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COMMISSION ON GENETIC RESOURCES FOR FOOD AND AGRICULTURE

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INTERGOVERNMENTAL TECHNICAL WORKING GROUP ON ANIMAL GENETIC RESOURCES FOR FOOD AND AGRICULTURE

Eleventh Session

19 - 21 May 2021

SYNTHESIS PROGRESS REPORT ON THE IMPLEMENTATION OF THE GLOBAL PLAN OF ACTION FOR ANIMAL GENETIC RESOURCES - 2020

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EXECUTIVE SUMMARY

This report presents an analysis of progress made in the implementation of the Global Plan of Action for Animal Genetic Resources (Global Plan of Action)[1] since its adoption in 2007. It updates the information presented in the *Synthesis progress report on the implementation of the Global Plan of Action for Animal Genetic Resources – 2012*[2] and *Synthesis progress report on the implementation of the Global Plan of Action for Animal Genetic Resources – 2014.*[3]

The report is based on data collected via a reporting process originally endorsed by the Commission on Genetic Resources for Food and Agriculture (Commission) at its Fourteenth Regular Session in 2013[4] and reconfirmed at the Seventeenth Regular Session in 2019.[5] Countries, regional focal points and networks for animal genetic resources, and relevant international organizations were invited to complete questionnaires on their implementation of activities relevant to the implementation of the Global Plan of Action.

The analysis of country-level implementation presented in this report is based on the set of indicators that were used in the preparation of the 2012 and 2014 synthesis progress reports and were agreed upon by the Commission at its Fourteenth Regular Session.[6] Indicator scores were calculated for individual countries and at subregional, regional and global levels. The impact of the Global Plan of Action was assessed based on the proportion of countries reporting progress in the various elements of the Global Plan of Action since its adoption in 2007.

Country progress reports were submitted by 104 countries in 2019. Reports were received from four subregional or regional focal points or networks and from 14 international organizations. All reports have been made available on the FAO web site.[7,8],[9]

The country reports reveal that many countries have continued to strengthen their activities in the various strategic priority areas of the Global Plan of Action, especially regarding Strategic Priority Area 4 (Policies, institutions and capacity-building). However, both the overall level of implementation and the amount of progress since the adoption of the Global Plan of Action vary greatly among both countries and regions. Implementation is generally reported to be at a high level in Europe and the Caucasus and in North America, at a medium level in Africa, Asia, and Latin America and the Caribbean and at a low level in the Near and Middle East and Southwest Pacific regions. Some caution is, however, needed in interpreting these regional differences, because of gaps in the country coverage. Individual countries from all developing regions have high indicator scores for some of the strategic priorities of the Global Plan of Action. Likewise, some countries in developed regions have low indicator scores for some strategic priorities. For the world as a whole, Strategic Priority Areas 1 (Characterization, inventory and monitoring of trends and associated risks) and 4 (Policies, institutions and capacity-building) have a higher level of implementation, especially compared to Strategic Priority Area 3 (Conservation).

The regional progress reports indicate varying degrees of progress since the first round of reporting. The European Regional Focal Point (ERFP), the longest established regional focal point, continues to report activities across all strategic priority areas. The Association for Strengthening Agricultural Research in Eastern and Central Africa (ASARECA), which serves as the Subregional Focal Point for East Africa, also reported activities in all four strategic priority areas. Support for a range of activities across the strategic priority areas was also reported by the Regional Focal Point for Latin America and the

[1] http://www.fao.org/3/a1404e/a1404e00.htm
[2] CGRFA/WG-AnGR-7/12/Inf.3.
[3] CGRFA/WG-AnGR-8/14/Inf.5
[4] CGRFA-14/13/Report, paragraph 72.
[5] CGRFA-17/19/Report, paragraph 85.
[6] CGRFA-14/13/Report, paragraph 28.
[7] http://www.fao.org/animal-genetics/global-policy/reporting-system/countries/en/
[8] http://www.fao.org/animal-genetics/global-policy/reporting-system/regions/en/
[9] http://www.fao.org/animal-genetics/global-policy/reporting-system/international-organizations/en

Caribbean and the Asian Animal Genetic Resources Network.

International organizations continue to make significant contributions to the implementation of the Global Plan of Action. In general, these actors stress the involvement of local stakeholders to ensure ownership and to maximize impact. The activities of these organizations span the four strategic areas.

Despite the promising results described in this report, the task of improving the management of the world's animal genetic resources for food and agriculture remains far from complete. The reasons for this shortfall continue to include a lack of financial resources and institutional and human capacity. Decision-makers are encouraged to use the country-level indicators presented in this report as a means of identifying strategic priority areas and strategic priorities where national action is particularly required.

I. INTRODUCTION

In September 2007, the International Technical Conference on Animal Genetic Resources for Food and Agriculture, held in Interlaken, Switzerland, adopted the Global Plan of Action for Animal Genetic Resources (Global Plan of Action).[10] The Global Plan of Action was subsequently endorsed by the Thirty-fourth Session of the FAO Conference.[11] The main responsibility for implementing the Global Plan of Action lies with national governments.[12] However, some strategic priorities are particularly relevant to implementation at regional or international levels. Table 1 illustrates the main levels of implementation (national, regional or international) for each strategic priority.

The Commission on Genetic Resources for Food and Agriculture (Commission), at its Eleventh Regular Session in 2007, agreed that follow-up to the International Technical Conference should be part of the Commission's Multi-Year Programme of Work and that the Commission should oversee the implementation of the Global Plan of Action.[13] The Commission also requested the development of modalities for evaluating progress in the implementation of the Global Plan of Action.[14]

At its Twelfth Regular Session in 2009, the Commission adopted a schedule for reporting on the implementation of the Global Plan of Action, which involves the preparation of country progress reports by individual countries, as well as reports from regional focal points for animal genetic resources and relevant international organizations. The Commission endorsed the flexible use of a questionnaire[15] prepared by FAO to assist countries in the preparation of their country progress reports, and requested FAO to enable countries to report electronically.[16] The first round of reporting led to the preparation of the *Synthesis progress report on the implementation of the Global Plan of Action for Animal Genetic Resources – 2012*.[17] A second round in 2014, undertaken as part of the reporting process for the preparation of *The Second Report on the State of the World's Animal Genetic Resources for Food and Agriculture*,[18] resulted in the *Synthesis progress report on the implementation of the Global Plan of Action for Animal Genetic Resources – 2014*.[19]

At its Seventeenth Regular Session, the Commission endorsed the preparation of a third review of progress in the implementation of the Global Plan of Action, following the reporting format that had been used for the preparation of the previous synthesis reports.[20]

II. PROGRESS IN THE IMPLEMENTATION OF THE GLOBAL PLAN OF ACTION AT THE COUNTRY LEVEL

A. Data collection

The questionnaire for reporting by countries and international organizations consisted primarily of multiple-choice questions for which responses were obligatory. Most of these questions also included text boxes, in which countries and organizations could voluntarily provide descriptions of their activities or clarifications of their response to the multiple-choice questions.

[10] http://www.fao.org/3/a1404e/a1404e00.htm
[11] C 2007/REP, paragraph 147.
[12] Global Plan of Action for Animal Genetic Resources, paragraph 56; http://www.fao.org/docrep/010/a1404e/a1404e00.htm.
[13] CGRFA-11/07/Report, paragraph 17.
[14] CGRFA-11/07/Report, paragraph 23.
[15] CGRFA-12/09/Inf.9.
[16] CGRFA-12/09/Report, paragraph 38.
[17] CGRFA/WG-AnGR-7/12/Inf.3 at http://www.fao.org/docrep/meeting/026/me636e.pdf
[18] http://www.fao.org/3/a-i4787e.pdf
[19] CGRFA/WG-AnGR-8/14/Inf.5 at http://www.fao.org/3/a-at136e.pdf
[20] CGRFA-17/19/Report, paragraph 85.

Table 1. Priority levels of implementation (national, regional or international) of the strategic priorities of the Global Plan of Action for Animal Genetic Resources

GLOBAL PLAN OF ACTION FOR ANIMAL GENETIC RESOURCES	STRATEGIC PRIORITY AREA 1 CHARACTERIZATION, INVENTORY AND MONITORING OF TRENDS AND ASSOCIATED RISKS	STRATEGIC PRIORITY AREA 2 SUSTAINABLE USE AND DEVELOPMENT	STRATEGIC PRIORITY AREA 3 CONSERVATION	STRATEGIC PRIORITY AREA 4 POLICIES, INSTITUTIONS AND CAPACITY BUILDING
NATIONAL	**SP 1** Inventory and characterize AnGR, monitor trends and risks associated with them, and establish country-based early-warning and response systems	**SP 3** Establish and strengthen national sustainable use policies **SP 4** Establish national species and breed development strategies and programmes **SP 5** Promote agro-ecosystems approaches to the management of AnGR **SP 6** Support indigenous and local production systems and associated knowledge systems of importance to the maintenance and sustainable use of AnGR	**SP 7** Establish national conservation policies **SP 8** Establish or strengthen in situ conservation programmes **SP 9** Establish or strengthen ex situ conservation programmes	**SP 12** Establish or strengthen national institutions, including national focal points, for planning and implementing AnGR measures, for livestock sector development **SP 13** Establish or strengthen national educational and research facilities **SP 14** Strengthen national human capacity for characterization, inventory, and monitoring of trends and associated risks, for sustainable use and development, and for conservation **SP 18** Raise national awareness of the roles & values of AnGR **SP 20** Review and develop national policies and legal frameworks for AnGR
REGIONAL			**SP 10** Develop and implement regional and global long-term conservation strategies	**SP 17** Establish Regional Focal Points and strengthen international networks
INTERNATIONAL	**SP 2** Develop international technical standards and protocols for characterization, inventory, and monitoring of trends and associated risks		**SP 11** Develop approaches and technical standards for conservation	**SP 15** Establish or strengthen international information sharing, research and education **SP 16** Strengthen international cooperation to build capacities in developing countries and countries with economies in transition, **SP 19** Raise regional and international awareness of the roles and values of AnGR **SP 21** Review and develop international policies and regulatory frameworks relevant to AnGR **SP 22** Coordinate the Commission's efforts on AnGR policy with other international forums **SP 23** Strengthen efforts to mobilize resources, including financial resources, for the conservation, sustainable use and development of AnGR

In March 2019, FAO invited via Circular State Letter CSL C/AGA-5 of 4 March 2019 all countries to prepare country reports using an electronic questionnaire,[21] which was made available individually to each National Coordinator for the Management of Animal Genetic Resources (NC-AnGR) together with a unique username and password. Countries were requested to submit their reports by 31 July 2019 and were informed that use of the electronic questionnaire was compulsory, as this would enable FAO to transfer the data to a database for analysis. A similar invitation was dispatched to international organizations. The coordinators of regional focal points and networks received their invitations from the Secretary of the Intergovernmental Technical Working Group on Animal Genetic Resources for Food and Agriculture in September 2019 and were provided access to the questionnaires of countries within their respective regions.

B. Data analysis

Status of implementation of the Global Plan of Action

Prior to the preparation of the first synthesis progress report, a set of indicators had been developed for use in summarizing the information reported in the country progress reports: six indicators at strategic priority area level (one for each of the four strategic priority areas, one for the state of collaboration and one for the state of funding – the latter two relating to Part 3 of the Global Plan of Action "Implementation and financing …"); and 14 indicators at strategic priority level (addressing the 13 strategic priorities intended for implementation mainly at national level – one indicator per strategic priority, except for Strategic Priority 1, for which two indicators were established). Targets were formulated for each of the indicators. The use of these targets and indicators to monitor progress in the implementation of the Global Plan of Action was agreed upon by the Commission at its Fourteenth Regular Session.[22] Each indicator is based on one or more of the multiple-choice questions in the country progress report questionnaire. The relationships between the questions and the indicators are shown in Annex 1. Because of the concise nature of the questionnaire agreed upon by the Commission, in some cases, the set of questions associated with a given indicator does not fully cover all aspects of the respective strategic priority or strategic priority area.

The indicator scores are calculated as follows: (i) The answers to the multiple-choice questions are classified into three categories**:** low level of implementation (no action undertaken); medium level of implementation (some action undertaken, but more required to achieve full implementation); and high level of implementation (action completed either prior to or since the adoption of the Global Plan of Action). (ii) Each of these levels of implementation are assigned a score (0 = low level of implementation; 1 = medium level of implementation; 2 = high level of implementation). (iii) An overall score for each indicator is obtained by calculating the arithmetic mean of the scores for all the questions assigned to the respective indicator. (iv) Scores are calculated at national, subregional, regional and global levels.

Classification of countries into regions and subregions is based on the classification system used in *The State of the World's Animal Genetic Resources for Food and Agriculture*[23] (see Figure 1).

For presentation purposes, indicator scores are divided into eight classes, evenly distributed between the minimum score of 0 and the maximum score of 2. The eight classes are represented by eight colours – three shades of green (representing high levels of implementation), two of yellow (representing medium levels of implementation) and three of red (representing low levels of implementation). The colours and their respective scores and levels are shown in Table 2.

[21] The invitation, questionnaire and instructions are published at:
http://www.fao.org/animal-genetics/global-policy/reporting-system/reporting-processes/en/
[22] CGRFA-14/13/Report, paragraph 28.
[23]http://www.fao.org/docrep/010/a1250e/a1250e00.htm

Table 2. Colour scale used to express the indicators

Scores for colour class	Indicator colour	Indicator level
0.00 – 0.25		Low
>0.25 – 0.50		Low
>0.50 – 0.75		Low
>0.75 – 1.00		Medium
>1.00 – 1.25		Medium
>1.25 – 1.50		High
>1.50 – 1.75		High
>1.75 – 2.00		High

Impact of the Global Plan of Action

In addition to presenting the above-described indicators of the current state of implementation of the various elements of the Global Plan of Action, this synthesis progress report includes an analysis of the extent to which the implementation of Global Plan of Action has led to changes in the targeted fields of activity.[24] Many of the multiple-choice questions in the country progress report questionnaire allow countries to indicate whether the reported level of implementation is a result of progress made before or since the adoption of the Global Plan of Action. The potential answers fall into three categories:

- the respective action was fully implemented prior to the adoption of the Global Plan of Action in 2007 (such answers were classified as "completed before");
- progress has been made since the adoption of the Global Plan of Action, with the respective action now either fully or partially completed (such answers were classified as "progress"); and
- the respective action has not yet been fully implemented (or has not been implemented at all) and no progress has been made since the adoption of the Global Plan of Action (such answers were classified as "no progress").

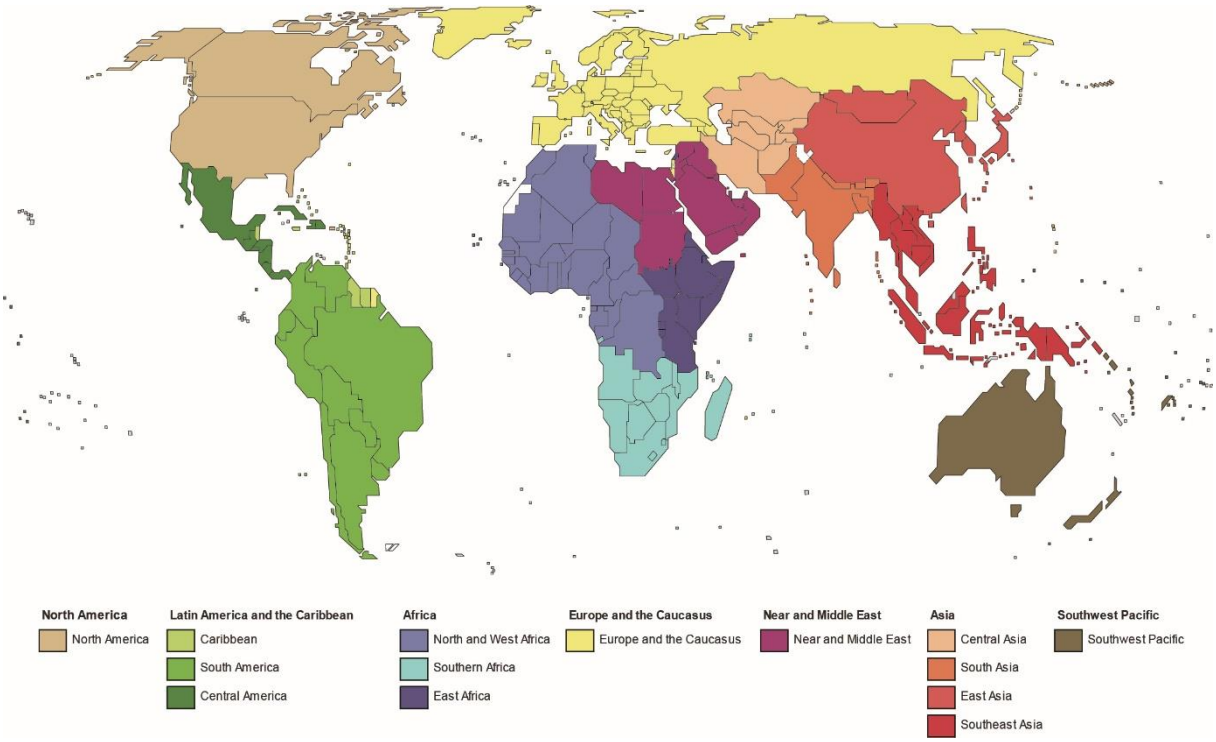
For each strategic priority area, the number of responses falling into each of the three categories was counted and the results presented as relative frequencies (percentages).

Relating process and resource indicators

In addition to agreeing to the use of the above-described targets and indicators for monitoring progress in the implementation of the Global Plan of Action (process indicators), the Commission, at its Fourteenth Regular Session, agreed to the use of a set of indicators for monitoring the status and trends of animal genetic resources for food and agriculture (resource indicators).[25,26] A graphical method of relating resource indicators to process indicators has been developed for Strategic Priority Area 1. For each region, the percentage of national breed populations (excluding extinct breeds) with unknown status for risk of extinction (also referred to as "risk status") is plotted against the regional process indicator score for Strategic Priority Area 1. Relationships between process and resource indicators in other strategic priority areas have not been explored. Strategic Priority Area 1 involves inventory, surveying and monitoring of animal genetic resources for food and agriculture and thus associates more directly to monitoring of the status of national breed populations than do the other strategic priority areas.

[24]For the purpose of the analysis, any relevant activity undertaken after the adoption of the Global Plan of Action was considered to constitute implementation of the Global Plan of Action. No attempt was made to distinguish activities that might have occurred even if there had been no Global Plan of Action.
[25] CGRFA-14/13/Report, paragraph 28.
[26] CGRFA-14/13/4.2

Figure 1. Classification of countries into regions and subregions



C. Results

Answers to the individual questions are summarized graphically and discussed in Annex 2. Responses are presented globally and according to region.

Participation by countries

A total of 104 country reports (i.e. completed questionnaires) were received and analysed. Seventy-five reports were received in English, 17 in French and 12 in Spanish. Country reports have been published on FAO's web site.[27] The regional distribution of the country reports is also shown in Table 3. In terms of the proportion of countries that submitted country reports, coverage was more complete in Africa than in any other region (with the exception of North America, which has only two countries, Canada and the United States of America, both of which submitted questionnaires). Table 3 also shows the response rate per region for all three rounds (2012, 2014 and 2019) of reporting on implementation the Global Plan of Action. The greatest rate of reporting occurred in 2014, which corresponded to reporting for preparation of *The Second Report on the State of the World's Animal Genetic Resources for Food and Agriculture*.[28] Countries may have thus given more priority to that round of reporting. The level of coverage was greater in 2019 than in 2012 for all regions with the exception of Europe and the Caucasus, which had equal levels of coverage (61 percent) during those two rounds of reporting.

