BCP at the Tajikistan and Uzbekistan border

  (d) Tokham–Torkham at the Afghanistan and Pakistan border

  (e) Shirkhan Bandar–Panji Poyon at the Afghanistan and Tajikistan border

  (f) Hairatan–Termez at the Afghanistan and Uzbekistan border

  (g) Red Bridge and Beyuk Kesik border-crossing points (road and rail, respectively) at the Georgia and Azerbaijan border

  (h) Zamyn-Uud-Erenhot at the Mongolia and the PRC border

Fully integrate SPS measures into border management operations through data sharing, single window, and other trade facilitation initiatives.

Table 14 outlines an action plan for capacity building. Some recommendations are for technical assistance but the majority involve creating or improving awareness of critical SPS issues through workshops and technical training.

Table 14: Action Plan for Sanitary and Phytosanitary Capacity Building

Action		Proposed Support
• **Regulatory Framework**		
1.1	Harmonize and reform the regulatory framework and primary legislation for SPS measures.	TA
1.2	Organize the structure of competent SPS authorities and institutions to ensure adequate capacity.	TA
1.3	Develop integrated national SPS strategy consistent with the SPS Agreement and international standards (IPPC, OIE, Codex).	TA and regional workshops to raise awareness
1.4	Develop secondary legislation to implement international standards for SPS measures.	Regional workshops and training
1.5	Develop tools and guidelines for implementing SPS measures to international standards.	Regional workshops and training
1.6	Develop or amend legislation to adopt risk-based SPS measures.	Regional workshops and training
1.7	Develop a modern risk-based food safety management or HACCP-based system for food safety according to Codex standards.	Regional workshops and training
1.8	Set up a technical working group to develop a regional surveillance program for phytosanitary regulated pests. Establish risk-based national pest lists and import requirements.	Regional workshops and training
1.9	CAREC countries should continue to progress along the OIE PVS pathway.	PVS gap analysis and treatment through training and capacity building
1.10	Categorize and list animal diseases of importance to trade according to the risk to animal health, veterinary public health, and food safety.	Regional workshops and training
1.11	Establish risk-based categories and unified lists of food products and priorities on a regional basis using working groups.	Regional workshops and training
1.12	As appropriate for each country, set up a national inquiry point and provide SPS information. Ensure food business operators are aware and have the capacity to perform their SPS responsibilities, and staff are adequately trained and capable.	National awareness campaigns and training workshops
1.13	Set up efficient SPS inspection services with sufficiently trained staff.	TA and training
• **Laboratory Capacity**		
2.1	As appropriate for each country, carry out an accreditation-oriented inventory of diagnostic capacity and design a network of laboratories and inspection and sampling stations sufficient to protect from internal and external risks to plant health, animal health, veterinary public health, and food safety (chemicals and microbiology).	TA
2.2	As appropriate at regional level, consider designating specific regional reference laboratories for selected analyses.	TA and regional workshops
2.3	Prepare lists of equipment and other requirements for upgrading the laboratory and sampling infrastructure in each country.	TA followed by investment
2.4	Identify training needs at all levels and provide appropriate training in modern laboratory techniques and SOPs required to meet international SPS standards.	TA and training
2.5	Adopt laboratory quality management systems, as appropriate.	TA and training

continued on next page

Table 14 *continued*

Action		Proposed Support
2.6	As required, prepare and implement plans to progress toward eventual ISO accreditation of central laboratories.	TA and training
2.7	Improve inter-laboratory proficiency testing.	TA and training
2.8	Provide recurrent budgets for laboratory consumables.	Small-scale investment as part of SPS tests and diagnostics
2.9	At CAREC regional level, harmonize the categories, types, and maximum residue levels of food safety (chemical and microbiological) contaminants, and the moment of sampling with Codex and other international standards. Apply Codex standards to sampling protocols.	Regional workshops and training
2.10	At the regional level, agree on selected ISO 17025:2005 internationally accredited food safety parameters.	Regional workshops and training
2.11	Adopt Codex guidelines for sampling.	Regional workshops and training
• **Border Services Management**		
3.1	Provide a legal framework for a unitary organizational structure for agencies working at the border. Develop interagency agreements (e.g., memorandum of understanding) as required.	TA
3.2	For each country, create an interagency border management working group to develop and implement a coordinated border management strategy based on the single electronic window system that ensures the application of risk-based SPS measures according to international standards.	TA, national and regional workshops
3.3	Identify and designate BCPs and facilities for live animals and categories of goods subject to SPS measures. Define procedures and identify which checks will be carried out at the border and which will be done internally.	TA, training and regional workshops
3.4	Conduct pre-feasibility and prepare investment program for identified BCPs.	TA and investment
3.5	Ensure adequate staffing with suitable training to implement SPS import and export measures at a national level.	TA, training and national workshops
3.6	Develop an integrated data management system between border agencies, to the extent possible, use of ICT.	TA and training
3.7	Establish a regional working group to discuss regional SPS issues including development of BCPs and bilateral and multilateral SPS agreements.	Regional training workshops