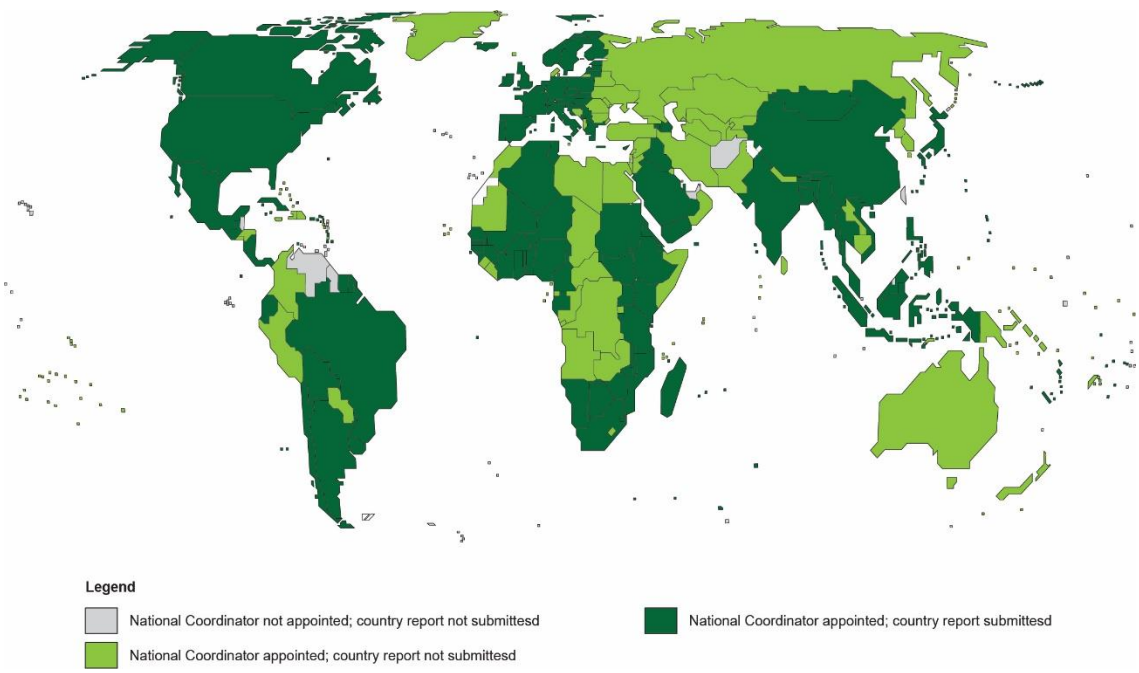
Coverage for the 2019 round of reporting is illustrated in the form of a map in Figure 2. In geographical terms, the main gap in information relates to Southwest Pacific, eastern European and central Asian countries. Figure 2 also shows which countries have an officially nominated NC-AnGR. As of January 2021, 178 countries have a NC-AnGR according to FAO's records.[29]

[27] http://www.fao.org/animal-genetics/global-policy/reporting-system/countries/en/
[28] http://www.fao.org/3/a-i4787e.pdf
[29] http://www.fao.org/dad-is/national-coordinators/en/

Table 3. Overview of the regional distribution of the reports analysed in 2012, 2014 and 2019

Regions	Number of reporting countries in 2019	Number of countries in the region	Coverage 2012[30]	Coverage 2014[31]	Coverage 2019
Africa	34	52	39%	77%	65%
Asia	13	31	26%	65%	42%
Europe and the Caucasus	30	49	61%	71%	61%
Latin America and the Caribbean	15	33	39%	55%	45%
Near and Middle East	6	14	29%	50%	43%
North America	2	2	100%	50%	100%
Southwest Pacific	4	15	20%	47%	27%
World	**104**	**196**	**41%**	**65%**	**53%**

Figure 2. Map showing which countries have a National Coordinator for the Management of Animal Genetic Resources (as of January 2021) and which submitted country reports



Indicators at the level of strategic priority area, collaboration and funding

Table 4 presents a global summary of the indicators for the four strategic priority areas and for Collaboration and Funding expressed as colours and as average scores (see Table 2 for details of the indicator colour scheme). Tables 5 and 6 present summaries of the indicators for the four strategic priority areas, plus those for Collaboration and Funding, at regional and subregional levels. Table 7 presents the same information as Table 6 but also includes results for 2012 and 2014. Table 8 shows the indicators for each reporting country.

Presenting this set of tables is intended to facilitate comparisons between countries, regions and subregions. The indicator scores (numerical values), which provide the baseline for future comparisons,

[30]The following reports were received after the deadline and could thus not be included in the first synthesis progress report: Australia, Azerbaijan, Bangladesh, Italy, Jamaica, Lithuania, Sri Lanka, Viet Nam.
[31]The country report from Morocco did not follow the questionnaire template and could thus not be included in the second synthesis progress report.

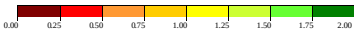
are presented together with the colour scheme. Yearly results are based on the subset of countries reporting that given year.

Table 4. Global overview of indicators for strategic priority areas and collaboration and funding — 2012, 2014 and 2019.

Reference in the Global Plan of Action	Indicator colour and average score		
	2012	2014	2019
SPA1	1.11	0.98	1.16
SPA2	1.04	0.89	1.08
SPA3	1.01	0.78	0.92
SPA4	0.98	0.95	1.16
Collaboration	0.53	0.54	0.76
Funding	0.32	0.53	0.59

Note: Indicator scores are divided into eight evenly distributed classes between a minimum score of 0 and a maximum score of 2.

A score of 2 means that all actions covered by the indicator have been implemented fully. A score of 0 means that no action has been taken. Indicator scores:



Global. Table 4 shows that globally, the indicators for all four strategic priority areas of the Global Plan of Action show a medium level of implementation and that all four have improved since 2014. Implementation for SPA 3 (Conservation) continues to have a lower level of implementation than the other three strategic priority areas. This may be a logical result, given that conservation is usually the last step to be undertaken in management of animal genetic resources for food and agriculture and is generally only a priority for only a subset of breeds, that is, those breeds at risk of extinction. Improvement has also been reported in the states of Collaboration and Funding, Collaboration has especially increased (by around 40 percent, according to the scoring system) and has moved from the low to medium category of implementation. Despite the improvement, Funding remains at a low level.

Table 5. Indicators for strategic priority areas – regional summary

Region	**SPA 1**	**SPA 2**	**SPA 3**	**SPA 4**	**Collaboration**	**Funding**
Africa	0.96	0.87	0.64	1.07	0.72	0.64
Asia	1.22	1.15	1.06	1.14	0.55	0.44
Europe and the Caucasus	1.53	1.43	1.35	1.49	1.08	0.60
Latin America and the Caribbean	1.02	1.05	0.75	1.03	0.58	0.67
Near and Middle East	0.83	0.37	0.47	0.65	0.33	0.44
North America	1.83	1.53	1.77	1.77	1.25	0.83
Southwest Pacific	0.58	0.83	0.43	0.54	0.31	0.33
World	**1.16**	**1.08**	**0.92**	**1.16**	**0.76**	**0.59**

Note: Indicator scores are divided into eight evenly distributed classes between a minimum score of 0 and a maximum score of 2.

A score of 2 means that all actions covered by the indicator have been implemented fully. A score of 0 means that no action has been taken. Indicator scores:

Table 6. Indicators for strategic priority areas, collaboration and funding – subregional summary

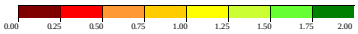
Region	SPA 1	SPA 2	SPA 3	SPA 4	Collaboration	Funding
Africa Average	**0.96**	**0.87**	**0.64**	**1.07**	**0.72**	**0.64**
East Africa Average	0.93	0.90	0.71	1.04	0.66	1.05
North and West Africa Average	0.88	0.78	0.54	0.97	0.69	0.50
Southern Africa Average	1.15	1.03	0.80	1.30	0.83	0.59
Asia Average	**1.22**	**1.15**	**1.06**	**1.14**	**0.55**	**0.44**
East Asia Average	1.56	1.36	1.21	1.13	0.38	0.56
South Asia Average	1.23	1.13	1.07	1.27	0.69	0.83
Southeast Asia Average	1.06	1.07	0.97	1.06	0.54	0.11
Europe and the Caucasus Average	**1.53**	**1.43**	**1.35**	**1.49**	**1.08**	**0.60**
Latin America and the Caribbean Average	**1.02**	**1.05**	**0.75**	**1.03**	**0.58**	**0.67**
Caribbean Average	0.47	0.62	0.45	0.38	0.21	0.33
Central America Average	1.14	1.16	0.76	1.14	0.65	0.67
South America Average	1.17	1.16	0.89	1.23	0.69	0.83
Near and Middle East Average	**0.83**	**0.37**	**0.47**	**0.65**	**0.33**	**0.44**
North America Average	**1.83**	**1.53**	**1.77**	**1.77**	**1.25**	**0.53**
Southwest Pacific Average	**0.58**	**0.83**	**0.43**	**0.54**	**0.31**	**0.33**
World Average	**1.16**	**1.08**	**0.92**	**1.16**	**0.76**	**0.59**

Table 7. Indicators for strategic priority areas, collaboration and funding – subregional summary comparing 2012, 2014 and 2019

Region	Coverage (%)			SPA 1			SPA 2			SPA 3			SPA 4			Collaboration			Funding		
	2012	2014	2019	2012	2014	2019	2012	2014	2019	2012	2014	2019	2012	2014	2019	2012	2014	2019	2012	2014	2019
Africa	**39**	**77**	**65**	**0.68**	**0.69**	**0.96**	**0.67**	**0.66**	**0.87**	**0.49**	**0.48**	**0.64**	**0.6**	**0.74**	**1.07**	**0.29**	**0.39**	**0.72**	**0.2**	**0.51**	**0.64**
East Africa	40	80	70	0.69	0.71	0.93	0.4	0.61	0.9	0.41	0.53	0.71	0.66	0.72	1.04	0.13	0.31	0.66	0.33	0.71	1.05
North and West Africa	48	74	67	0.62	0.67	0.88	0.68	0.7	0.78	0.47	0.48	0.54	0.52	0.77	0.97	0.38	0.58	0.69	0.21	0.5	0.5
Southern Africa	21	86	64	0.92	0.73	1.15	0.96	0.64	1.03	0.7	0.45	0.8	0.88	0.71	1.3	0.08	0.15	0.83	0	0.39	0.59
Asia	**26**	**65**	**42**	**1.23**	**1.01**	**1.22**	**1.14**	**0.94**	**1.15**	**1.26**	**0.81**	**1.06**	**1.1**	**0.99**	**1.14**	**0.16**	**0.36**	**0.55**	**0.5**	**0.5**	**0.44**
Central Asia	0	57	0		0.92			1			0.48			0.9			0.22			0.5	
East Asia	60	80	60	1.42	1.31	1.56	1.22	1.15	1.36	1.42	1.16	1.21	1.26	1.21	1.13	0.08	0.5	0.38	0.89	0.58	0.56
South Asia	29	86	57	1.08	0.85	1.23	1.07	0.69	1.13	0.82	0.71	1.07	1.11	0.79	1.27	0	0.33	0.69	0.33	0.72	0.83
Southeast Asia	25	50	50	1.14	1.03	1.06	1.11	1	1.07	1.39	0.89	0.97	0.93	1.1	1.06	0.33	0.4	0.54	0.22	0.22	0.11
Europe and the Caucasus	**61**	**71**	**61**	**1.53**	**1.48**	**1.53**	**1.36**	**1.31**	**1.43**	**1.46**	**1.29**	**1.35**	**1.34**	**1.43**	**1.49**	**0.9**	**1.03**	**1.08**	**0.42**	**0.54**	**0.6**
Latin America and the Caribbean	**39**	**55**	**45**	**0.86**	**0.89**	**1.02**	**0.82**	**0.9**	**1.05**	**0.77**	**0.77**	**0.75**	**0.8**	**0.91**	**1.03**	**0.25**	**0.33**	**0.58**	**0.21**	**0.65**	**0.67**
Caribbean	8	38	23	0.17	0.48	0.47	0.2	0.64	0.62	0	0.85	0.45	0.29	0.58	0.38	0	0.08	0.21	0	0.53	0.33
Central America	40	60	60	0.79	0.82	1.14	0.65	0.96	1.16	0.55	0.71	0.76	0.66	1.15	1.14	0	0.43	0.65	0	0.2	0.67
South America	80	80	60	0.98	1.19	1.17	0.98	1.02	1.16	0.98	0.75	0.89	0.93	0.95	1.23	0.41	0.44	0.69	0.33	1	0.83
Near and Middle East	**29**	**50**	**43**	**0.73**	**0.57**	**0.83**	**0.8**	**0.33**	**0.37**	**0.48**	**0.22**	**0.47**	**0.57**	**0.35**	**0.65**	**0.25**	**0.25**	**0.33**	**0.5**	**0.38**	**0.44**
North America	**100**	**50**	**100**	**1.75**	**1.92**	**1.83**	**1.73**	**1.87**	**1.53**	**1.82**	**2**	**1.77**	**1.43**	**1.69**	**1.77**	**1.13**	**1.13**	**1.25**	**0**	**1**	**0.53**
Southwest Pacific	**20**	**47**	**27**	**0.69**	**0.57**	**0.58**	**0.93**	**0.37**	**0.83**	**0.45**	**0.25**	**0.43**	**0.52**	**0.23**	**0.54**	**0.5**	**0.11**	**0.31**	**0**	**0.38**	**0.33**
World	**41**	**65**	**53**	**1.11**	**0.98**	**1.16**	**1.04**	**0.89**	**1.08**	**1.01**	**0.78**	**0.92**	**0.98**	**0.95**	**1.16**	**0.53**	**0.54**	**0.76**	**0.32**	**0.53**	**0.59**

Note: Indicator scores are divided into eight evenly distributed classes between a minimum score of 0 and a maximum score of 2.

A score of 2 means that all actions covered by the indicator have been implemented fully. A score of 0 means that no action has been taken. Indicator scores:



Regional, subregional and national. In Africa, the reported levels of implementation in all strategic priority areas but SPA3 were medium. The lowest scoring indicators for this region were for Funding and Conservation (SPA 3). At the subregional level, Southern Africa had the highest scores in the region, especially for Policies, institutions and capacity building (SPA4), where implementation can be considered high. East Africa, however, reported the highest score for Funding within the region. Several countries report having benefited from a project[32] of the African Union Interafrican Bureau for Animal Resources (AU-IBAR), primarily funded by the European Union. Among individual countries (Table 9), Ethiopia, Uganda, Niger and Togo all generally reported medium to high levels of implementation, while South Africa reported to having reached a high level of implementation in all fields but Funding.

In general, Asia has reached a medium level of implementation in all the strategic priority areas, but low levels of implementation in both Collaboration and Funding. East Asia continues to be slightly more advanced than the other subregions, having attained a medium level of implementation in SPA 2, 3 and 4 and a high level in SPA1. Southeast Asia countries reported particularly low levels of implementation in Funding. China reported high levels of implementation for all four strategic priority areas. Nearly all countries in Asia, however, report low levels of both Collaboration and Funding, with the exception of Bhutan in the latter case.

On average, reporting countries in Europe and the Caucasus have reached a high level of implementation in all four strategic priority areas. Collaboration is at a medium level and the state of Funding remains at a low level. Only three of 30 countries reported low levels of implementation for more than two indicators. Germany and Spain reported high implementation for all six indicators and several other countries report high implementation for all indicators except Funding.

Countries in Latin America and the Caribbean have on average reported a medium level of implementation in all strategic priority areas except Conservation, although the mean score (0.75) for the latter is precisely on the threshold between low and medium. As in many other regions, reported levels of Collaboration and Funding were quite low. The region is characterized by great variability in the state of implementation of the Global Plan of Action at subregion and country levels. Implementation was much lower among the Caribbean countries, on average, than in Central and South America. A few countries have achieved high levels of implementation across all four strategic priority areas, whereas others remain at low levels of implementation in all or most strategic priority areas.

The countries in the Near and Middle East Region reported low levels of implementation on average for all indicators with the exception of SPA 1. Egypt generally reports the highest levels of implementation within the region, despite a deficit of Funding.

On average, the two North American countries have reached high levels of implementation across all four strategic priority areas. Collaboration and Funding are less well developed, perhaps due to strong commercial livestock sectors in both countries, decreasing the need for public support.

The reporting countries of the Southwest Pacific have very low scores for all indicators except for SPA2, which has a low-medium level of implementation. On the national level, Samoa reported high implementation of SPA1 and both Samoa and Vanuatu have high implementation of SPA 2.

Table 8. Average indicators for strategic priority areas, collaboration and funding at country level

Region	Strategic Priority Area				Collaboration	Funding
	1	2	3	4		
Africa (Average)	**0.96**	**0.87**	**0.64**	**1.07**	**0.72**	**0.64**
East Africa	**0.93**	**0.90**	**0.71**	**1.04**	**0.66**	**1.05**
Burundi	1.17	1.00	0.82	1.54	0.13	1.67
Djibouti	0.42	0.33	0.18	0.15	0.00	0.00
Eritrea	0.58	0.40	0.27	0.54	0.00	0.00
Ethiopia	1.25	1.27	1.45	1.69	1.63	1.33

[32] http://www.au-ibar.org/angr

Kenya	0.75	1.00	0.27	1.08	0.88	1.00
Uganda	1.08	1.40	1.27	1.08	1.63	1.67
United Republic of Tanzania	1.25	0.87	0.73	1.23	0.38	1.67
North and West Africa	**0.88**	**0.78**	**0.54**	**0.97**	**0.69**	**0.50**
Algeria	1.17	0.93	0.91	1.00	0.50	0.00
Benin	0.50	0.60	1.00	0.77	1.38	0.67
Burkina Faso	1.17	0.93	0.18	1.31	0.50	0.00
Cabo Verde	0.67	0.53	0.73	0.77	0.00	0.00
Cameroon	1.33	0.60	0.91	1.15	1.25	0.67
Cote D'Ivoire	0.83	0.47	0.18	1.15	0.25	0.33
Gabon	0.33	0.07	0.00	0.77	0.88	0.67
Gambia	0.17	0.73	0.55	1.00	0.75	1.00
Ghana	0.58	0.80	0.45	1.31	0.38	0.67
Guinea	0.50	0.93	0.18	0.92	0.13	0.33
Guinea Bissau	1.08	0.53	0.00	0.54	0.38	0.00
Mali	1.17	1.20	0.91	1.23	1.38	1.00
Niger	1.67	1.27	1.27	1.46	1.50	0.67
Nigeria	0.75	0.73	0.55	0.85	0.63	0.00
Republic of South Sudan	0.17	0.27	0.00	0.00	0.00	0.00
Senegal	0.83	0.80	0.36	1.08	0.50	1.33
Togo	1.33	1.33	1.09	1.15	1.88	1.67
Tunisia	1.50	1.27	0.45	1.00	0.25	0.00
Southern Africa	**1.15**	**1.03**	**0.80**	**1.30**	**0.83**	**0.59**
Botswana	1.25	1.13	1.09	1.54	1.00	0.67
Eswatini	1.42	1.00	0.36	1.23	1.00	0.67
Madagascar	0.75	0.93	0.36	1.15	0.38	0.00
Malawi	1.00	0.87	1.09	1.38	1.13	0.67
Mauritius	0.67	0.47	0.45	0.92	0.00	0.33
Mozambique	0.92	1.00	0.82	1.08	1.13	1.00
Namibia	1.25	0.93	0.45	1.08	0.50	1.00
Zimbabwe	1.25	1.07	1.00	1.31	0.75	1.00
South Africa	1.83	1.87	1.55	2.00	1.63	0.00
Asia	**1.22**	**1.15**	**1.06**	**1.14**	**0.55**	**0.44**
East Asia	**1.56**	**1.36**	**1.21**	**1.13**	**0.38**	**0.56**
China	2.00	1.93	1.55	2.00	0.25	0.67
Japan	1.33	0.87	1.36	0.77	0.63	0.00
Mongolia	1.33	1.27	0.73	0.62	0.25	1.00
South Asia	**1.23**	**1.13**	**1.07**	**1.27**	**0.69**	**0.83**
Bangladesh	0.83	1.20	1.36	0.85	0.88	0.67
Bhutan	1.08	0.93	0.55	1.31	0.50	1.67
India	1.75	1.80	1.64	1.77	0.88	0.67

Nepal	1.25	0.60	0.73	1.15	0.50	0.33
Southeast Asia	**1.06**	**1.07**	**0.97**	**1.06**	**0.54**	**0.11**
Indonesia	1.00	1.53	0.91	1.46	0.63	0.00
Malaysia	1.42	0.87	1.09	0.77	0.63	0.00
Myanmar	0.67	0.67	0.55	0.77	0.50	0.00
Philippines	1.08	1.07	0.91	0.92	0.13	0.00
Thailand	1.50	1.33	1.27	1.54	0.88	0.00
Viet Nam	0.67	0.93	1.09	0.92	0.50	0.67
Europe and the Caucasus	**1.53**	**1.43**	**1.35**	**1.49**	**1.08**	**0.60**
Austria	1.83	1.80	2.00	1.85	1.25	1.00
Azerbaijan	1.17	1.60	1.45	1.62	0.38	0.67
Belgium	0.42	0.93	0.73	0.00	0.25	0.00
Croatia	1.67	1.73	1.82	2.00	1.75	0.67
Cyprus	1.42	0.93	0.82	1.08	1.00	0.67
Czech Republic	1.58	1.60	1.82	1.38	0.88	0.67
Estonia	0.83	1.13	0.82	1.08	0.25	0.67
Finland	1.67	1.73	1.45	1.69	1.38	1.33
France	1.83	1.33	1.55	1.54	1.38	1.00
Germany	1.75	1.40	1.18	1.92	2.00	1.67
Greece	1.67	1.27	1.18	1.31	1.38	0.00
Hungary	1.83	1.87	1.64	1.54	1.00	0.33
Iceland	1.75	1.53	1.36	1.85	0.75	0.67
Ireland	1.75	1.80	1.36	1.23	0.75	0.00
Italy	1.33	1.47	1.18	1.54	1.50	0.00
Latvia	1.50	1.27	1.27	1.15	0.38	0.00
Lithuania	1.67	0.87	1.73	1.92	0.25	0.67
Montenegro	1.00	0.60	0.73	1.15	0.50	0.67
Netherlands	1.83	1.73	1.82	1.69	1.50	0.67
Norway	2.00	1.73	1.64	2.00	1.13	1.00
Poland	1.50	1.60	1.36	1.85	0.75	1.33
Portugal	1.58	1.67	1.55	1.92	1.75	0.67
Republic of Macedonia	1.33	0.93	0.45	0.46	0.00	0.33
Serbia	1.42	0.93	0.73	1.15	1.38	0.67
Slovakia	1.42	1.67	0.91	1.08	0.75	0.00
Slovenia	1.75	1.47	1.73	1.85	1.63	0.00
Spain	1.75	1.73	1.73	1.92	1.88	1.33
Sweden	1.25	1.47	1.27	1.46	1.13	0.00
Switzerland	1.75	1.80	1.55	2.00	1.75	0.67
United Kingdom	1.75	1.33	1.73	1.62	1.88	0.67
Latin America and the Caribbean	**1.02**	**1.05**	**0.75**	**1.03**	**0.58**	**0.67**
Caribbean	**0.47**	**0.62**	**0.45**	**0.38**	**0.21**	**0.33**

Barbados	0.58	0.67	0.82	0.62	0.38	0.33
Suriname	0.33	0.13	0.00	0.23	0.00	0.33
Saint Vincent and the Grenadines	0.50	1.07	0.55	0.31	0.25	0.33
Central America	**1.14**	**1.16**	**0.76**	**1.14**	**0.65**	**0.67**
Costa Rica	0.25	0.40	0.00	0.85	0.00	0.33
Cuba	1.92	2.00	1.82	1.85	1.25	1.33
Guatemala	0.42	0.60	0.18	0.69	0.00	0.00
Mexico	1.75	1.73	1.09	1.77	1.00	0.67
Nicaragua	1.25	1.40	0.00	1.08	0.13	0.33
Panama	**1.25**	**0.80**	**1.45**	**0.62**	**1.50**	**1.33**
South America	**1.17**	**1.16**	**0.89**	**1.23**	**0.69**	**0.83**
Argentina	1.17	1.07	1.45	1.23	1.63	0.67
Bolivia	0.92	1.20	1.09	1.23	0.75	0.33
Brazil	1.83	1.80	1.36	1.54	1.00	2.00
Chile	1.08	1.20	0.64	1.38	0.13	0.67
Ecuador	0.67	0.27	0.00	0.54	0.13	0.00
Uruguay	1.33	1.40	0.82	1.46	0.50	1.33
Near and Middle East	**0.83**	**0.37**	**0.47**	**0.65**	**0.33**	**0.44**
Egypt	1.00	0.67	0.55	0.92	0.88	0.00
Iraq	1.33	0.07	0.55	0.92	0.13	0.67
Qatar	0.58	0.20	0.36	0.31	0.00	1.00
Republic of Yemen	0.67	0.60	0.73	0.23	0.13	1.00
Saudi Arabia	0.67	0.20	0.27	0.46	0.13	0.00
Sudan	0.75	0.47	0.36	1.08	0.75	0.00
North America	**1.83**	**1.53**	**1.77**	**1.77**	**1.25**	**0.83**
Canada	1.67	1.60	1.73	1.62	1.00	0.67
United States of America	2.00	1.47	1.82	1.92	1.50	1.00
Southwest Pacific	**0.58**	**0.83**	**0.43**	**0.54**	**0.31**	**0.33**
Niue	0.50	0.60	0.09	0.38	0.00	0.67
Samoa	1.42	1.40	0.64	1.00	0.38	0.00
Tonga	0.00	0.00	0.00	0.00	0.00	0.33
Vanuatu	0.42	1.33	1.00	0.77	0.88	0.33
World	**1.16**	**1.08**	**0.92**	**1.16**	**0.76**	**0.59**

Note: Indicator scores are divided into eight evenly distributed classes between a minimum score of 0 and a maximum score of 2.

A score of 2 means that all actions covered by the indicator have been implemented fully. A score of 0 means that no action has been taken. Indicator scores:

Figures 3 to 8 show the country-level indicators in the form of maps.

Figure 3. Implementing Strategic Priority Area 1 of the Global Plan of Action for Animal Genetic Resources: indicator for the completeness of characterization and inventory and the regularity of monitoring of trends and associated risks

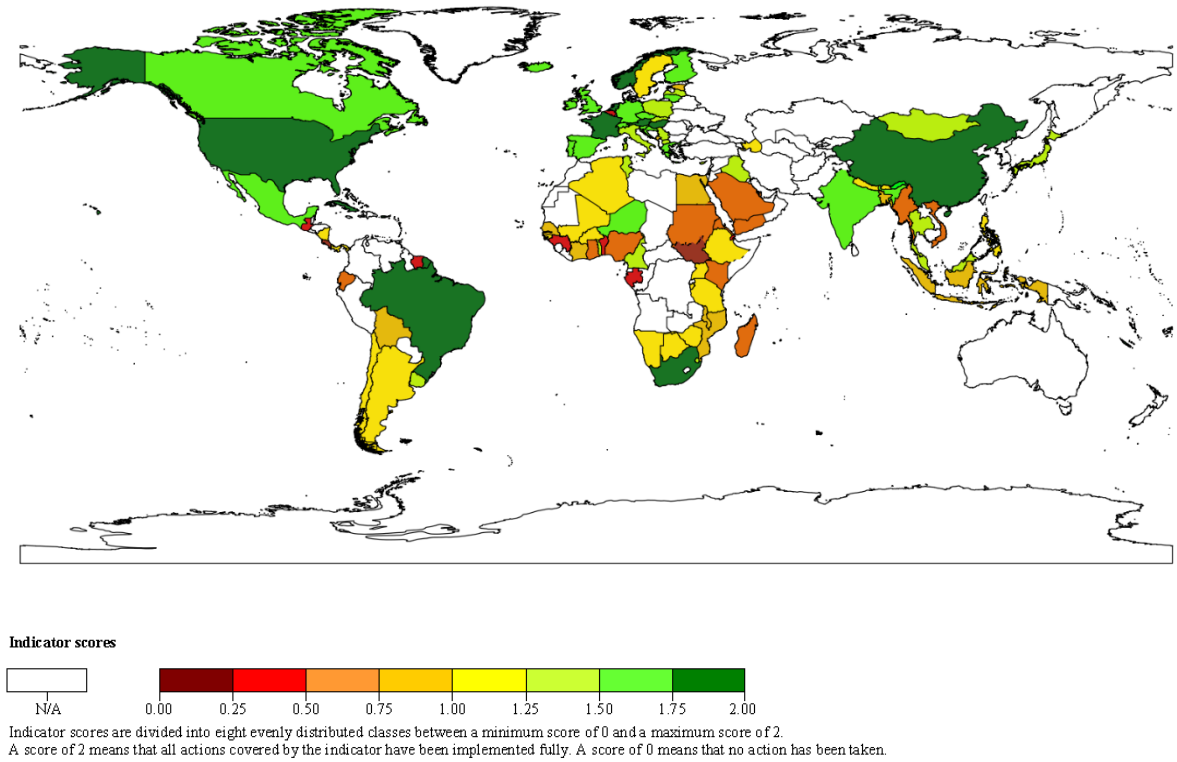


Figure 4. Implementing Strategic Priority Area 2 of the Global Plan of Action for Animal Genetic Resources: indicator for the state of sustainable use and development

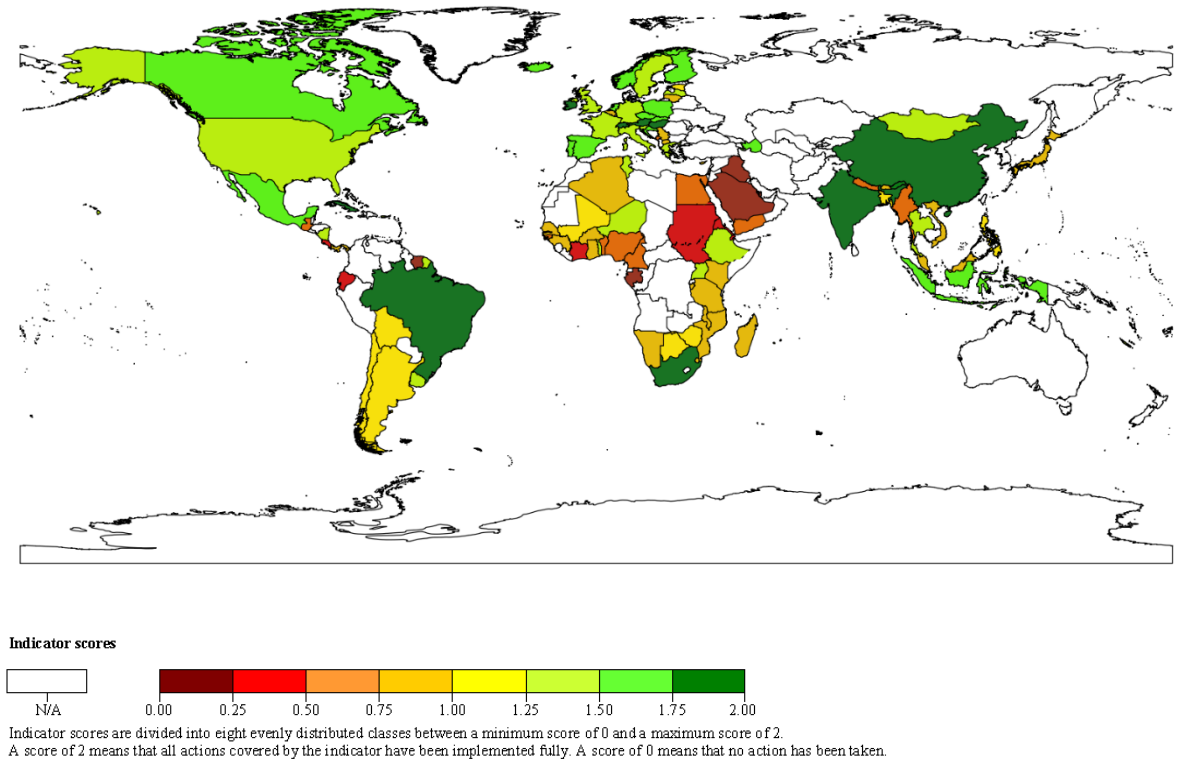


Figure 5. Implementing Strategic Priority Area 3 of the Global Plan of Action for Animal Genetic Resources: indicator for the state of national conservation policies

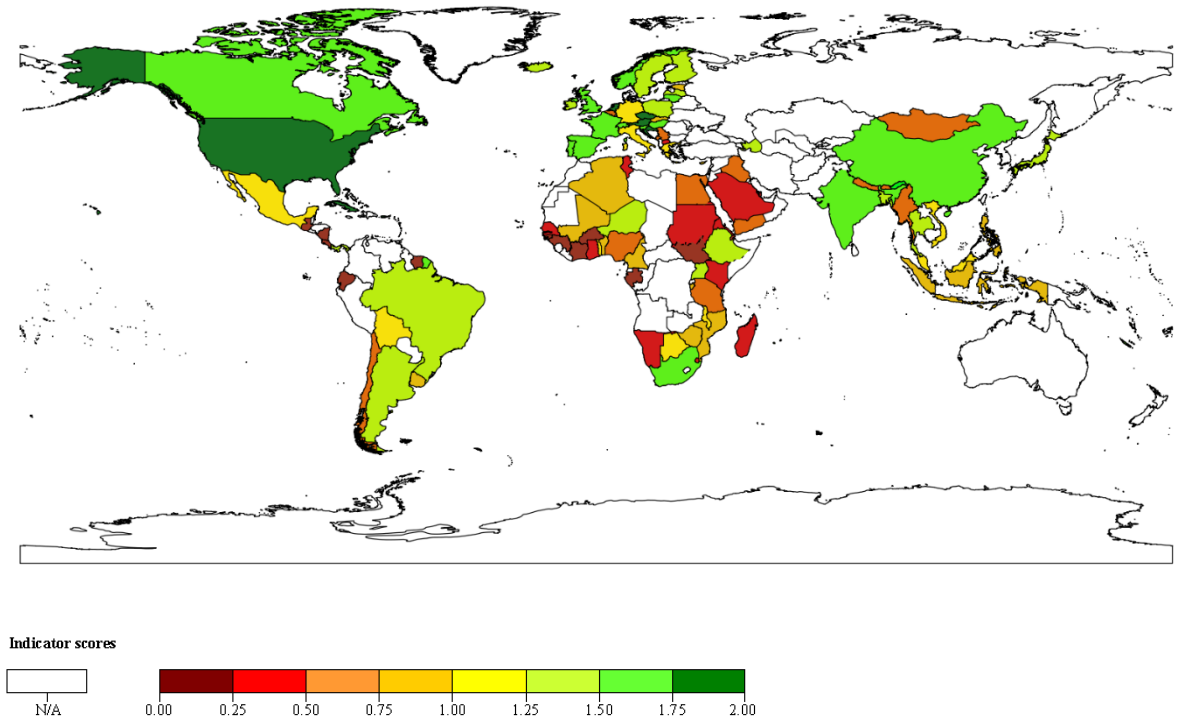


Figure 6. Implementing Strategic Priority Area 4 of the Global Plan of Action for Animal Genetic Resources: indicator for the state of national policies and legal frameworks and efforts to strengthen institutional and human capacities

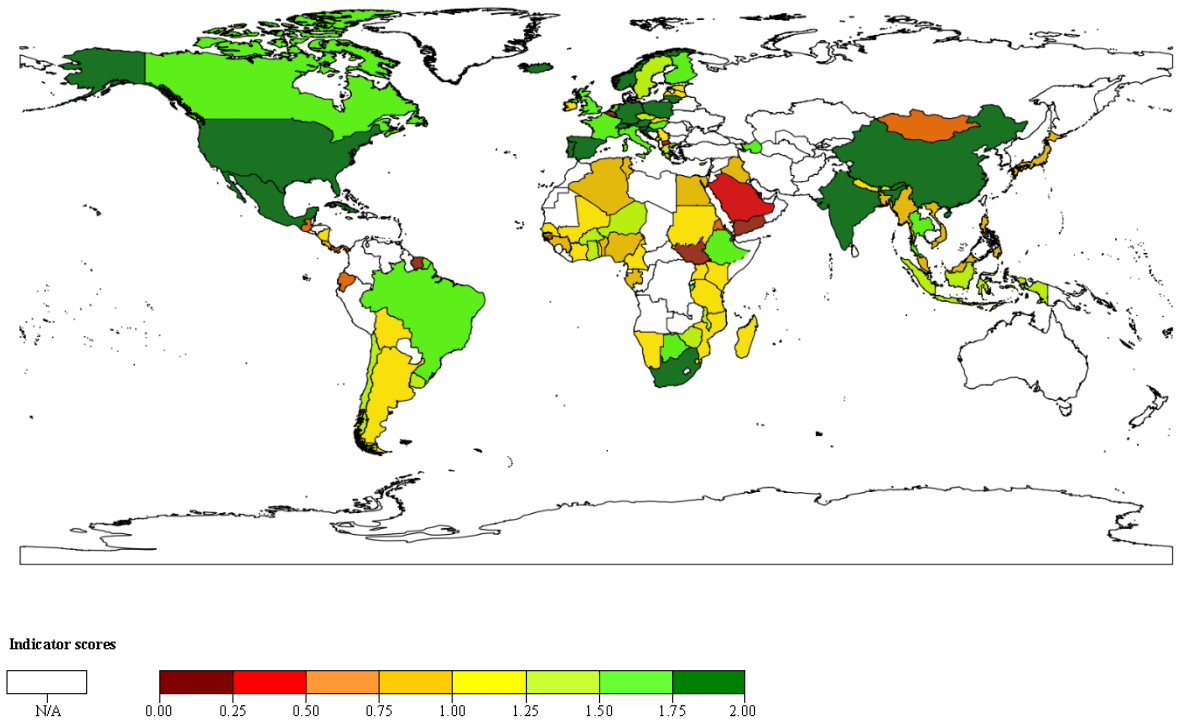


Figure 7. Implementing the Global Plan of Action for Animal Genetic Resources: indicator for the state of international collaboration