BCP = border-crossing point, CAREC = Central Asia Regional Economic Cooperation, HACCP = hazard analysis and critical control points, ICT = information and communication technology, IPPC = International Plant Protection Convention, ISO = International Organization for Standardization, MOU = memorandum of understanding, OIE = World Organisation for Animal Health, PVS = Performance of Veterinary Services, SOP = standard operating procedure, SPS = sanitary and phytosanitary, TA = technical assistance.

Source: Authors.

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APPENDIX 1

Requirements of Sanitary and Phytosanitary Laboratories

1.1 Equipment and Test Inventory for Phytosanitary Laboratory with Basic Capacity to Identify Quarantine Pests (insects, mites, nematodes fungi, bacteria, phytoplasmas, viruses/viroids, weeds/seeds)

Prior assumptions:

(i) Laboratories are thoroughly trained in relevant procedures.

(ii) The laboratory is furbished to a high standard with air conditioning, hygienic work surfaces with power outlets, constant electricity supply (back-up generator as necessary), separate rooms for working with gels and other hazardous processes, and safe-working environment, etc.

(iii) Biosecurity measures are in place (controlled access, safe waste disposal, etc.)

(iv) Personal computers run and control equipment with up-to-date software and printing capacity.

(v) Basic glassware (petri dishes, etc.), reaction vessels, disposable items for enzyme-linked immunosorbent assay and molecular work, reagents, etc. available with adequate running budget.

(vi) Maintenance contracts for equipment.

Type of Test or Process	Equipment	Minimum Number (if appropriate)	Comments
Incubation	Incubators with precise temperature control	5	To operate at different temperatures; some require temperature cycles and cycles of light/dark, UV light
Refrigeration	Refrigerators	4	All operating at 4°C–8°C but plenty of capacity is needed, especially to separate plant materials and chemicals
–20°C storage	Freezers	3	Chest and upright
–80°C storage	Freezer for DNA and bacteria, virus samples	2	Must have back-up electricity source; may require 3-phase current
Culture shaking and/or incubation	Shakers	2–3	Flasks required, tissue culture, and temperature control

continued on next page

Table *continued*

Type of Test or Process	Equipment	Minimum Number (if appropriate)	Comments
Sterilization	Autoclaving	2–3	Separate autoclaves for media preparation and destruction of contaminated material; may need 3-phase electrical connection
Drying and sterilization	Ovens	2–3	Glassware drying; sterilization
Visual examination	Mounted magnifying glass	1	
	Microscopes, compound (objectives up to x100)	4–5	At least one with fluorescence, phase contrast, and digital output on computer
	Microscope, inverted	1	For nematodes, some insects
	Microscopes, stereo	3	
Aseptic handling	Laminar flow	2	For routine culture work: one for inoculation, one for transfers
Media, reagent, and sample preparation	Water purification	2	Deionized, distilled, double-distilled, deionized-distilled may be required for different purposes. Alternatives are essential in case of breakdown. Ultra-pure bottled water available but expensive.
	Electric balances	3	Various weight ranges
	pH meter	2	Replacement electrodes essential
	Bench centrifuge	1	
	Hot plate stirrer	2	
	Microwave oven	1	
	Class 2 biohazard cabinet	1	For molecular work or where hazard to workers
	Water bath	1	
ELISA	ELISA plate reader	1	
PCR	Microcentrifuge (for Eppendorf tubes)	1	Real-time PCR is state of the art alternative progressing to this stage without familiarity with conventional PCR should be considered carefully.
	Thermo cyclers ("PCR machine")	2	
	Gel electrophoresis	1	

ELISA = enzyme-linked immunosorbent assay, PCR = polymerase chain reaction.
Source: Asian Development Bank (compiled from TA 8386 Consultant's Report).