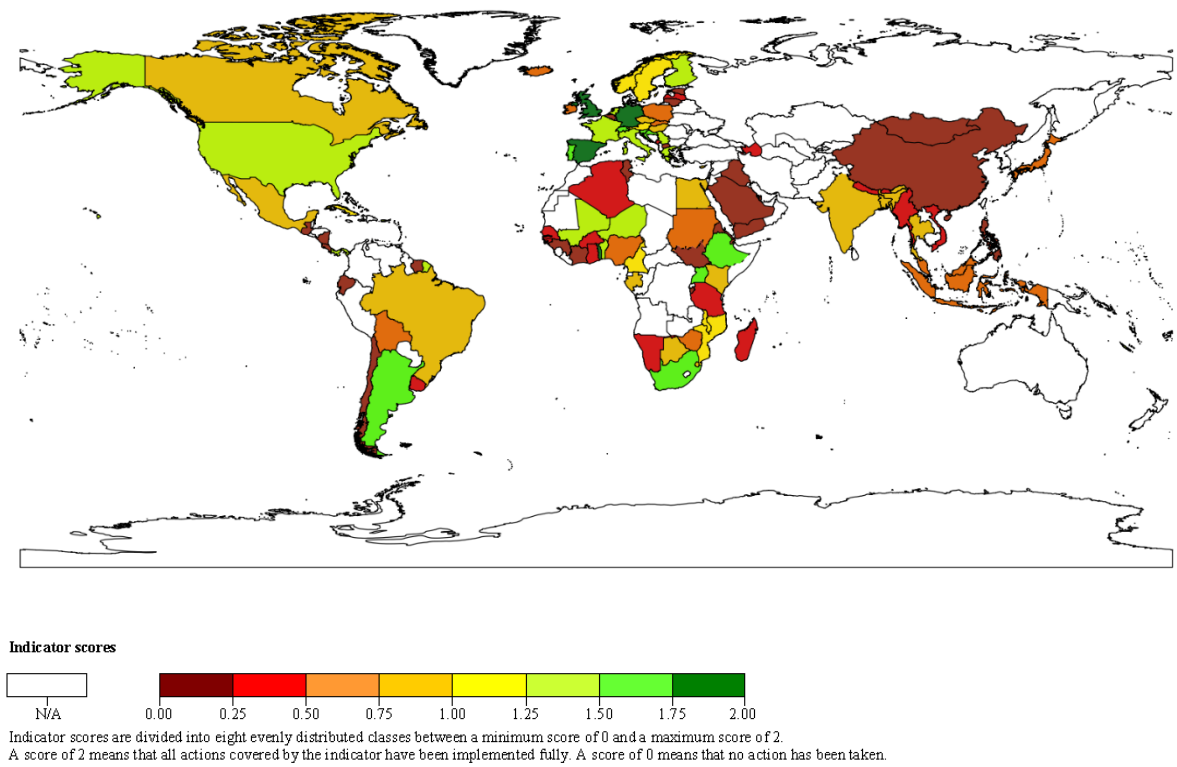
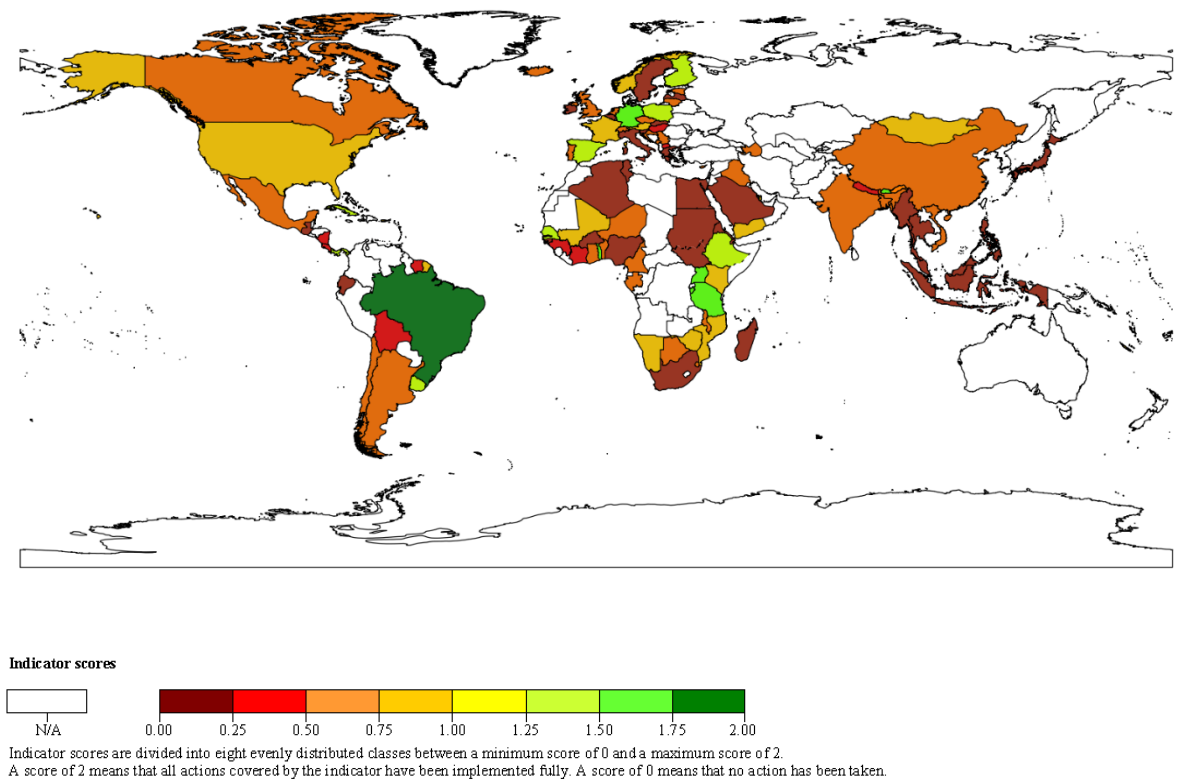


Figure 8. Implementing the Global Plan of Action for Animal Genetic Resources: indicator for the state of funding



Indicators at the level of strategic priorities

Table 9 presents a global summary of 2019 data for the indicators at the level of strategic priorities expressed as colours and as average scores (see Table 2 for details of the indicator colour scheme). Table 9 also shows the percentage of reporting countries falling into the high, medium and low categories for each indicator. Tables 10 and 11 present summaries of the strategic priority-level indicators at regional and subregional levels. Table 12 shows the indicator for each reporting country.

Table 9 shows that, globally, a medium level of implementation has been achieved for most strategic priorities. The indicators with the highest levels of implementation are SP1a (the completeness of characterization), SP12 (the state of efforts to strengthen national institutions for planning and implementing animal genetic resources measures) and SP18 (the state of efforts to raise national awareness of the roles and values of animal genetic resources). The strategic priorities with lowest reported levels of implementation are SP3 (the state of national sustainable use policies) and SP9 (the state of *ex situ* conservation programmes).

Table 9. Global overview of indicators for strategic priorities

Reference in the Global Plan of Action		Countries low (%)	Countries medium (%)	Countries high (%)	Indicator colour and average score
SPA1[a]	SP1a	0.30	0.05	0.65	1.21
	SP1b	0.29	0.28	0.43	1.12
SPA2	SP3	0.36	0.33	0.32	0.89
	SP4	0.34	0.21	0.45	1.10
	SP5	0.44	0.14	0.41	0.98
	SP6	0.29	0.51	0.20	0.96
SPA3	SP7	0.27	0.36	0.38	1.11
	SP8	0.31	0.50	0.19	0.88
	SP9	0.70	0.07	0.23	0.63
SPA4	SP12	0.39	0.00	0.61	1.17
	SP13	0.13	0.44	0.42	1.29
	SP14	0.28	0.40	0.32	1.05
	SP18	0.33	0.00	0.67	1.35
	SP20	0.32	0.26	0.42	1.11

[a]SP1a corresponds to completeness of characterization and SP1b corresponds to the completeness of inventory and the regularity of monitoring of trends and associated risks

Note: Indicator scores are divided into eight evenly distributed classes between a minimum score of 0 and a maximum score of 2. A score of 2 means that all actions covered by the indicator have been implemented fully. A score of 0 means that no action has been taken. Indicator scores:

Table 10. Indicators for strategic priorities – regional summary

	SPA 1[a]		SPA 2				SPA 3			SPA 4				
Region	**SP1a**	**SP1b**	**SP3**	**SP4**	**SP5**	**SP6**	**SP7**	**SP8**	**SP9**	**SP12**	**SP13**	**SP14**	**SP18**	**SP20**
Africa	0.99	0.96	0.62	0.81	0.97	0.76	0.74	0.59	0.37	1.24	1.18	0.79	1.12	0.99
Asia	1.21	1.25	1.08	1.13	0.96	1.19	0.92	1.00	0.77	0.92	1.38	1.08	1.38	1.08
Europe and the Caucasus	1.57	1.48	1.32	1.55	1.12	1.20	1.87	1.47	1.04	1.49	1.57	1.45	1.73	1.50
Latin America and the Caribbean	1.09	0.91	0.83	1.11	1.07	0.73	0.80	0.60	0.47	1.07	1.07	1.07	1.07	0.93
Near and Middle East	1.11	0.62	0.00	0.33	0.17	0.75	0.50	0.33	0.33	0.44	1.00	0.58	1.00	0.58
North America	2.00	1.71	1.50	1.79	1.00	1.75	2.00	1.50	1.33	1.67	2.00	1.75	2.00	1.50
Southwest Pacific	0.50	0.64	0.75	0.79	0.88	0.88	0.75	0.25	0.08	0.33	0.75	0.50	1.50	0.50
World	**1.21**	**1.12**	**0.89**	**1.10**	**0.98**	**0.96**	**1.11**	**0.88**	**0.63**	**1.17**	**1.29**	**1.05**	**1.35**	**1.11**

[a]SP1a corresponds to completeness of characterization and SP1b corresponds to the completeness of inventory and the regularity of monitoring of trends and associated risks

Note: Indicator scores are divided into eight evenly distributed classes between a minimum score of 0 and a maximum score of 2. A score of 2 means that all actions covered by the indicator have been implemented fully. A score of 0 means that no action has been taken. Indicator scores:

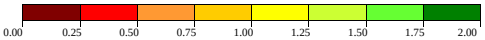


Table 11. Indicators for strategic priorities – sub-regional summary

	SPA 1[a]		SPA 2				SPA 3			SPA 4				
Region	**SP1a**	**SP1b**	**SP3**	**SP4**	**SP5**	**SP6**	**SP7**	**SP8**	**SP9**	**SP12**	**SP13**	**SP14**	**SP18**	**SP20**
East Africa Average	1.14	0.86	0.57	0.90	1.00	0.71	0.71	0.43	0.52	1.05	1.14	0.71	1.14	1.21
North and West Africa	0.89	0.87	0.67	0.64	0.89	0.64	0.67	0.44	0.24	1.19	1.06	0.69	0.78	0.94
Southern Africa	1.07	1.22	0.56	1.08	1.11	1.06	0.89	1.00	0.52	1.48	1.44	1.06	1.78	0.89
Africa	**0.99**	**0.96**	**0.62**	**0.81**	**0.97**	**0.76**	**0.74**	**0.59**	**0.37**	**1.24**	**1.18**	**0.79**	**1.12**	**0.99**
East Asia	1.56	1.52	1.50	1.29	1.00	1.50	0.67	1.33	1.11	0.89	1.33	1.33	1.33	1.00
South Asia	1.33	1.18	1.13	1.11	1.00	1.00	0.75	1.00	0.83	1.17	1.25	1.00	1.50	1.38
Southeast Asia	0.94	1.17	0.83	1.07	0.92	1.17	1.17	0.83	0.56	0.78	1.50	1.00	1.33	0.92
Asia	**1.21**	**1.25**	**1.08**	**1.13**	**0.96**	**1.19**	**0.92**	**1.00**	**0.77**	**0.92**	**1.38**	**1.08**	**1.38**	**1.08**
Europe and the Caucasus	**1.57**	**1.48**	**1.32**	**1.55**	**1.12**	**1.20**	**1.87**	**1.47**	**1.04**	**1.49**	**1.57**	**1.45**	**1.73**	**1.50**
Caribbean	0.33	0.38	0.17	0.76	0.33	0.50	0.33	0.67	0.22	0.22	0.33	0.67	0.67	0.17
Central America	1.11	1.05	0.92	1.17	1.42	0.92	0.83	0.50	0.56	1.22	1.17	1.08	0.67	1.08
South America	1.44	1.05	1.08	1.24	1.08	0.67	1.00	0.67	0.50	1.33	1.33	1.25	1.67	1.17
Latin America & the Caribbean	**1.09**	**0.91**	**0.83**	**1.11**	**1.07**	**0.73**	**0.80**	**0.60**	**0.47**	**1.07**	**1.07**	**1.07**	**1.07**	**0.93**
Near and Middle East	**1.11**	**0.62**	**0.00**	**0.33**	**0.17**	**0.75**	**0.50**	**0.33**	**0.33**	**0.44**	**1.00**	**0.58**	**1.00**	**0.58**
North America	**2.00**	**1.71**	**1.50**	**1.79**	**1.00**	**1.75**	**2.00**	**1.50**	**1.33**	**1.67**	**2.00**	**1.75**	**2.00**	**1.50**
Southwest Pacific	**0.50**	**0.64**	**0.75**	**0.79**	**0.88**	**0.88**	**0.75**	**0.25**	**0.08**	**0.33**	**0.75**	**0.50**	**1.50**	**0.50**
World	**1.21**	**1.12**	**0.89**	**1.10**	**0.98**	**0.96**	**1.11**	**0.88**	**0.63**	**1.17**	**1.29**	**1.05**	**1.35**	**1.11**

[a]SP1a corresponds to completeness of characterization and SP1b corresponds to the completeness of inventory and the regularity of monitoring of trends and associated risks

Note: Indicator scores are divided into eight evenly distributed classes between a minimum score of 0 and a maximum score of 2. A score of 2 means that all actions covered by the indicator have been implemented fully. A score of 0 means that no action has been taken. Indicator scores:

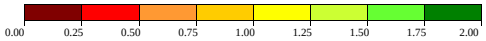


Table 12. Indicators for strategic priorities – country level

	SPA1[a]		SPA 2				SPA 3			SPA 4				
Region	**SP1a**	**SP1b**	**SP3**	**SP4**	**SP5**	**SP6**	**SP7**	**SP8**	**SP9**	**SP12**	**SP13**	**SP14**	**SP18**	**SP20**
Africa	**0.99**	**0.96**	**0.62**	**0.81**	**0.97**	**0.76**	**0.74**	**0.59**	**0.37**	**1.24**	**1.18**	**0.79**	**1.12**	**0.99**
East Africa	**1.14**	**0.86**	**0.57**	**0.90**	**1.00**	**0.71**	**0.71**	**0.43**	**0.52**	**1.05**	**1.14**	**0.71**	**1.14**	**1.21**
Burundi	1.33	1.14	0.00	1.29	2.00	0.00	1.00	0.00	0.67	1.33	1.00	1.50	2.00	1.50
Djibouti	0.00	0.43	0.00	0.29	0.00	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00
Eritrea	1.00	0.29	0.00	0.43	0.00	0.50	1.00	0.00	0.00	0.67	0.00	0.00	0.00	0.00
Ethiopia	1.33	1.29	1.00	1.43	1.50	1.00	1.00	1.00	1.33	2.00	2.00	1.00	2.00	2.00
Kenya	1.67	0.57	1.50	0.71	1.50	1.00	1.00	0.00	0.67	1.33	1.00	1.00	0.00	1.50
Uganda	1.33	1.00	1.50	1.29	1.50	1.00	1.00	1.00	0.67	1.33	2.00	1.00	2.00	1.00
United Republic of Tanzania	1.33	1.29	0.00	0.86	0.50	1.00	0.00	1.00	0.33	0.67	2.00	0.50	2.00	1.50
North and West Africa	**0.89**	**0.87**	**0.67**	**0.64**	**0.89**	**0.64**	**0.67**	**0.44**	**0.24**	**1.19**	**1.06**	**0.69**	**0.78**	**0.94**
Algeria	1.33	1.14	0.00	0.71	1.50	1.00	1.00	1.00	0.67	0.67	1.00	1.00	2.00	1.00
Benin	0.33	0.43	1.00	0.14	0.50	0.50	1.00	1.00	1.00	0.67	1.00	1.00	0.00	1.50
Burkina Faso	1.67	1.00	2.00	0.57	0.50	0.50	0.00	0.00	0.00	1.33	2.00	1.00	2.00	1.00
Cabo Verde	0.00	0.86	0.00	0.29	0.00	2.00	2.00	0.00	0.00	0.67	0.00	0.00	0.00	1.00
Cameroon	2.00	1.14	0.50	0.71	0.00	0.50	1.00	1.00	0.67	0.67	2.00	1.00	2.00	0.50
Cote D'Ivoire	1.00	0.71	0.00	0.29	1.00	0.50	0.00	0.00	0.00	2.00	0.00	0.50	0.00	1.00
Gabon	0.33	0.43	0.00	0.00	0.50	0.00	0.00	0.00	0.00	1.33	0.00	0.00	0.00	1.00
Gambia	0.00	0.29	0.00	0.86	0.50	1.00	1.00	1.00	0.00	2.00	1.00	1.00	0.00	1.00
Ghana	0.67	0.43	1.00	0.43	1.50	0.00	1.00	1.00	0.33	2.00	1.00	0.50	0.00	1.50
Guinea	0.00	0.57	1.00	0.57	1.50	0.50	0.00	0.00	0.00	0.67	2.00	0.50	0.00	1.50
Guinea Bissau	1.33	1.00	1.00	0.29	1.00	0.00	0.00	0.00	0.00	1.33	1.00	0.00	2.00	0.00
Mali	1.33	1.14	1.00	1.43	1.50	0.50	1.00	1.00	0.67	0.67	2.00	1.00	2.00	1.00
Niger	1.67	1.86	1.00	1.00	2.00	1.00	2.00	1.00	0.33	2.00	1.00	1.50	0.00	1.50
Nigeria	0.00	1.00	0.00	0.71	0.50	0.50	0.00	0.00	0.00	1.33	1.00	0.50	2.00	0.50
Republic of South Sudan	0.00	0.00	0.00	0.29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Senegal	1.33	0.57	1.00	0.71	1.50	1.00	0.00	0.00	0.00	1.33	1.00	1.00	2.00	0.50
Togo	1.67	1.00	1.50	1.14	1.50	1.00	1.00	1.00	0.00	1.33	1.00	1.00	0.00	1.00
Tunisia	1.33	2.00	1.00	1.43	0.50	1.00	1.00	0.00	0.67	1.33	2.00	1.00	0.00	1.50
Southern Africa	**1.07**	**1.22**	**0.56**	**1.08**	**1.11**	**1.06**	**0.89**	**1.00**	**0.52**	**1.48**	**1.44**	**1.06**	**1.78**	**0.89**
Botswana	0.67	1.57	0.00	1.43	1.00	0.50	0.00	1.00	0.33	2.00	2.00	1.00	2.00	1.50
Eswatini	1.33	1.57	0.00	1.00	1.50	1.50	1.00	1.00	0.00	1.33	1.00	1.00	2.00	1.00
Madagascar	0.67	0.71	1.00	0.43	1.50	1.00	1.00	0.00	0.33	2.00	1.00	0.50	0.00	0.50
Malawi	0.67	1.14	1.50	0.71	0.50	1.00	2.00	0.00	0.67	1.33	1.00	1.00	2.00	1.00
Mauritius	0.33	0.71	0.00	0.43	0.50	0.50	1.00	1.00	0.33	1.33	1.00	0.50	2.00	0.00
Mozambique	1.33	0.71	0.00	1.29	1.00	1.00	0.00	1.00	0.67	2.00	2.00	1.50	2.00	0.50
Namibia	1.67	1.14	0.50	1.14	0.50	1.00	0.00	2.00	0.33	0.67	1.00	1.00	2.00	0.50
Zimbabwe	1.00	1.43	0.00	1.29	1.50	1.00	1.00	2.00	0.67	0.67	2.00	1.00	2.00	1.00