1.2 **Minimum Conditions for Phytosanitary Border Inspection Facilities** ("laboratory")

1. Resources:

   (i) Written, up-to-date national inspection guidelines based on the domestic legislation of the country

   (ii) Up-to-date national plant health legislation

   (iii) An up-to-date list including addresses and telephone numbers of specialized laboratories that have been officially approved for performing tests to determine the presence of pests or to identify pests

   (iv) Suitable written procedures to ensure the integrity and security of the sample(s) when moved to the laboratory and during the testing process

   (v) Database of previous consignments of plants and plant products subject to inspection and/or testing

2. Reliable electricity supply to ensure

   (i) lighting,

   (ii) equipment use, and

   (iii) communications at least during working hours.

3. System for communication by telephone and/or through the internet with

   (i) managers and experts in the phytosanitary authority, and

   (ii) the specialized laboratories referred to in paragraph 1.

4. Inspection facilities:

   (i) suitable areas for inspection, as appropriate;

   (ii) adequate lighting;

   (iii) inspection table(s) allowing bags or boxes to be emptied and then refilled;

   (iv) equipment suitable for

      (a) visual checks,

      (b) disinfecting the premises and equipment used for plant health checks, and

      (c) preparing samples for possible further tests in the specialized laboratories referred to in paragraph 1.

(v) facilities for sampling:

(a) appropriate material for the individual identification and packaging of each sample,

(b) adequate packaging material for sending samples to the specialized laboratories referred to in paragraph 1, and

(c) seals and official stamps.

1.3 Lists of Veterinary Laboratory Equipment

Provincial Diagnostic Veterinary Laboratories and Laboratory for Non-Infectious Operations—Master Mix Room

Chair, laboratory, 5 casters, adjustable seat height from 41 cm to 53 cm, non-fabric	1
Hood, PCR workstation, vertical laminar flow, 220 VAC	1
Mixer, laboratory, vortex, variable speed, 220 VAC	1
Refrigerator/freezer (4/–20°C), ~14.4 cubic feet, 220 VAC	1
Thermometer, freezer, –30°C to 0°C, NIST traceable (QA/QC item)	1
Thermometer, refrigerator, –5°C to 15°C, NIST traceable (QA/QC item)	1
Water purification system, tabletop, ultrapure water unit (Type 1 water), with reservoir feed, 220 VAC	1

Laboratory for Preparation of Polymerase Chain Reaction

Bench, laboratory, ~90 x 150 cm	6
Biological safety cabinet (BSC) (6 feet), BSC unit, with UV and base, 220 VAC	1
Cabinet, safety, flammable/acid, mini stak-a-cab	1
Cart, multishelf, mobile (for use with BSC)	1
Centrifuge, bench top, micro centrifuge, refrigerated, 220 VAC	1
Centrifuge, bench top, micro centrifuge, refrigerated, rotor, 24-place, sealable for aerosol protection	1
Chair, laboratory, 5 casters, adjustable seat height from 41 cm to 53 cm, non-fabric	3
Container, biohazardous waste, 1.5 gallon (biohazard container for BSC)	1
Container, biohazardous waste, 10 gallon, polyethylene (biohazard container for room)	1
Eyewash station, double, sealed single dose 32 oz. bottles (safety item)	0
Freezer, ultra low, –80°C, upright, ~17.2 cubic feet, 220 VAC	1
Freezer, ultra low, drawer racks for upright ultra low freezer, sized for 2-inch boxes	15
Glasses, safety (safety item)	2
Gloves, ultra low temperature, water resistant	1
Hood, PCR workstation, vertical laminar flow, 220 VAC	1
Mixer, laboratory, vortex, variable speed, 220 VAC	2
Mixer, thermomixer R, with 1.5 milliliter block, 220 VAC	1
Pan, stainless steel, bain marie cover, 2-quart capacity (biohazardous container for BSC)	4
Pan, stainless steel, bain marie pot, 2-quart capacity (biohazardous container for BSC)	4

pH meter, bench top, 220 VAC	1
pH meter, electrode holder, swing arm holder	1
Pipettor stand, acrylic	1
Pipettor, electric, biohazard filtration, 220 VAC	1
Pipettor, single channel, 0.5–10 ul	2
Pipettor, single channel, 10–100 ul	2
Pipettor, single channel, 100–1,000 ul	2
Pipettor, single channel, 2–20 ul	2
Pipettor, single channel, 20–200 ul	2
Rack, cryovial	5
Refrigerator/freezer (4/–20°C), ~14.4 cubic feet, 220 VAC	2
Spill kit, chemical (safety item)	1
Spill kit, liquid, ~20 liter (5 gallons) (safety item)	1
Stirrer, magnetic, hotplate, variable speed, 220 VAC	1
Thermometer, block heater, non-mercury (QA/QC item)	1
Thermometer, freezer, non-mercury, –30°C to 0°C, NIST traceable (QA/QC item)	2
Thermometer, refrigerator, non-mercury, –5°C to 15°C, NIST traceable (QA/QC item)	2
Thermometer, ultra low freezer, non-mercury, –90°C to 20°C, NIST traceable (QA/QC item)	1
Tray, pipette sterilizing, with cover, 18”L x 6”W x 25/8”H	2
Shaker, titer plate, vibrating/orbital, 220 VAC	1
Magnetic stand, 6 tube (ambion RNA extraction system)	1

Laboratory for Polymerase Chain Reaction Sample Loading

Bench, laboratory, ~90 x 150 cm	2
Eyewash station, double, sealed single dose 32 oz. bottles (safety item)	0
Hood, PCR workstation, vertical laminar flow, 220 VAC	1
Pipettor stand, acrylic	1
Pipettor, single channel, 0.5–10 ul	2
Pipettor, single channel, 2–20 ul	2
Pipettor, multichannel, 12 channel, 5–50 ul	1
Pipettor, multichannel, 12 channel, 50–300 ul	1

Laboratory for Polymerase Chain Reaction Instruments

Bench, laboratory, ~90 x 150 cm	2
Container, biohazardous waste, 10 gallons, polyethylene (biohazardous container for room)	1
Eyewash station, double, sealed single dose 32 oz. bottles (safety item)	0
Glasses, safety (safety item)	2
Standard light cycler 480 real-time PCR 96-well, with laptop computer and printer	1
Uninterrupted power supply for PCR machine, sized to SmartCycler, 220 VAC	1

Office of Polymerase Chain Reaction laboratory

Computer	1
Desk, office	2
Printer	1
Table, computer	1

District Veterinary Diagnostic Laboratories/Laboratory for Collection and Processing of Samples from the Field

Biological safety cabinet (BSC) (6 feet), BSC unit, with UV and base, 220 VAC	1
Biological safety cabinet (BSC) (6 feet), exhaust HEPA filter (spare part)	1
Biological safety cabinet (BSC) (6 feet), supply HEPA filter (spare part)	1
Centrifuge, bench top, general purpose centrifuge, refrigerated, 220 VAC	1
Centrifuge, bench top, rotor for general purpose centrifuge, swinging bucket, 4 x 250 ml	1
Centrifuge, bench top, sealable carrier bucket (aerosol protection), for general purpose centrifuge, 10–15 ml tube	1
Centrifuge, bench top, sealable carrier bucket (aerosol protection), for general purpose centrifuge, 3–5 ml tube	1
Centrifuge, bench top, sealable carrier bucket (aerosol protection), for general purpose centrifuge, 5–7 ml tube	1
Centrifuge, bench top, sealable carrier bucket (aerosol protection), for general purpose centrifuge, 50 milliliter tube	1
Chair, laboratory, 5 casters, adjustable seat height from 41 cm to 53 cm, non-fabric	1
Container, biohazardous waste, 1.5 gallon (biohazard container for BSC)	1
Container, biohazardous waste, 10 gallon, polyethylene (biohazardous container for room)	1
Eyewash station, double, sealed single dose 32 oz. bottles (safety item)	1
Freezer, ultra low, –80°C, upright, ~17.2 cubic feet, 220 VAC	1
Freezer, ultra low, drawer racks for upright ultra low, sized for 2-inch boxes	15
Glasses, safety (safety item)	2
Gloves, ultra low temperature, water resistant	1
Mixer, laboratory, vortex, variable speed, 220 VAC	1
Pan, stainless steel, bain marie cover, 2 quarts capacity (biohazardous container for BSC)	4
Pan, stainless steel, bain marie pot, 2 quarts capacity (biohazardous container for BSC)	4
Refrigerator/freezer (4/–20°C), ~14.4 cubic feet, 220 VAC	1
Thermometer, freezer, non-mercury, –30°C to 0°C, NIST traceable (QA/QC item)	1
Thermometer, refrigerator, non-mercury, –5°C to 15°C, NIST traceable (QA/QC item)	1
Thermometer, ultra low freezer, non-mercury, –90°C to 20°C, NIST traceable (QA/QC item)	1
Thermometer, water bath, non-mercury, –20°C to 150°C, ~300 MB NIST traceable (QA/QC item)	1
Tray, pipette sterilizing, with cover, 18”L x 6”W x 25/8”H	2