South Africa	2.00	2.00	2.00	2.00	2.00	2.00	2.00	1.00	1.33	2.00	2.00	2.00	2.00	2.00
Asia	**1.21**	**1.25**	**1.08**	**1.13**	**0.96**	**1.19**	**0.92**	**1.00**	**0.77**	**0.92**	**1.38**	**1.08**	**1.38**	**1.08**
East Asia	**1.56**	**1.52**	**1.50**	**1.29**	**1.00**	**1.50**	**0.67**	**1.33**	**1.11**	**0.89**	**1.33**	**1.33**	**1.33**	**1.00**
China	2.00	2.00	2.00	1.86	2.00	2.00	2.00	1.00	1.33	2.00	2.00	2.00	2.00	2.00
Japan	1.33	1.43	1.00	1.00	0.00	1.00	0.00	1.00	1.33	0.00	2.00	1.50	0.00	0.50
Mongolia	1.33	1.14	1.50	1.00	1.00	1.50	0.00	2.00	0.67	0.67	0.00	0.50	2.00	0.50
South Asia	**1.33**	**1.18**	**1.13**	**1.11**	**1.00**	**1.00**	**0.75**	**1.00**	**0.83**	**1.17**	**1.25**	**1.00**	**1.50**	**1.38**
Bangladesh	0.67	0.86	1.00	1.43	0.00	1.00	1.00	1.00	1.00	0.00	2.00	1.00	0.00	1.50
Bhutan	0.67	1.29	1.50	0.71	1.50	1.50	1.00	1.00	0.67	1.33	0.00	1.00	2.00	1.50
India	2.00	1.57	2.00	1.86	2.00	1.00	1.00	1.00	1.33	2.00	2.00	1.50	2.00	1.00
Nepal	2.00	1.00	0.00	0.43	0.50	0.50	0.00	1.00	0.33	1.33	1.00	0.50	2.00	1.50
Southeast Asia	**0.94**	**1.17**	**0.83**	**1.07**	**0.92**	**1.17**	**1.17**	**0.83**	**0.56**	**0.78**	**1.50**	**1.00**	**1.33**	**0.92**
Indonesia	0.67	1.14	2.00	1.43	1.50	2.00	1.00	1.00	0.67	1.33	1.00	1.00	2.00	1.50
Malaysia	1.33	1.57	0.00	1.14	0.50	1.00	1.00	1.00	0.67	0.00	1.00	1.00	2.00	1.00
Myanmar	0.33	0.71	0.00	0.57	0.00	1.00	1.00	0.00	0.33	0.67	1.00	1.00	0.00	0.50
Philippines	1.33	1.00	1.00	1.00	0.50	1.00	2.00	1.00	0.33	0.67	2.00	1.00	2.00	0.50
Thailand	1.33	1.71	1.00	1.29	1.50	1.00	1.00	1.00	0.67	1.33	2.00	1.00	2.00	1.50
Viet Nam	0.67	0.86	1.00	1.00	1.50	1.00	1.00	1.00	0.67	0.67	2.00	1.00	0.00	0.50
Europe and the Caucasus	**1.57**	**1.48**	**1.32**	**1.55**	**1.12**	**1.20**	**1.87**	**1.47**	**1.04**	**1.49**	**1.57**	**1.45**	**1.73**	**1.50**
Austria	1.67	1.86	2.00	1.71	2.00	1.50	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Azerbaijan	0.67	1.14	1.50	1.71	1.50	1.00	2.00	2.00	1.33	1.33	2.00	1.00	2.00	2.00
Belgium	1.33	0.14	1.50	1.14	0.50	1.00	1.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
Croatia	1.33	1.71	1.00	1.86	1.50	2.00	2.00	2.00	1.33	2.00	2.00	2.00	2.00	2.00
Cyprus	1.67	1.43	0.00	1.00	0.50	1.00	1.00	1.00	0.33	1.33	1.00	1.00	2.00	0.50
Czech Republic	1.33	1.57	2.00	2.00	0.50	0.50	2.00	2.00	1.33	1.33	2.00	1.50	2.00	1.00
Estonia	0.67	0.86	1.00	1.71	0.00	0.50	2.00	2.00	0.33	0.67	1.00	1.00	2.00	0.50
Finland	2.00	1.43	2.00	2.00	2.00	1.00	2.00	1.00	0.33	1.33	2.00	2.00	2.00	2.00
France	2.00	1.71	1.00	1.43	2.00	1.00	2.00	2.00	1.67	2.00	2.00	2.00	2.00	1.50
Germany	1.67	1.71	2.00	1.29	1.00	1.00	2.00	1.00	1.33	2.00	2.00	1.50	2.00	2.00
Greece	1.67	1.57	1.50	1.29	0.50	1.00	2.00	2.00	0.33	0.67	2.00	1.00	2.00	1.50
Hungary	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	1.33	2.00	2.00	2.00	2.00
Iceland	1.67	1.71	1.00	1.71	1.00	1.50	2.00	2.00	1.00	2.00	2.00	2.00	2.00	2.00
Ireland	1.67	1.71	1.00	2.00	2.00	1.50	2.00	1.00	0.67	2.00	2.00	1.00	0.00	1.00
Italy	2.00	1.14	1.00	1.57	1.50	2.00	2.00	1.00	0.67	2.00	2.00	2.00	0.00	1.00
Latvia	1.33	1.43	1.00	1.43	0.50	1.00	2.00	2.00	1.33	1.33	1.00	1.00	2.00	0.50
Lithuania	1.67	1.57	1.50	1.14	0.00	0.00	2.00	1.00	1.33	2.00	2.00	2.00	2.00	2.00
Montenegro	1.33	0.86	1.50	0.29	0.00	1.00	2.00	1.00	0.33	0.67	1.00	0.50	2.00	1.50
Netherlands	1.67	1.86	1.00	2.00	2.00	1.00	2.00	1.00	1.67	2.00	2.00	2.00	2.00	2.00
Norway	2.00	2.00	2.00	2.00	1.00	1.00	2.00	2.00	1.33	2.00	2.00	2.00	2.00	2.00
Poland	1.67	1.57	1.00	1.71	2.00	1.00	2.00	1.00	0.67	2.00	1.00	1.50	2.00	2.00
Portugal	2.00	1.29	2.00	1.57	2.00	2.00	2.00	2.00	1.67	2.00	1.00	2.00	2.00	2.00

Republic of Macedonia	0.67	1.43	1.00	0.86	0.00	1.00	1.00	1.00	0.33	0.00	1.00	0.50	0.00	1.00
Serbia	1.67	1.43	0.00	1.14	0.00	1.00	2.00	2.00	0.67	0.67	1.00	1.00	2.00	1.00
Slovakia	1.67	1.14	2.00	1.57	1.50	1.50	1.00	1.00	0.67	0.67	2.00	1.00	2.00	0.50
Slovenia	1.67	1.71	1.00	1.71	1.00	1.00	2.00	1.00	1.33	1.33	2.00	2.00	2.00	2.00
Spain	1.67	1.71	1.00	1.71	2.00	2.00	2.00	2.00	1.00	2.00	1.00	2.00	2.00	2.00
Sweden	1.33	1.29	1.00	1.43	2.00	1.00	2.00	1.00	1.00	2.00	1.00	1.00	2.00	2.00
Switzerland	2.00	1.57	1.50	2.00	1.00	2.00	2.00	2.00	1.00	2.00	2.00	2.00	2.00	2.00
United Kingdom	1.33	1.86	1.50	1.57	0.00	1.00	2.00	1.00	1.33	2.00	1.00	1.00	2.00	1.50
Latin America and the Caribbean	**1.09**	**0.91**	**0.83**	**1.11**	**1.07**	**0.73**	**0.80**	**0.60**	**0.47**	**1.07**	**1.07**	**1.07**	**1.07**	**0.93**
Caribbean	**0.33**	**0.38**	**0.17**	**0.76**	**0.33**	**0.50**	**0.33**	**0.67**	**0.22**	**0.22**	**0.33**	**0.67**	**0.67**	**0.17**
Barbados	0.33	0.57	0.00	1.00	0.50	0.00	1.00	2.00	0.67	0.00	1.00	0.50	0.00	0.50
Suriname	0.67	0.00	0.00	0.14	0.00	0.50	0.00	0.00	0.00	0.00	0.00	0.50	2.00	0.00
Saint Vincent and the Grenadines	0.00	0.57	0.50	1.14	0.50	1.00	0.00	0.00	0.00	0.67	0.00	1.00	0.00	0.00
Central America	**1.11**	**1.05**	**0.92**	**1.17**	**1.42**	**0.92**	**0.83**	**0.50**	**0.56**	**1.22**	**1.17**	**1.08**	**0.67**	**1.08**
Costa Rica	0.33	0.00	1.00	0.29	1.00	0.00	0.00	0.00	0.00	1.33	1.00	0.00	0.00	1.00
Cuba	1.67	2.00	2.00	2.00	2.00	2.00	2.00	1.00	1.67	2.00	2.00	2.00	2.00	2.00
Guatemala	0.33	0.29	0.00	0.71	0.00	1.00	0.00	0.00	0.00	1.33	0.00	0.00	0.00	0.00
Mexico	1.67	1.71	1.00	2.00	2.00	1.00	2.00	1.00	0.33	2.00	2.00	2.00	2.00	2.00
Nicaragua	1.33	1.00	1.50	1.14	2.00	1.00	0.00	0.00	0.00	0.67	1.00	1.00	0.00	1.00
Panama	1.33	1.29	0.00	0.86	1.50	0.50	1.00	1.00	1.33	0.00	1.00	1.50	0.00	0.50
South America	**1.44**	**1.05**	**1.08**	**1.24**	**1.08**	**0.67**	**1.00**	**0.67**	**0.50**	**1.33**	**1.33**	**1.25**	**1.67**	**1.17**
Argentina	1.33	0.86	0.00	1.29	0.50	1.00	1.00	1.00	1.33	1.33	1.00	1.00	2.00	1.00
Bolivia	1.33	0.71	2.00	1.29	1.00	0.50	2.00	1.00	0.33	0.67	1.00	1.50	2.00	1.50
Brazil	2.00	1.71	1.50	2.00	2.00	1.00	2.00	1.00	0.67	2.00	1.00	2.00	2.00	1.50
Chile	1.33	1.00	1.00	0.86	2.00	1.00	1.00	0.00	0.00	1.33	2.00	1.50	2.00	1.50
Ecuador	0.67	0.86	1.00	0.29	0.00	0.00	0.00	0.00	0.00	0.67	1.00	0.00	0.00	0.50
Uruguay	2.00	1.14	1.00	1.71	1.00	0.50	0.00	1.00	0.67	2.00	2.00	1.50	2.00	1.00
Near and Middle East	**1.11**	**0.62**	**0.00**	**0.33**	**0.17**	**0.75**	**0.50**	**0.33**	**0.33**	**0.44**	**1.00**	**0.58**	**1.00**	**0.58**
Egypt	1.33	0.57	0.00	0.43	0.50	1.00	0.00	1.00	0.33	0.67	1.00	0.50	0.00	1.50
Iraq	1.33	1.14	0.00	0.14	0.00	0.00	0.00	0.00	0.00	1.33	1.00	1.00	2.00	0.50
Qatar	1.00	0.57	0.00	0.29	0.00	0.50	1.00	1.00	0.00	0.00	1.00	0.50	2.00	0.00
Republic of Yemen	1.00	0.43	0.00	0.71	0.00	1.00	0.00	0.00	0.67	0.00	1.00	0.50	0.00	0.00
Saudi Arabia	0.67	0.57	0.00	0.14	0.00	1.00	1.00	0.00	0.67	0.00	1.00	0.00	0.00	0.50
Sudan	1.33	0.43	0.00	0.29	0.50	1.00	1.00	0.00	0.33	0.67	1.00	1.00	2.00	1.00
North America	**2.00**	**1.71**	**1.50**	**1.79**	**1.00**	**1.75**	**2.00**	**1.50**	**1.33**	**1.67**	**2.00**	**1.75**	**2.00**	**1.50**
Canada	2.00	1.43	2.00	1.57	1.00	1.50	2.00	1.00	1.33	1.33	2.00	2.00	2.00	1.00
United States of America	2.00	2.00	1.00	2.00	1.00	2.00	2.00	2.00	1.33	2.00	2.00	1.50	2.00	2.00
Southwest Pacific	**0.50**	**0.64**	**0.75**	**0.79**	**0.88**	**0.88**	**0.75**	**0.25**	**0.08**	**0.33**	**0.75**	**0.50**	**1.50**	**0.50**
Niue	0.67	0.57	0.00	0.71	0.00	1.00	0.00	1.00	0.00	0.00	0.00	0.00	2.00	0.50
Samoa	1.33	1.57	1.50	1.43	2.00	1.00	1.00	0.00	0.00	1.33	2.00	1.00	2.00	1.00

Tonga	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vanuatu	0.00	0.43	1.50	1.00	1.50	1.50	2.00	0.00	0.33	0.00	1.00	1.00	2.00	0.50
World	**1.21**	**1.12**	**0.89**	**1.10**	**0.98**	**0.96**	**1.11**	**0.88**	**0.63**	**1.17**	**1.29**	**1.05**	**1.35**	**1.11**

[a]*SP1a corresponds to completeness of characterization and SP1b corresponds to the completeness of inventory and the regularity of monitoring of trends and associated risks*

Note: Indicator scores are divided into eight evenly distributed classes between a minimum score of 0 and a maximum score of 2. A score of 2 means that all actions covered by the indicator have been implemented fully. A score of 0 means that no action has been taken. Indicator scores:

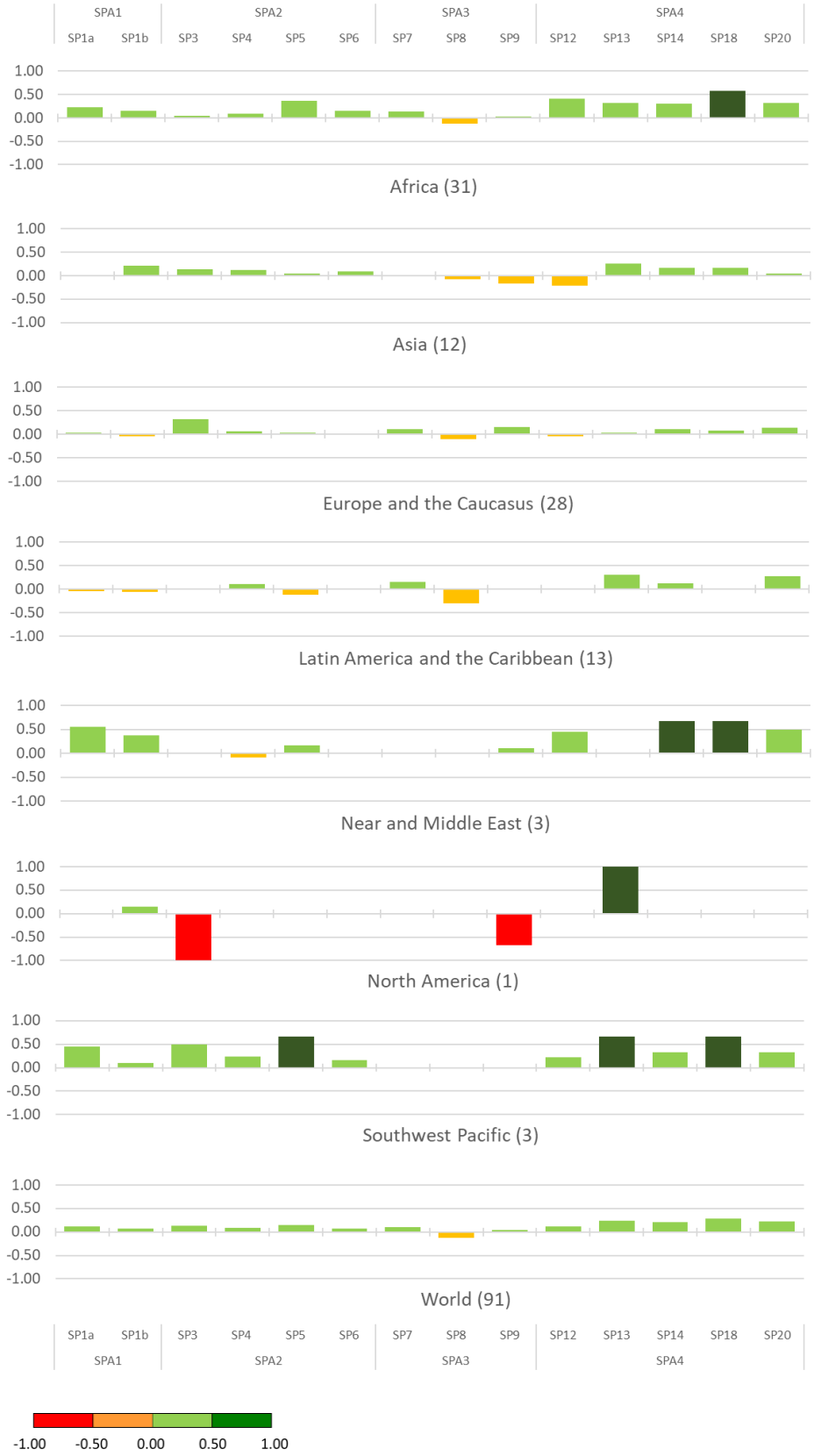
III. CHANGES SINCE 2014 IN THE IMPLEMENTATION OF THE GLOBAL PLAN OF ACTION BY COUNTRIES

Figure 9 presents a comparison of the mean indicator scores in 2014 and 2019 for the various regions of the world, taking into account only the 91 countries that provided reports in both rounds of reporting. The subjective nature of some of the questions, changes in NC-AnGRs (in some cases) and the different contexts in which the data were collected (i.e. in 2014 as part of a more comprehensive country reporting process for *The Second Report State of the World's Animal Genetic Resources for Food and Agriculture*) mean that the apparent changes since 2014 need to be interpreted with discretion. A decrease in an indicator score since 2014 does not necessarily mean that there has been a decline in the adequacy of provision in the respective strategic priority area. For example, countries may have decided that "Partially completed" is a more realistic description of their state of provision in 2019, despite having reported in 2014 that an activity had been "Completed". This may be either because of improved information on the state of provision or because of growing awareness of the scale of the challenge. In other words, trends in the state of implementation may be confounded by trends in the state of knowledge and awareness at country level.

Globally, on average countries reported slight progress in the implementation of the Global Plan of Action for each strategic priority area and strategic priority except SP8 (Establish or strengthen *in situ* conservation programmes). Progress was most marked for SP5 (Promote agro-ecosystems approaches to the management of animal genetic resources) and the five strategic priorities related to SPA4 (Policies, institutions and capacity building).

At regional level, Africa, Near and Middle East and Southwest Pacific reported greater progress than other regions, relative to 2014, especially for strategic priorities in SP4. Other regions generally reported more stable trends. A few large differences were reported for North America, for which only the United States of America provided reports in both rounds).