Source: Asian Development Bank (compiled from TA 8386 Consultant’s Report).

1.4 Recommendations on National Veterinary Capacity and Equipment—Regional and Country Level

(i) (a) an inventory of diagnostic capacities in units of the veterinary laboratory network at all levels; (b) assessment of feasibility for application of OIE-listed prescribed tests with capacities existing at central level; (c) assessment of feasibility for application of OIE-listed alternative tests with capacities at provincial level; and (d) categorization of units of the network in accordance with their capabilities to diagnose endemic transboundary animal diseases (TADs) and zoonotic diseases at provincial level (for all countries except the People's Republic of China [PRC]).

(ii) (a) design and establishment of quality management system in central veterinary laboratories and in veterinary laboratory of at least one regional center; (b) preparation of laboratory facilities at central level for accreditation in accordance with ISO 17025:2005 standard; (c) participation in international training courses on application of standards prescribed in the Terrestrial Code (particularly those in Chapters 1.1.1–1.1.3 and 1.1.3a) and corresponding standards of the Aquatic Code of the OIE for laboratory personnel at central level (for all countries except the PRC and Kazakhstan).

(iii) renovation of facilities and provision of laboratory equipment for (a) at least 2 diagnostic laboratories at provincial level—PCR equipment (Afghanistan, the Kyrgyz Republic, Tajikistan, Turkmenistan); (b) at least 8 diagnostic laboratories at district level—sample processing equipment (Afghanistan, the Kyrgyz Republic, Tajikistan, Turkmenistan, Mongolia); (c) at least 10 hygiene laboratories at all levels (Afghanistan, Azerbaijan, Kazakhstan, the Kyrgyz Republic, Pakistan, Tajikistan, Turkmenistan); (d) at least 2 border inspection posts (all countries except the PRC and Kazakhstan).[1]

(iv) provision of on-the-spot training on (a) sampling handling, packaging, and transportation of samples for at least 50 laboratory personnel at district level, at least 30 laboratory personnel at provincial level, and at least 15 veterinary officers at border inspection posts; (b) diagnosis of selected diseases for at least 15 laboratory personnel at provincial level, and for at least 5 laboratory personnel at central level; and (c) proficiency testing and test validation for at least 10 laboratory personnel at central level (for all countries except the PRC).

1.5 Food Microbiology Laboratory Equipment

The CAREC countries in general have limited capacity to test the entire range of pathogenic bacteria.

The tests are conducted according to classical methods, which takes up to 3 to 4 days to produce results. There is very limited capacity to test pathogenic strains of *E. coli* and *Salmonella*. There is very limited capacity to test the water activity (Aw). The (Mini) Vidas is the essential equipment to be purchased to enable the laboratory to analyze the series of pathogenic bacteria, pathogenic strains of *E. coli*, *Campylobacter*, etc. Results can be produced within 24 hours or a maximum of 48 hours.

[1] The recommended equipment for diagnostic laboratories is listed in Appendixes 1.1 and 1.3.

The water activity meter is needed to determine the water activity of certain food products.

The following table gives an estimate of costs:

	Type of Equipment	Price in $
1	VIDAS® automated immunoassay (ELFA) or Mini Vidas	45,000
2	Tests for the various pathogenic bacteria	8,000
3	Water activity meter (desk type)	15,000
4	Laboratory glass washer and accessories	15,000
5	Laboratory sterilizer	13,000
6	(Cooled) incubators	12,000
7	Small laboratory accessories and equipment such as pH meter	10,000
8	Glassware	10,000
9	Microbiological agents, media, reference materials	15,000
10	Training	5,000
	Total	**$148,000**

Source: Asian Development Bank (compiled from TA 8386 Consultant's Report).

Investment in the equipment listed above enables a laboratory to analyze the presence of

(i) *Listeria monocytogenus*, *E. coli*, and *E. coli* O157:H7, *Salmonella*, *Campylobacter*, and enterotoxins of *Staphylococcus aureus*.

(ii) Results can be produced from 8 hours to 24 to 48 hours depending on the type of organism.

(iii) Water activity to be determined of a large number of products.

Cost of international accreditation according to ISO 17025:2005 for a single food microbiological analysis is estimated at $20,000.

1.6 Laboratory Equipment for Chemical Contaminants

Type of Chemical Contaminants in Food Products	Specific Chemical Contaminants to Be Tested	Basic Equipment Required	Cost ($) (A)	Cost of Additional Equipment (B)	Additional Reagents, Test Kits, Standard Reference Materials as Part of Operational Cost (C)	Total Cost to Complete the Laboratory ($) (A)+(B)+(C)
ANTIBIOTICS	a) Chloramphenicol[a] b) Nitrofurans[a] Furazolidone (AOZ) Furatadone (AMOZ) Nitrofurantoin (AHD)	LC MS MS[b]	280,000		5,000	285,000
	c) Sulphonamides Sulfadimidine Sulfadiazine Sulfadimethoxine Sulfadoxine Sulfamerazine Sulfanilamide Sulfamethoxypyridazine Sulfamethoxazol Sulfathiazol Trimethoprim	ELISA	100,000	20,000[c]	5,000	125,000
	d) Streptomycin	ELISA			5,000	5,000
	e) Tetracyclines Tetracyclin Oxytetracyclin Chlortetracyclin Doxycyclin	ELISA			5,000	5,000
PESTICIDES (priority)	Organochlorine compounds Chlorobenzilate Hexachlorobezene (Benzenehexachloride) pp—DDT op—DDT pp—DDE pp—DDD alpha—HCH beta—HCH Lindane Vinclozolin	Start off with ELISA for types of pesticides			5,000	5,000
		GC-MS/MS[d]	180,000	20,000	5,000	205,000
	Organophosphorus compounds Coumaphos Malathion Phosalone	GC-MS or LC-MS-MS, respectively	110,000		5,000	115,000

continued on next page

Table *continued*

Type of Chemical Contaminants in Food Products	Specific Chemical Contaminants to Be Tested	Basic Equipment Required	Cost ($) (A)	Cost of Additional Equipment (B)	Additional Reagents, Test Kits, Standard Reference Materials as Part of Operational Cost (C)	Total Cost to Complete the Laboratory ($) (A)+(B)+(C)
	Pyrethroids (insecticides) Cyfluthrin Cypermethrin Deltamethrin Permethrin Fenvalerate Fluvalinate Cyhalothrin	GC MS/MS	See above			
	Carbamates (insecticides) Carbofuran Propoxeur Carbaryl	GC-MS or LC-MS-MS, respectively	See above			
	Miscellaneous (pesticides) Cymiazol Amitraz Brompropylat Chinomethionat	GC-MS or LC-MS-MS, respectively	See above			
PESTICIDES in water	Pesticides residues in water	GS-MS/MS, LC-MSMS, and GC ECD	See above and below			
MYCOTOXINS	The series of mycotoxins such as Aflatoxine M1, Aflatoxine B1, B2, G1, and G2 Fumonisines Deoxinivalenol (DON) Trichothecenes Zearalenon (ZON) Ochratoxin A Aflatoxins Patulin	LC-MS-MS/ CL	See above		10,000	10,000
HEAVY METALS	Heavy metals lead, cadmium, mercury, zinc, tin, arsenic, other mineral elements	ET-AAS[e]	100,000		5,000	105,000