Figure 9. Regional and world-wide changes between 2014 and 2019 in mean indicators for strategic priorities (number of countries per region in parentheses)

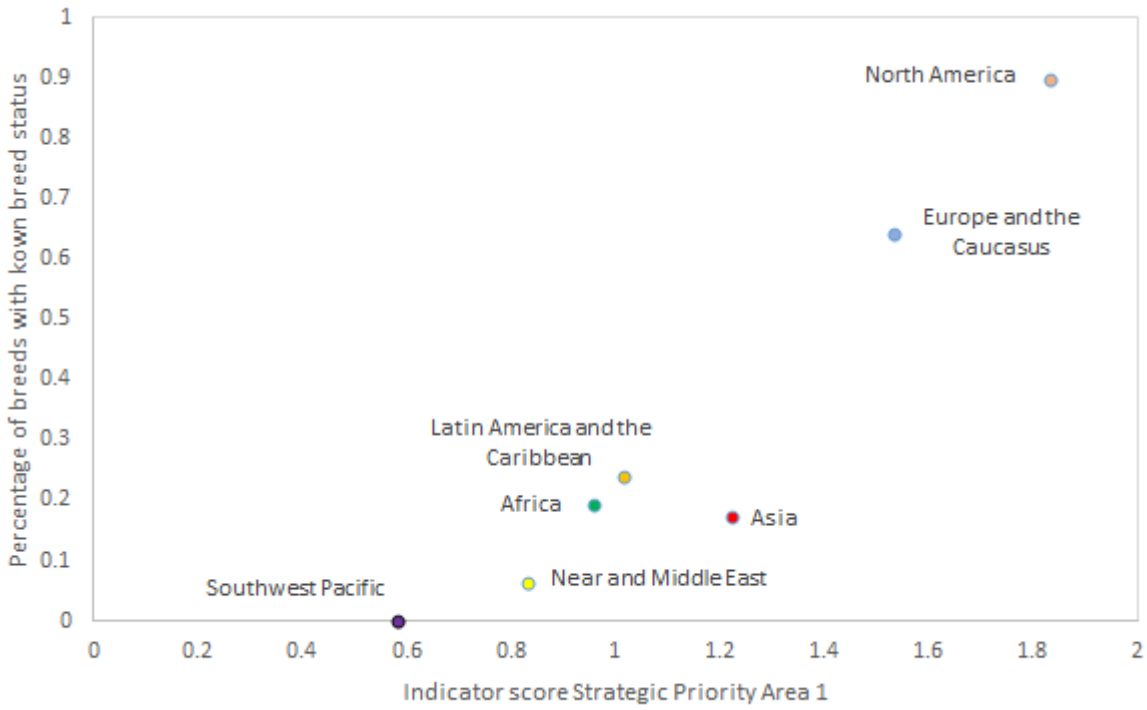


Note: The figure is based on data from the 91 countries that provided reports in both 2014 and 2019.

IV. RELATIONSHIPS BETWEEN PROCESS INDICATORS AND GENETIC RESOURCES

The relationship between process and resource indicators is demonstrated in Figure 10, which plots the percentage of national breed populations (excluding extinct breeds) with unknown risk status (data extracted from the Domestic Animal Diversity Information System -DAD-IS - in January 2020) against the process indicator score for SPA1. The results illustrate a clear relationship between the implementation of SPA1 and the knowledge of breeds' risk status, at a regional level. Countries in North America and Europe and the Caucasus tend to have a greater knowledge of the risk status of their breeds and a higher level of SPA1 implementation than do the other regions. The Southwest Pacific and Near and Middle East regions report a relatively low SPA1 implementation level and small numbers of national breed population with known risk status. Exploring the relationship between process indicators other resource indicators, such as proportion of breeds at risk of extinction, is not possible due to a lack of adequate resource metrics, particularly insufficient numbers of breeds with population data).

Figure 10. Relationship between implementation of Strategic Priority Area 1 and the availability of breed population data at regional level



V. PROGRESS MADE IN THE IMPLEMENTATION OF THE GLOBAL PLAN OF ACTION BY REGIONAL FOCAL POINTS AND NETWORKS

In September 2019, FAO invited Regional (and Subregional) Coordinators for the Management of Animal Genetic Resources to report on progress made in their regions in the implementation of the Global Plan of Action. An electronic questionnaire was made available on the FAO web site.[33] Completed national questionnaires for countries within the respective regions were also shared with Regional Coordinators. Regional Coordinators were asked to submit their completed questionnaires by 30 November 2019. They were reminded that the objective of the exercise was to "highlight collaborative efforts and indicate regional priorities for capacity building in relation to the implementation of the Global Plan of Action" [34] rather than to summarize activities at country level.

Responses were received from the following Regional/or Subregional Focal Points and networks:

- European Regional Focal Point for Animal Genetic Resources (ERFP);
- Latin America and the Caribbean's Regional Focal Point;
- Asian Animal Genetic Resources Network; and
- Association for Strengthening Agricultural Research in Eastern and Central Africa (ASARECA - which also reported as an international organization).

The compiled questionnaires are available on the FAO web site.[35] The following paragraphs summarize the regional activities reported, grouped according to strategic priority area.

A. Strategic Priority Area 1. Characterization, inventory and monitoring of trends and associated risks

The ERFP Working Group Documentation and Information contributed to the development of the renewed DAD-IS. This contribution involved general aspects of DAD-IS itself and the European regional node EFABIS, as well as specific work to identify core data fields to monitor the status and trends of honeybee populations. In Latin American and the Caribbean, some multi-country initiatives were reported that strengthen the monitoring of breeds through application of a statistical tool developed by FAO and the RED CONBIAND Network.[36] In 2019, a regional study on the molecular characterization of Criollo cattle was implemented. Asia reported that all countries use FAO criteria for assessing the risk status of animal genetic resources and that nearly 40 percent of countries have established an operational emergency response system. ASARECA has been involved in the implementation of projects on characterization of production systems in its member states.

B. Strategic Priority Area 2. Sustainable use and development

The ERFP supported various activities in relation to inventory, best practices, and awareness raising around the valorization of rare breeds and rural development measures for animal genetic resources. The specific taskforce on access and benefit sharing was reported to have pursued its work until 2019. In Latin America and the Caribbean, all the initiatives reported were at the country level and related to integration of agroecosystem approaches, genetic improvement programmes, recording systems and access and benefit sharing. In Asia, in addition to activities at the country level, a few international collaboration initiatives were reported, such as the establishment of the Native Animal Information System in Vietnam, with the support of the Philippines Los Banos-Institute of Animal Science (UPLB-IAS), the Department of Science and Technology (DOST), and the Philippine Council for Agriculture, Research and Development of Natural Resources and Water (DPS-PCAARRD). ASARECA reported on the implementation of a project on Conservation Agriculture and Sustainable Intensification (CASI) over the last 10 years.

[33] http://www.fao.org/3/ca4101en/ca4101en.pdf
[34] CGRFA-12/09/Report. Appendix G.
[35] http://www.fao.org/animal-genetics/global-policy/reporting-system/regions/en/
[36] http://www.uco.es/conbiand/Bienvenida.html

C. Strategic Priority Area 3. Conservation

In Europe, whereas most of the work regarding *in situ* conservation related to breed valorization (see above), ERFP reported extensive activity by the *ex situ* working group, especially with regard to the development of the European Genebank Network for Animal Genetic Resources (EUGENA) network and EUGENA portal.[37] The ERFP also collaborated closely with partners of the European Union sponsored "IMAGE" (Innovative Management of Animal Genetic Resources) project,[38] which developed a web portal[39] to facilitate access to gene bank samples and associated data. The portal was developed to promote utilization and valorization of gene bank collections. The Latin America and the Caribbean's Regional Focal Point reported only initiatives at the country level regarding *in situ* and *ex situ* conservation programmes. Similarly, the Asian Animal Genetic Resources Network reported only initiatives at country level, with a lack of funds and human resources being frequently reported as the main constraint limiting national and regional activities on the conservation of animal genetic resources. ASARECA reported on their role coordinating the establishment of the Eastern Africa Regional Gene Bank for animal genetic resources located in Uganda. ASARECA cited limited human capacity and animal health and sanitation arrangements as major obstacles to conservation of animal genetic resources in the subregion.

D. Strategic Priority Area 4. Policies, institutions and capacity-building

The ERFP reported a close connection with the Working Group on Animal Genetic Resources of the European Federation of Animal Science (EAAP),[40] but also with other European and international organizations such as the European Forum of Farm Animal Breeders (EFFAB),[41] Rare Breeds International (RBI),[42] SAVE (Safeguard for Agricultural Varieties in Europe) Foundation,[43] Swiss Foundation for the Cultural-Historical and Genetic Diversity of Plants and Animals (ProSpecie Rara),[44] Danubian Alliance for the Preservation of Animal Breeds (DAGENE)[45] and the Nordic Genetic Resource Center (NordGen).[46] Activities related to awareness raising, acceleration of collaborative efforts (for instance through the project European Project GenResBridge),[47] and development of guidance documents were mentioned. In Latin American and the Caribbean, existence of institutional capacities was mentioned only for some countries, while the Asian Animal Genetic Resources Network did not report any initiatives on SPA4. ASARECA reported to be involved in the development of legal and institutional frameworks in the Eastern and Central Africa Regions, in collaboration with national livestock keepers' organizations, government agencies, and research institutes. It is also particularly involved in the implementation of training and capacity building programmes at the regional level. For instance, under the SCARDA (Strengthening Capacity for Agricultural Research and Development in Africa) project, ASARECA has collaborated with other institutions in capacity development initiatives for agricultural researchers in Rwanda, Burundi and Sudan.

[37] https://eugena-erfp.net/en/
[38] http://www.imageh2020.eu/
[39] https://www.image2020genebank.eu
[40] http://www.eaap.org
[41] https://www.effab.info
[42] https://www.rarebreedsinternational.org
[43] http://www.save-foundation.net
[44] https://www.prospecierara.ch
[45] http://www.dagene.eu
[46] https://www.nordgen.org
[47] http://www.genresbridge.eu

VI. PROGRESS MADE IN THE IMPLEMENTATION OF THE GLOBAL PLAN OF ACTION BY INTERNATIONAL ORGANIZATIONS

In accordance with the reporting schedule agreed by the Commission, FAO, in April 2019, invited close to 140 international organizations to report, via an electronic questionnaire made available online[48] and on the FAO web site,[49] on their activities in implementing the Global Plan of Action. This was the third round of reporting by international organizations, who had been invited in 2012 and at the end of 2014 to complete the same questionnaire.

Detailed analysis of the activities of international organizations in implementing the Global Plan of Action was provided in the 2012 and 2014 synthesis progress reports.[50,51] The reports concluded that a number of international organizations were making important contributions to the implementation of the Global Plan of Action, often via innovative, efficient and participatory programmes and projects, but that given the limited uptake of the survey, it was unclear to what extent the Global Plan of Action had influenced the activities of the majority of international organizations working in the livestock sector. Activities of international organizations were distributed across the four strategic priority areas of the Global Plan of Action. The information obtained during the latest round of reporting is consistent with these general conclusions. Some new developments are described below. The reports have been made available on the FAO web site.[52]

Fourteen reports were received in 2019, compared to 15 in 2014. The following organizations submitted reports in 2019:

- Arab Center for the Studies of Arid Zones and Dry Lands (ACSAD)
- Arab Organization for Agricultural Development (AOAD)
- Asociación sobre la Conservación de la Biodiversidad de los Animales Domésticos Locales para el Desarrollo Rural Sostenible (CONBIAND Network)
- Association for Strengthening Agricultural Research in Eastern and Central Africa (ASARECA)
- Centre for Agriculture and Bioscience International (CABI)
- Caribbean Agricultural Research and Development Institute (CARDI)
- European Forum of Farm Animal Breeders (EFFAB)
- Heifer International
- International Atomic Energy Agency (IAEA)
- International Committee for Animal Recording (ICAR)
- International Food Policy Research Institute (IFPRI)
- League for Pastoral Peoples (LPP)
- Nordic Genetic Resource Centre (NordGen);
- Rare Breeds International (RBI)

Seven organizations provided reports in both 2014 and 2019 (ACSAD, Heifer International, IAEA, ICAR, LPP, NordGen, RBI), generally showing consistency in activities but with marginal increases over the past five years. The reports submitted describe a wide range of activities, in line with the organizations' particular mandates. Most organizations reported activities related to the promotion of agro-ecosystem approaches, the support for the development institutional and regulatory frameworks for management of animal genetic resources, as well as the implementation of training or capacity-building programmes for animal genetic resources management. Organizations also reported using collaborative links to other stakeholders involved in the management of animal genetic resources and contributing to the development of mechanisms for facilitating interactions among stakeholders, scientific disciplines and sectors. By contrast, only a few organizations reported to have a database or information system for animal genetic resources-related data, or to contribute to the development of

[48] https://www.surveymonkey.com/r/GlobalPlanofAction2019
[49] http://www.fao.org/3/ca4100en/ca4100en.pdf
[50] http://www.fao.org/docrep/meeting/027/mg044e.pdf
[51] http://www.fao.org/3/a-at136e.pdf
[52] http://www.fao.org/animal-genetics/global-policy/reporting-system/international-organizations/en/

agreements for equitable sharing of benefits arising from access to, and use and development of, animal genetic resources.

The seven organizations submitting reports for the first time, reported to support the following range of activities:
AOAD reported related to all four strategic priority areas. Capacity building is a major focus of AOAD's work. In terms of species, much of AOAD's work deals with dromedary genetic resources, although work with cattle, sheep and goats was also mentioned. The development of an "extension law" on animal genetic resources for Arab countries was mentioned as having relevance for several strategic priority areas. The activities related to SPA3 were mostly related to cryoconservation.

CONBIAND Network has a focus on research on animal genetic resources for food and agriculture in Latin America and the Iberian Peninsula. All major species are addressed in their work. Activities included work on characterization, conservation, and support to the development of policies, institutions and capacity building.

ASARECA serves as the Subregional Focal Point for Management of Animal Genetic Resources in East Africa and their major activities are described in that section of this document.

CABI reported working with all major species of livestock. Provision of information is a major activity of CABI. Their main area of focus is on the sustainable use of animal genetic resources. They also support the development of policies and institutions and capacity building.

IFPRI has a general mandate across livestock species and production systems. They reported activities mostly relating to research in sustainable use of animal genetic resources for food and agriculture, the response to emergencies and the development of policies, institutions and capacity building.

CARDI reported activities across all of the strategic priority areas. The organization emphasises local breeds of small ruminants in its work.

EFFAB is a consortium representing breeding companies and other non-governmental organizations relating to animal genetic resources in Europe and did not provide details on their activities.

VII. CONCLUSIONS

The implementation of the elements of the Global Plan of Action continues to progress, but with substantial variation among the different continental regions. Implementation is the most advanced in Europe and the Caucasus and North America, at a medium level in Africa, Asia, and Latin America and the Caribbean and at a low level in Near and Middle East and Southwest Pacific. Variation in implementation of the Global Plan of Action is also substantial among countries within the same region. Individual countries from all regions have reached high levels of implementation for some strategic priorities, whereas others remain at the very initial stages. More than 100 countries reported on their activities, which is very satisfactory but still means that approximately 75 countries did not respond. Implementation by these countries is thus unknown but may presumably be lower on average than in the countries that did participate in the reporting process.

Globally, the indicators for Strategic Priority Areas 1 (Characterization, inventory and monitoring of trends and associated risks) and 4 (Policies, institutions and capacity-building) show higher levels of implementation, especially compared to Strategic Priority Area 3 (Conservation). The most frequently mentioned obstacles to enhancing conservation programmes are resource-related constraints. For example, cryoconservation, through the establishment of a gene bank, requires a substantial initial investment in infrastructure.

In all regions, the indicators for the state of collaboration and for the state of funding show lower levels of implementation than the indicators for the strategic priority areas themselves. Financial constraints remain among the most frequently mentioned obstacles and barriers to the implementation of the Global Plan of Action. Many countries have developed National Strategies and Action Plans for animal genetic resources in recent years. During this round of reporting, 40 countries confirmed advancement in this process with respect to 2014, including 12 countries that have begun the process of preparing their first National Strategy and Action Plan (Annexx 2; Figure A2.49 Q48). These instruments have the potential to facilitate improvements to key areas of animal genetic resources management, but effective implementation will require ongoing political commitment and adequate resources.

The impact of the Global Plan of Action is increasing over time. On average, substantial progress has been made since in the last survey in 2014, as measured by differences in mean indicator scores for the four strategic priority areas and Collaboration and Funding. The greatest improvement was observed in Collaboration. Although the increase in Funding was a welcome sign, given the frequent citations by countries regarding financial obstacles, it was smaller than for any of the strategic priorities.

The regional progress reports indicate varying degrees of progress since the last round of reporting. The ERFP, the longest established regional focal point, continues to report activities across all strategic priority areas. ASARECA, which serves as the Subregional Focal Point for East Africa, also reported also activities in the four strategic priority areas. Activities reported by the Regional Focal Point for Latin America and the Caribbean and Asian Animal Genetic Resources Network addressed several of the strategic priority areas.

International organizations continue to make significant contributions to the implementation of the Global Plan of Action. The activities of these organizations span the four strategic areas of the Global Plan of Action. Several organizations reported on their activities for the first time since FAO began collecting such information in 2012.

Despite the encouraging progress described in this report, the task of improving the management of the world's animal genetic resources for food and agriculture remains far from complete. The reasons for this continue to include a lack of financial resources and low levels of human capacity. Decision-makers are encouraged to use the country-level indicators presented in this report as a means of identifying strategic priority areas and strategic priorities where action is particularly required. Countries and international organizations with strong capacity in management of animal genetic resources are invited to assist those countries in need.

Annex 1

Overview: Goals, indicators and targets of the Global Plan of Action by strategic priority area (SPA) and implementation and financing (collaboration and financing) and questions used for their calculation

SPA 1 Characterization, inventory and monitoring of trends and associated risks		
SPA 1 Goal	Improved understanding of the status, trends and associated risks, and characteristics of all aspects and components of animal genetic resources, to facilitate and enable decision-making for their sustainable use, development and conservation	
SPA 1 Indicator	The completeness of characterization and inventory and the regularity of monitoring of trends and associated risks	
SPA 1 Target	Increase the completeness of characterization and inventory and improve monitoring of trends and associated risks	
SP 1a Goal	Inventory and characterize animal genetic resources, monitor trends and risks associated with them, and establish country-based early-warning and response systems	
SP 1a Indicator	The completeness of characterization	
SP 1a Target	Increase the completeness of characterization	
	Q 2	Which of the following options best describes your country's progress in implementing phenotypic characterization studies covering morphology, performance, location, production environments and specific features in all livestock species of economic importance (SP 1, Actions 1 and 2)?
	Q 3	Which of the following options best describes your country's progress in molecular characterization of its animal genetic resources covering all livestock species of economic importance (SP 1)?
	Q 10	Is your country conducting research to develop methods, technical standards or protocols for phenotypic or molecular characterization, or breed evaluation, valuation or comparison? (SP 2, Action 2)
SP 1b Goal	Inventory and characterize animal genetic resources, monitor trends and risks associated with them, and establish country-based early-warning and response	
SP 1b Indicator	The completeness of inventory and the regularity of monitoring of trends and associated risks	
SP 1b Target	Increase the completeness of inventory and improve monitoring of trends and associated risks	
	Q 1	Which of the following options best describes your country's progress in building an inventory of its animal genetic resources covering all livestock species of economic importance (SP 1, Action 1)?
	Q 4	Has your country conducted a baseline survey of the population status of its animal genetic resources for all livestock species of economic importance (SP 1, Action 1)?
	Q 5	Have institutional responsibilities for monitoring the status of animal genetic resources in your country been established (SP 1, Action 3)?
	Q 6	Have protocols (details of schedules, objectives and methods) been established for a programme to monitor the status of animal genetic resources in your country (SP 2)?