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Table *continued*

Type of Chemical Contaminants in Food Products	Specific Chemical Contaminants to Be Tested	Basic Equipment Required	Cost ($) (A)	Cost of Additional Equipment (B)	Additional Reagents, Test Kits, Standard Reference Materials as Part of Operational Cost (C)	Total Cost to Complete the Laboratory ($) (A)+(B)+(C)
PCBs	Polychlorinated biphenyls	GC-ECD/ NPD[f]	90,000		2,000	92,000
DIOXINS	Dioxins Sum of dioxins (WHO PCDD/F-TEQ) Sum of dioxins and dioxin like (WHO PCDD/F-PCB-TEQ)	HRGC/ HRMS[g]				
PAHs	Polynuclear aromatic hydrocarbons such as benzopyrene	GS-MS/MS	See above			
3-MCPD	3-MonoChloroPropane 1,2 Diol (3 MCPD)[h]	GS-MS	See above		10,000	10,000
MELAMINE	Melamine	LC MS	120,000			120,000
RADIOACTIVITY	Radionuclides such as Caesium 134 and 137	Gamma Spectrometer	60,000		2,000	62,000
	Proficiency testing schemes for 1 year					10,000
	Accreditation expenses 1 to 3 years[i]					40,000
	Total Capital Investment					**1,194,000**

ELISA = enzyme-linked immunosorbent assay, PAHs = polyaromatic hydrocarbons, PCB = polychlorinated biphenyl, SEM = MaxSignal Nitrofurazone, WHO = World Health Organization.

[a] Chloramphenicol and Nitrofurans MUST be absent. Therefore, LC MS MS is needed (in the mid to long term).
[b] LC MS MS = Liquid Chromatography/Mass Spectrometry/Mass Spectrometry.
[c] For these tests, additional equipment is needed: sample preparation equipment, rotary evaporator, and glassware blenders centrifuge. Also, reader, washer, and incubator have to be available.
[d] GC/MS-NICI = Gas Chromatography with Negative Ion Chemical Ionization Mass Spectrometry
[e] ET-AAS = Electro Thermal Atomic Absorption Spectrometry with Hydride capability.
[f] PCBs to be analyzed with GC ECD /NPD Gas Chromatography with Electron-Capture and Nitrogen-Phosphorus Detection.
[g] HRGC/HR MS = High Resolution Gas Chromatography – High Resolution Mass Spectrometer.
[h] 3-MCPD are analyzed in hydrolyzed vegetable protein and soy sauce. Cause: 3-MCPD may be formed as a result of a reaction between a source of chlorine (e.g., chlorinated water or salt) in the food or a food contact material, and a lipid source.
[i] These are additional expenses to achieve accreditation for additional tests each over the next 3 years ($40,000 and $20,000 for the first year).

Source: Asian Development Bank (compiled from TA 8386 Consultant's Report).

In addition to the above, legislation also has to be put in place and factories have to comply with hygiene and food safety system requirements.

1.7 Codex Standards Relevant to Border Control

(i) CAC/GL 26-1997: Guidelines for the design, operation, assessment, and accreditation of food import and export inspection and certification systems. These guidelines provide a framework for developing import and export inspection and certification systems consistent with the principles for food import and export inspection and certification.

(ii) CAC/GL 38-2001: Guidelines for design, production, issuance, and use of generic official certificates. These provide guidance to countries on the design, production, issuance, and use of official certificates to attest that food presented for international trade has met the importing country's requirements relating to food safety and/or ensuring fair practices in the food trade.

(iii) CAC/GL 47-2003: Guidelines for food import control systems. This document provides a framework for developing and operating an import control system to protect consumers and facilitate fair practices in food trade while ensuring that unjustified technical barriers to trade are not introduced.

(iv) CAC/GL 82-2013: Principles and guidelines for national food control systems. This document is intended to provide practical guidance to assist the national government and the competent authority in the design, development, operation, evaluation, and improvement of the national food control system. It highlights the key principles and core elements of an efficient and effective food control system.

(v) CAC/GL 53-2003, Version 2008: Guidelines on the judgment of equivalence of sanitary measures associated with food inspection and certification systems. Equivalence is the state wherein sanitary measures applied in an exporting country, though different from the measures applied in an importing country, achieve, as demonstrated by the exporting country, the importing country's appropriate level of sanitary protection.

APPENDIX 2

Animal Diseases of Importance to CAREC Trade

Disease	Pathogenic Potential			
	Animal	TAD[a]	Zoonotic	Food-borne
Foot-and-mouth disease (FMD)	+	+	–	–
Bluetongue disease (BTD)	+	+	–	–
Johne's disease (JND)	+	–	–	–
Rift Valley fever (RVF)	+	+	+	–
West Nile fever (WNF)	+	+	+	–
Q fever	+	–	+	+
Campylobacteriosis (*Campylobacter spp.*)	+	–	+	+
Bovine tuberculosis (BTB)	+	–	–	–
Bovine enzootic leucosis (BEL)	+	–	–	–
Lumpy skin disease (LSD)	+	+	–	–
Trichomonosis	+	–	–	–
Contagious equine metritis (CEM)	+	–	–	–
Equine encephalomyelitis (EEM)	+	–	–	–
Equine infectious anemia (EIA)	+	+	–	–
Glanders	+	–	+	–
Strangles	+	–	–	–
Dourine	+	–	–	–
Equine viral arthritis (EVA)	+	–	–	–
Contagious caprine pleuropneumonia (CCPP)	+	+	–	–
Contagious bovine pleuropneumonia (CBPP)	+	+	–	–
Sheep and goat pox (SGP)	+	+	–	–
Peste des petits ruminants (PPR)	+	+	–	–
Classical swine fever virus (CSF)	+	+	–	–
Porcine reproductive and respiratory syndrome (PRRS)[b]	+	+	–	–
Avian influenza (AI)[c]	+	+	+	–
Newcastle disease (NCD)	+	+	–	–
Gumboro disease (GMD)	+	–	–	–
Marek's disease (MRD)	+	–	–	–
Avian infectious bronchitis	+	–	–	–

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Table *continued*

Disease	Pathogenic Potential			
	Animal	TAD[a]	Zoonotic	Food-borne
Avian infectious laryngotracheitis	+	–	–	–
Avian mycoplasmosis	+	–	–	–
Avian chlamydiosis	+	–	–	–

[a] Transboundary animal disease.

[b] Porcine reproductive and respiratory syndrome (PRRS) is recognized as an economically important swine disease worldwide. This disease was first discovered in the United States, then in Europe and in Asia in the early 1990s. In 2006, a disease that was called "porcine high fever syndrome" emerged in and spread throughout the country causing serious disease in pigs. Several laboratories in the People's Republic of China (PRC) isolated PRRS viruses from pigs suffering from this disease. The subsequent genetic and pathogenicity analysis of those viruses indicated that the disease was associated with an atypical highly virulent strain of PRRS virus. The disease caused by this new variant strain is now called highly pathogenic PRRS and therefore further in the text it is referred as HP-PRRS.

[c] It should be noted that avian influenza (AI) is caused by the influenza virus type "A," which affects birds and mammalian species including humans. There are many strains of AI viruses and generally they can be classified into two categories: low pathogenic AI (LPAI) that typically causes little or no clinical signs in birds and highly pathogenic AI (HPAI) that can cause severe clinical signs and/or high mortality in birds. The HPAI H5N1 strain of AI virus attracted much attention in 2005–2008 because of outbreaks in domestic and wild birds as well as mortality of people from this disease in other countries of Southeast Asia. Low pathogenic strains of AI H5N1 virus exist but do not produce significant clinical signs in birds.

Source: Asian Development Bank (compiled from TA 8386 Consultant's Report).

Modernizing Sanitary and Phytosanitary Measures in CAREC

An Assessment and the Way Forward

This publication assesses the plant health, animal health, and food safety measures of member countries of the Central Asia Regional Economic Cooperation (CAREC) Program. The assessment covers laws and procedures governing the oversight and application of sanitary and phytosanitary measures, laboratory infrastructure, and border services management. CAREC members include Afghanistan, Azerbaijan, the People's Republic of China, Georgia, Kazakhstan, the Kyrgyz Republic, Mongolia, Pakistan, Tajikistan, Turkmenistan, and Uzbekistan.

About the Central Asia Regional Economic Cooperation Program

The Central Asia Regional Economic Cooperation (CAREC) Program is a partnership of 11 member countries and development partners working together to promote development through cooperation, leading to accelerated economic growth and poverty reduction. It is guided by the overarching vision of "Good Neighbors, Good Partners, and Good Prospects". CAREC countries include: Afghanistan, Azerbaijan, the People's Republic of China, Georgia, Kazakhstan, the Kyrgyz Republic, Mongolia, Pakistan, Tajikistan, Turkmenistan, and Uzbekistan.

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ASIAN DEVELOPMENT BANK
6 ADB Avenue, Mandaluyong City
1550 Metro Manila, Philippines
www.adb.org