	Q 7	Are the population status and trends of your country's animal genetic resources being monitored regularly for all livestock species of economic importance (SP 1, Action 2)?
	Q 8	Which criteria does your country use for assessing the risk status of its animal genetic resources (SP 1, Action 7)
	Q 9	Has your country established an operational emergency response system (http://www.fao.org/docrep/meeting/021/K3812e.pdf) that provides for immediate action to safeguard breeds at risk in all important livestock species (SP 1, Action 7)?
Additional questions contributing to SPA 1		
	Q 11	Has your country identified the major barriers and obstacles to enhancing its inventory, characterization and monitoring programmes?
	Q 59.1	Are there any national NGOs active in your country in the fields of characterization?
SPA 2 Sustainable use and development		
SPA 2 Goal	Enhanced sustainable use and development of animal genetic resources in all relevant production systems, as a key contribution to achieving sustainable development, poverty eradication and adaptation to the effects of climate change	
SPA 2 Indicator	The state of sustainable use and development	
SPA 2 Target	Improve the state of sustainable use and development	
SP 3 Goal	Establish and strengthen national sustainable use policies	
SP 3 Indicator	The state of national sustainable use policies	
SP 3 Target	Improve the state of sustainable use policies	
	Q 14	Does your country have adequate national policies in place to promote the sustainable use of animal genetic resources (see also questions 46 and 54)?
	Q 23	Has your country developed a national policy or entered specific contractual agreements for access to and the equitable sharing of benefits resulting from the use and development of animal genetic resources and associated traditional knowledge (SP3, Action 2)?
SP 4	Establish national species and breed development strategies and programmes	
SP 4	The state of national species and breed development strategies and programmes	
SP 5	Improve the state of national species and breed development strategies and programmes	
	Q 16	Do breeding programmes exist in your country for all major species and breeds, and are these programmes regularly reviewed, and if necessary revised, with the aim of meeting foreseeable economic and social needs and market demands (SP4, Action 2)?
	Q 17	Is long-term sustainable use planning – including, if appropriate, strategic breeding programmes – in place for all major livestock species and breeds (SP4, Action 1)?

	Q 19	Have the long-term impacts of the use of exotic breeds on locally adapted breeds (e.g. economic, environmental or genetic impacts) and on food security been assessed in your country (SP4, Action 1)?
	Q 20	Have recording systems and organizational structures for breeding programmes been established or strengthened (SP4, Action 3)?
	Q 22	Have measures been implemented in your country to provide farmers and livestock keepers with information that facilitates their access to animal genetic resources (SP 4, Action 7)?
	Q 24	Have training and technical support programmes for the breeding activities of livestock-keepers been established or strengthened in your country (SP 4, Action 1)?
	Q 25	Have priorities for future technical training and support programmes to enhance the use and development of animal genetic resources in your country been identified (SP 4, paragraph 42)?
SP 5	Promote agro-ecosystems approaches to the management of animal genetic resources	
SP 5 Indicator	The state of efforts to promote agro-ecosystems approaches to the management of animal genetic resources	
SP 5 Target	Increase efforts to promote agro-ecosystems approaches to the management of animal genetic resources	
	Q 15	Do these policies address the integration of agro-ecosystem approaches into the management of animal genetic resources in your country (SP5) (see also questions 46 and 54)?
	Q 21	Are mechanisms in place in your country to facilitate interactions among stakeholders, scientific disciplines and sectors as part of sustainable use development planning (SP5, Action 3)?
SP 6	Support indigenous and local production systems and associated knowledge systems of importance to the maintenance and sustainable use of animal genetic resources	
SP 6 Indicator	The state of efforts to support indigenous and local production systems and associated knowledge systems of importance to the maintenance and sustainable use of animal genetic resources	
SP 6 Target	Increase efforts to support indigenous and local production systems and associated knowledge systems of importance to the maintenance and sustainable use of animal genetic resources	
	Q 26	Have efforts been made in your country to assess and support indigenous or local production systems and associated traditional knowledge and practices related to animal genetic resources (SP 6, Action 1, 2)?
	Q 27	Have efforts been made in your country to promote products derived from indigenous and local species and locally adapted breeds, and facilitate access to markets (SP 6, Action 2, 4)?
Questions contributing in addition to SPA 2		
	Q 18	Have the major barriers and obstacles to enhancing the sustainable use and development of animal genetic resources in your country been identified?
	Q 59.2	Are there any national NGOs active in your country in the fields of sustainable use and development?

SPA 3 Conservation

SPA 3 Goal Secure the diversity and integrity of the genetic base of animal genetic resources by better implementing and harmonizing measures to conserve these resources, both in situ and ex situ, including in the context of emergencies and disasters

SPA 3 The state of conservation

SPA 3 Improve the state of conservation

SP 7 Establish national conservation policies

SP 7 The state of national conservation policies

SP7 Improve the state of national conservation policies

Q 32 Does your country have conservation policies and programmes in place to protect locally adapted breeds at risk in all important livestock species (SP 7, SP 8 and SP 9)?

SP 8 Establish or strengthen in situ conservation programmes

SP 8 The state of in situ conservation programmes

SP 8 Improve the state of in situ conservation programmes

Q 34 Does your country have in situ conservation measures in place for locally adapted breeds at risk of extinction and to prevent breeds from becoming at risk (SP 8 and SP 9)?

SP 9 Establish or strengthen ex situ conservation programmes

SP 9 The state of ex situ conservation programmes

SP 9 Improve the state of ex situ conservation programmes

Q 35 Does your country have ex situ in vivo conservation measures in place for locally adapted breeds at risk of extinction and to prevent breeds from becoming at risk (SP 8 and SP 9)?

Q 36 Does your country have ex situ in vitro conservation measures in place for locally adapted breeds at risk of extinction and to prevent breeds from becoming at risk (SP 8 and SP 9)?

Q 42 Are arrangements in place in your country for extraction and use of conserved genetic material following loss of animal genetic resources (e.g. through disasters), including arrangements to enable restocking (SP 9, Action 3)?

Questions contributing in addition to SPA 3

Q 30 Does your country regularly assess factors leading to the erosion of its animal genetic resources (SP 7, Action 2)?

Q 39 Has your country identified the major barriers and obstacles to enhancing the conservation of its animal genetic resources?

Q 41 Are arrangements in place in your country to protect breeds and populations that are at risk from natural or human-induced disasters (SPA 3)?

Q 43 Is your country conducting research to adapt existing, or develop new, methods and technologies for in situ and ex situ conservation of animal genetic resources (SP 11, Action 1)?

	Q 44	Does your country implement programmes to promote documentation and dissemination of knowledge, technologies and best practices for conservation (SP 11, Action 2)?
	Q 59.3	Are there any national NGOs active in your country in the fields of conservation of breeds at risk?

SPA 4 Policies, institutions and capacity-building

SPA 4 Goal	Established cross-cutting policies and legal frameworks, and strong institutional and human capacities to achieve successful medium- and long-term planning for livestock sector development, and the implementation of national programmes for the long-term	
SPA 4 Indicator	The state of national policies and legal frameworks and efforts to strengthen institutional and human capacities	
SPA 4 Target	Improve the state of national policies and legal frameworks and increase efforts to strengthen institutional and human capacities	
SP 12 Goal	Establish or strengthen national institutions, including national focal points, for planning and implementing animal genetic resources measures, for livestock sector development	
SP 12 Indicator	The state of efforts to strengthen national institutions for planning and implementing animal genetic resources measures	
SP 12 Target	Increase efforts to strengthen national institutions for planning and implementing animal genetic resources measures	
	Q 47	Does your country have sufficient institutional capacity to support holistic planning of the livestock sector (SP 12, Action1)?
	Q 53	Has your country established a National Advisory Committee for Animal Genetic Resources (SP 12, Action 3)?
	Q 54	Is there strong coordination and interaction between the National Focal Point and stakeholders involved with animal genetic resources, such as the breeding industry, livestock keepers, government agencies, research institutes and civil society organizations (SP 12, Action 3)?
SP 13 Goal	Establish or strengthen national educational and research facilities	
SP 13 Indicator	The state of efforts to strengthen national educational and research facilities	
SP 13 Target	Increase efforts to strengthen national educational and research facilities	
	Q 60	Has your country established or strengthened research or educational institutions in the field of animal genetic resources management (SP 13, Action 3)?
SP 14	Strengthen national human capacity for characterization, inventory, and monitoring of trends and associated risks, for sustainable use and development, and for conservation	
SP 14 Indicator	The state of efforts to strengthen national human capacity for characterization, inventory, and monitoring of trends and associated risks, for sustainable use and development, and for conservation	
SP 14 Target	Increase efforts to strengthen national human capacity for characterization, inventory, and monitoring of trends and associated risks, for sustainable use and development, and for conservation	

	Q 57	Which of the following options best describes the state of training and technology transfer programmes in your country related to inventory, characterization, monitoring, sustainable use, development and conservation of animal genetic resources (SP14, Action 1)?
	Q 58	Have organizations (including where relevant community-based organizations), networks and initiatives for sustainable use, breeding and conservation been established or strengthened (SP 14, Action 3)?
SP 18	Raise national awareness of the roles and values of animal genetic resources	
SP 18	The state of efforts to raise national awareness of the roles and values of animal genetic resources	
SP 18	Increase efforts to raise national awareness of the roles and values of animal genetic resources	
	Q 55	Does the National Focal Point (or other institutions) undertake activities to increase public awareness of the roles and values of animal genetic resources (SP 18)?
SP 20	Review and develop national policies and legal frameworks for animal genetic resources	
SP 20	The state of national policies and legal frameworks for animal genetic resources	
SP 20	Improve the state of national policies and legal frameworks for animal genetic resources	
	Q 48	What is the current status of your country's national strategy and action plan for animal genetic resources (SP 20)?
	Q 56	Does your country have national policies and legal frameworks for animal genetic resources management (SP 20)?
Questions contributing in addition to SPA 4		
	Q 49	Are animal genetic resources addressed in your country's National Biodiversity Strategy and Action Plan (http://www.cbd.int/nbsap/)?
	Q 50	Are animal genetic resources addressed in your country's national livestock sector strategy, plan or policy (or equivalent instrument)?
	Q 51	Has your country established or strengthened a national database for animal genetic resources (independent from DAD-IS) (SP 15, Action 4)?
	Q 52	Have your country's national data on animal genetic resources been regularly updated in DAD-IS?
Implementation and financing of the Global Plan of Action: Collaboration		
Indicator	The state of international collaboration for planning and implementing animal genetic resources measures	
Target	Improve the state of international collaboration for planning and implementing animal genetic resources measures	
	Q 62.1	Has your country established or strengthened international collaboration in (SP 16): Characterization?
	Q 62.2	Has your country established or strengthened international collaboration in (SP 16): Sustainable use and development?
	Q 62.3	Has your country established or strengthened international collaboration in (SP 16): Conservation of breeds at risk?

Q 63.1	Are there any international NGOs active in your country in the fields of: Characterization?
Q 63.2	Are there any international NGOs active in your country in the fields of: Sustainable use and development?
Q 63.3	Are there any international NGOs active in your country in the fields of: Conservation of breeds at risk?
Q 66	Has your country supported or participated in international research and education programmes assisting developing countries and countries with economies in transition to better manage animal genetic resources (SP 15 and 16)?
Q 67	Has your country supported or participated in programmes aimed at assisting developing countries and countries with economies in transition to obtain training and technologies and to build their information systems (SP 15 and 16)?
Q 69	Has your country contributed to international cooperative inventory, characterization and monitoring activities involving countries sharing transboundary breeds and similar production systems (SP 1, Action 5)?
Q 70	Has your country contributed to establishing or strengthening global or regional information systems or networks related to inventory, monitoring and characterization of animal genetic resources (SP 1, Action 6)?
Q 71	Has your country contributed to the development of international technical standards and protocols for characterization, inventory and monitoring of animal genetic resources (SP2)?
Q 72	Has your country contributed to the development and implementation of regional in situ conservation programmes for breeds that are at risk (SP 8, Action 2; SP 10, Action 1)?
Q 73	Has your country contributed to the development and implementation of regional ex situ conservation programmes for breeds that are at risk (SP 9, Action 2; SP 10, Action 3; SP 10, Action 4)?
Q 74	Has your country contributed to the establishment of fair and equitable arrangements for the storage, access and use of genetic material stored in supra-national ex situ gene banks (SP9, Action 3)?
Q 75	Has your country participated in regional or international campaigns to raise awareness of the status of animal genetic resources (SP19)?
Q 76	Has your country participated in reviewing or developing international policies and regulatory frameworks relevant to animal genetic resources (SP 21)?

Implementation and financing of the Global Plan of Action: Funding

Indicator	The state of funding for the conservation, sustainable use and development of animal genetic resources
Target	Improve the state of funding for the conservation, sustainable use and development of animal genetic resources
Q 64	Has national funding for animal genetic resources programmes increased since the adoption of the GPA?
Q 65	Has your country received external funding for implementation of the GPA?

Q 68 Has your country provided funding to other countries for implementation of the Global Plan of Action?

Annex 2

Graphical summaries of the responses to each question, overall and according to region.

Questions are discussed in sections, according to strategic priority area. Within each strategic priority area, the questions are grouped according to the strategic priority level indicator to which they contribute. Questions that contribute to the respective strategic priority area level indicator, but not to a specific strategic priority indicator, follow at the end each subsection.

The questions from the questionnaire are used as the figure titles, and for ease of reference, the question numbers used in the questionnaire are also shown. In the figures, the multiple-choice answers from the questionnaire are shortened for clarity of presentation. Responses are presented globally and according to region. The number of reporting countries (n) in each region is presented on the right side of each figure.

Strategic priority areas, collaboration and funding

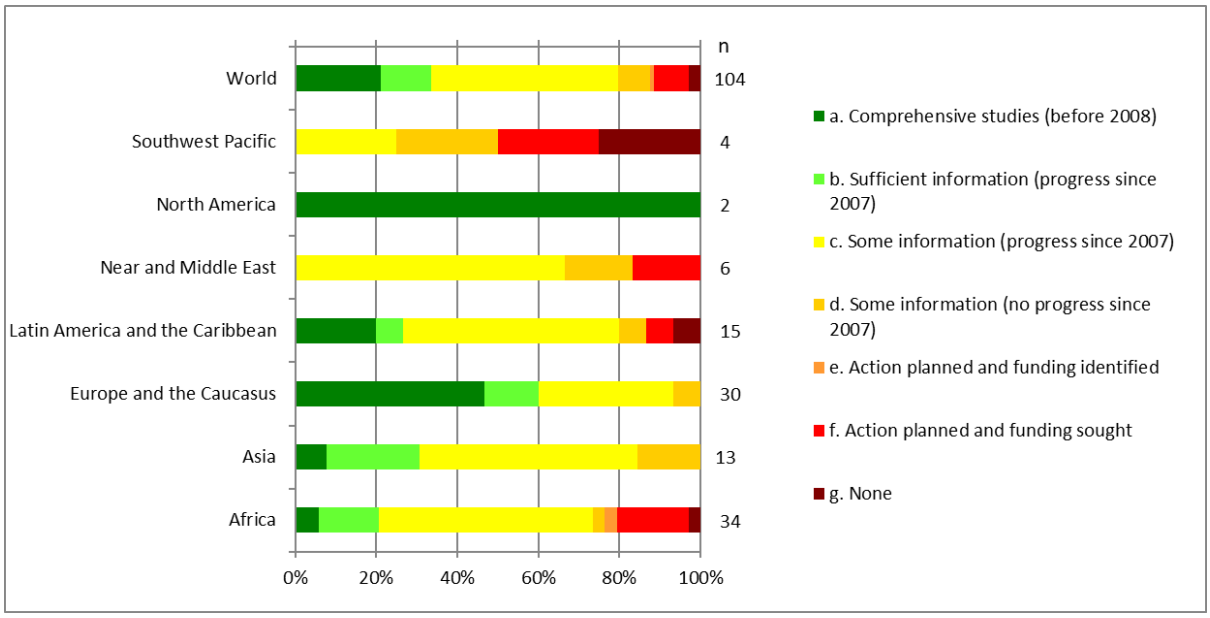
Strategic Priority Area 1: Characterization, inventory and monitoring of trends and associated risks

Long-term goal: Improved understanding of the status, trends and associated risks, and characteristics of all aspects and components of animal genetic resources, to facilitate and enable decision-making for their sustainable use, development and conservation.

SP1: Inventory and characterize animal genetic resources, monitor trends and risks associated with them, and establish country-based early-warning and response systems

Indicator SP1a: The completeness of characterization.

Figure A2.1 Q2. Which of the following options best describes your country's progress in implementing phenotypic characterization studies covering morphology, performance, location, production environments and specific features in all livestock species of economic importance (SP 1, Actions 1 and 2)?

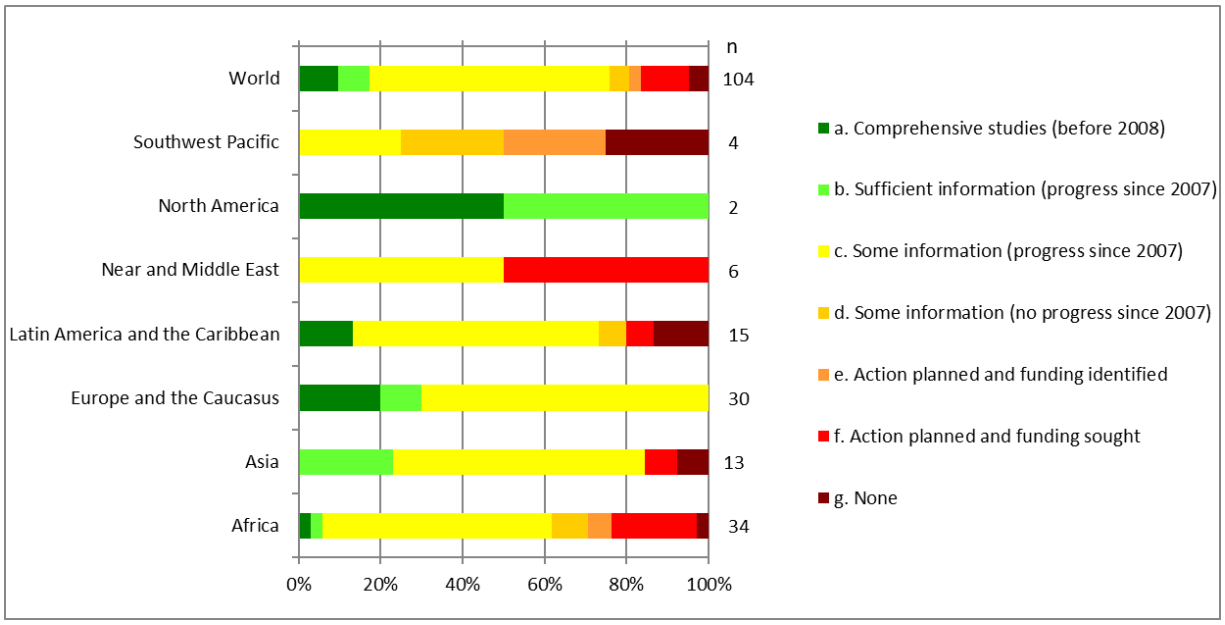


More than 80 percent of reporting countries have undertaken at least some phenotypic characterization studies. More than 30 percent of countries report either that comprehensive studies (covering morphology, performance, location, production environments) had been undertaken before 2008 or that

by now the information generated is considered sufficient Additional studies are, however, required in the majority of countries, particularly in the Southwest Pacific and Near and Middle East. Even where information is currently considered sufficient, further studies may be necessary in the future if significant changes to production environments occur.

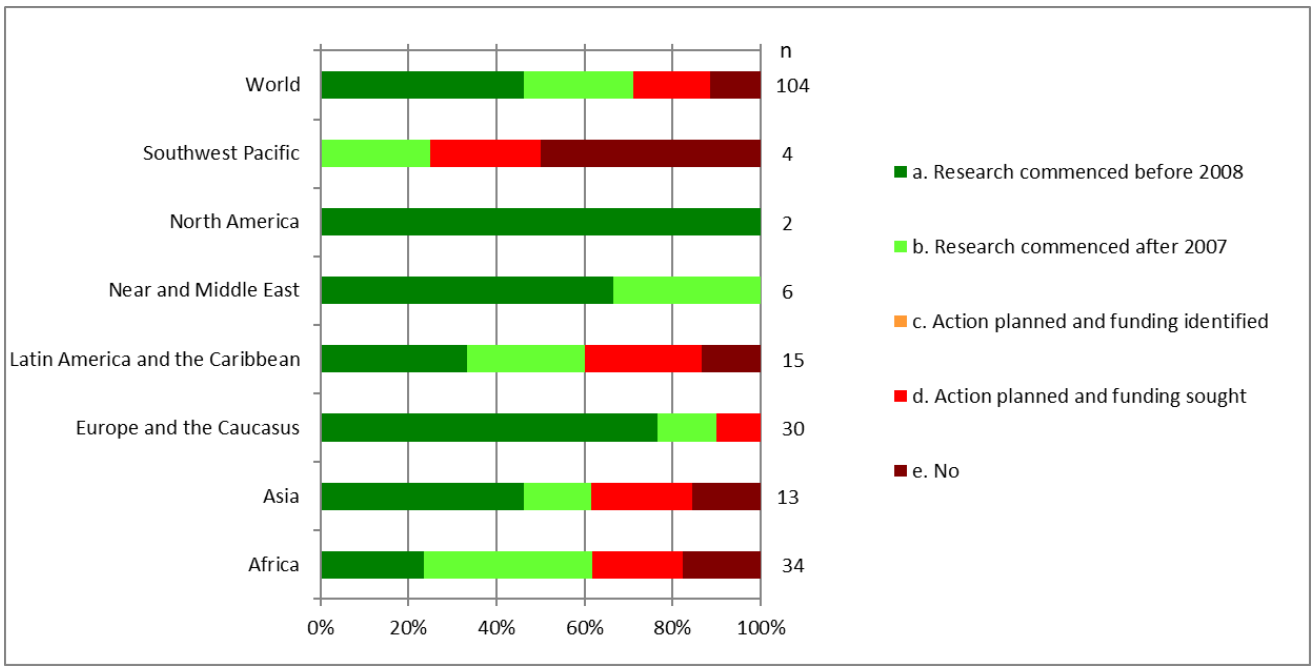
Countries in various regions – developed and less developed – report that phenotypic characterization work is undertaken by breeding organizations and non-governmental organizations (NGOs) for the breeds for which they take responsibility or by individual research organizations. More than 50 percent of countries have made progress in phenotypic characterization studies since the adoption of the Global Plan of Action (in addition to the 20 percent of countries that report comprehensive studies completed before 2008).

Figure A2.2 Q3. Which of the following options best describes your country's progress in molecular characterization of its animal genetic resources covering all livestock species of economic importance (SP 1)?



Approximately 10 percent of reporting countries had undertaken comprehensive molecular characterization studies before the Global Plan of Action was adopted. More than 50 percent have undertaken some molecular studies. More countries in developing regions report that they have undertaken no molecular characterization studies: about 40 percent in Africa, 50 percent in the Near and Middle East, and 25 percent in the Southwest Pacific. Overall, approximately 80 percent of countries have generated some information from molecular studies since 2007. A few countries note that a lack of funding constrained their capacities to undertake molecular characterization studies.

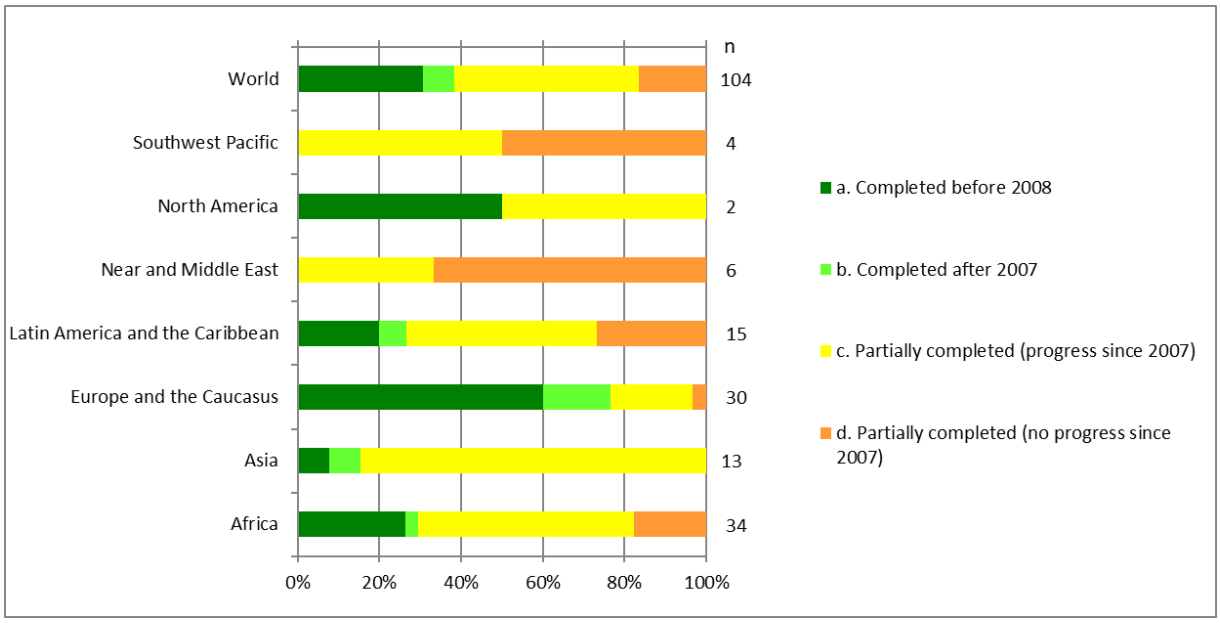
Figure A2.3 Q10. Is your country conducting research to develop methods, technical standards or protocols for phenotypic or molecular characterization, or breed evaluation, valuation or comparison? (SP 2, Action 2)



Approximately 70 percent of reporting countries indicate that they have undertaken research on methods and standards for breed characterization, evaluation, valuation or comparison. More than 40 percent of countries commenced these studies before the adoption of the Global Plan of Action, while almost 30 percent commenced studies after 2007. Research activities in this field are most widespread in North America, Europe and the Caucasus, and Near and Middle East.

Indicator SP1b: The completeness of inventory and the regularity of monitoring of trends and associated risks

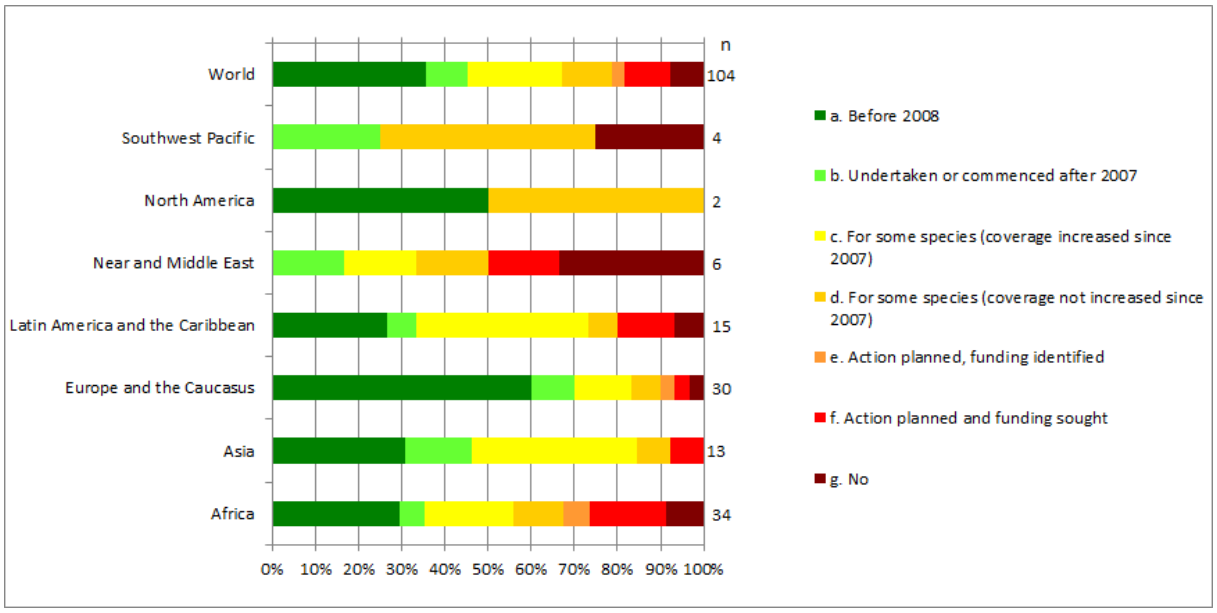
Figure A2.4 Q1. Which of the following options best describes your country's progress in building an inventory of its animal genetic resources covering all livestock species of economic importance (SP 1, Action 1)?



Approximately 30 percent of reporting countries had built an inventory of their animal genetic resources covering all livestock species of economic importance before the adoption of the Global Plan of Action. Among the remaining countries, the majority have either completed or made progress towards completing their inventories since 2007. However, 100 percent of the reporting countries from Southwest Pacific and Near and Middle East have only partially completed their inventories with approximately 50 percent and over 30 percent, respectively, indicating progress since 2007.

Several countries report that they prepared inventories many years ago, or as part of the first State of the World's Animal Genetic Resources for Food and Agriculture process. Countries reported a variability of sources to get inventory for livestock breeds, including national census, dedicated database or breed association registries.

Figure A2.5 Q4. Has your country conducted a baseline survey of the population status of its animal genetic resources for all livestock species of economic importance (SP 1, Action 1)?

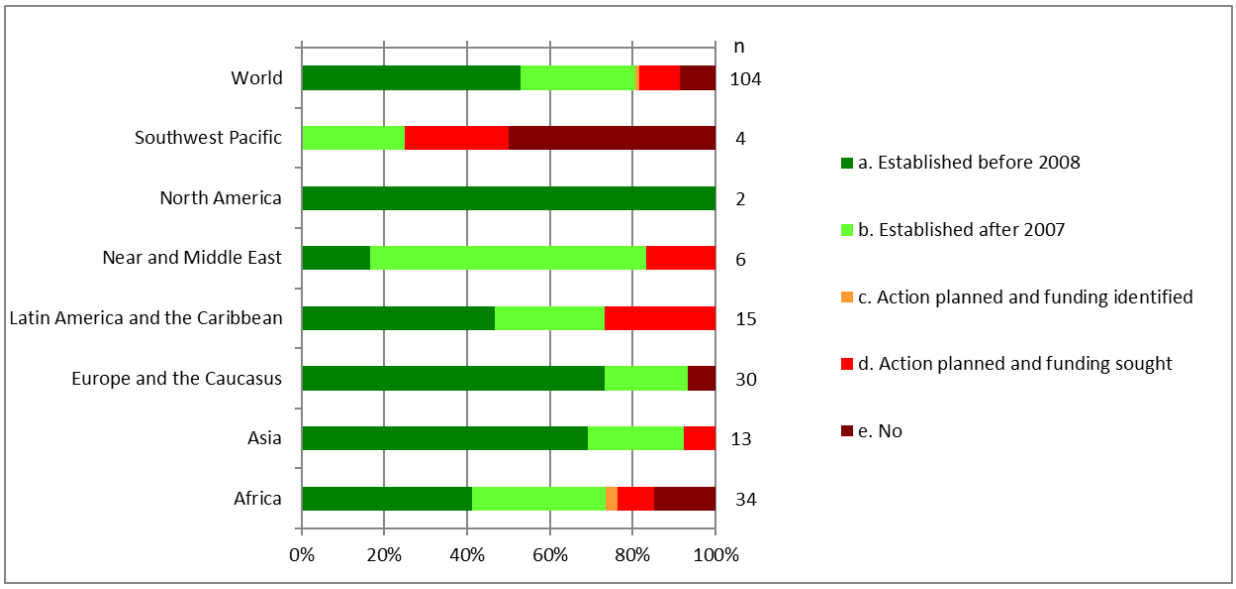


More than 40 percent of reporting countries have conducted a baseline survey of the population status of their animal genetic resources for all livestock species of economic importance.

For all regions except Europe and the Caucasus and North America, there is a general need for substantial further efforts to complete baseline surveys. This shortfall is reflected in the many gaps that still exist in the population data inserted by countries into the Domestic Animal Diversity Information System (DAD-IS).[53] For further information, see *Status and trends of animal genetic resources – 2020*[54]. Several countries note that that surveying activities are constrained by a lack of funds.

[53] http://www.fao.org/dad-is/
[54] CGRFA/WG-AnGR-11/21/Inf.4

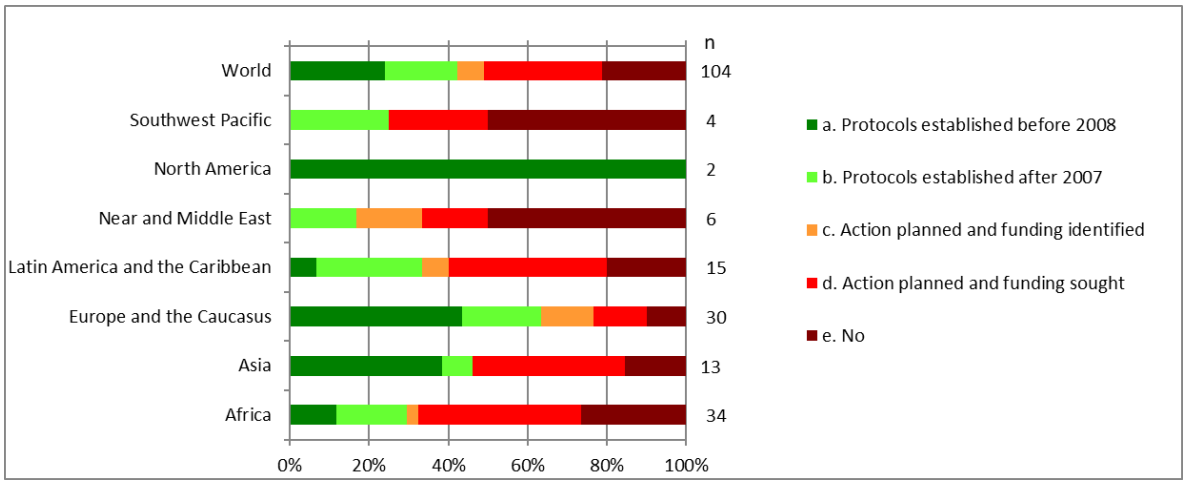
Figure A2.6 Q5. Have institutional responsibilities for monitoring the status of animal genetic resources in your country been established (SP 1, Action 3)?



More than 80 percent of reporting countries have established institutional responsibilities for monitoring the status of their animal genetic resources. However, in the Southwest Pacific, the majority of reporting countries have not yet established institutional responsibilities for monitoring.

A number of different national and institutional arrangements are reported. For example, responsibility may be given to government agencies, research institutions, breeding organizations or NGOs. In many countries, different stakeholders are responsible for monitoring different species or breeds of animals. Some countries note that although responsibilities have been established, monitoring does not actually take place because of a shortage of funds. In other cases, organizations participate in monitoring activities without having been allocated responsibility in a formal sense.

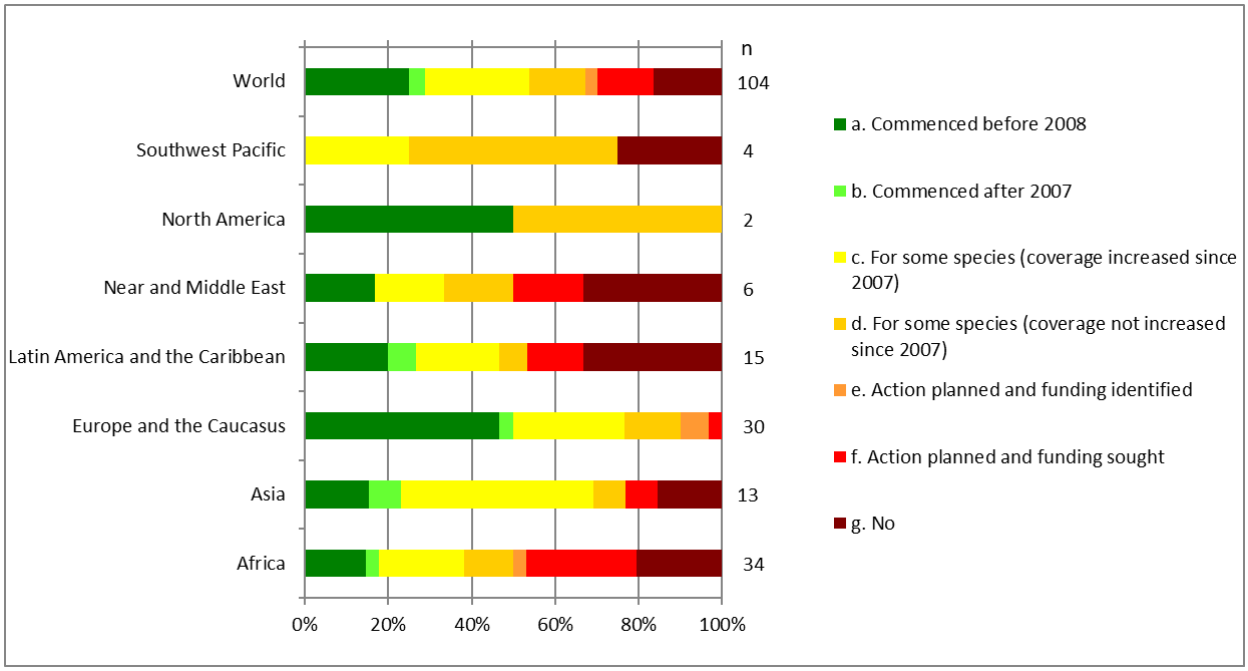
Figure A2.7 Q6. Have protocols (details of schedules, objectives and methods) been established for a programme to monitor the status of animal genetic resources in your country (SP 2)?



More than 40 percent of reporting countries have established protocols (details of schedules, objectives and methods) for programmes to monitor the status of their animal genetic resources. About one half of

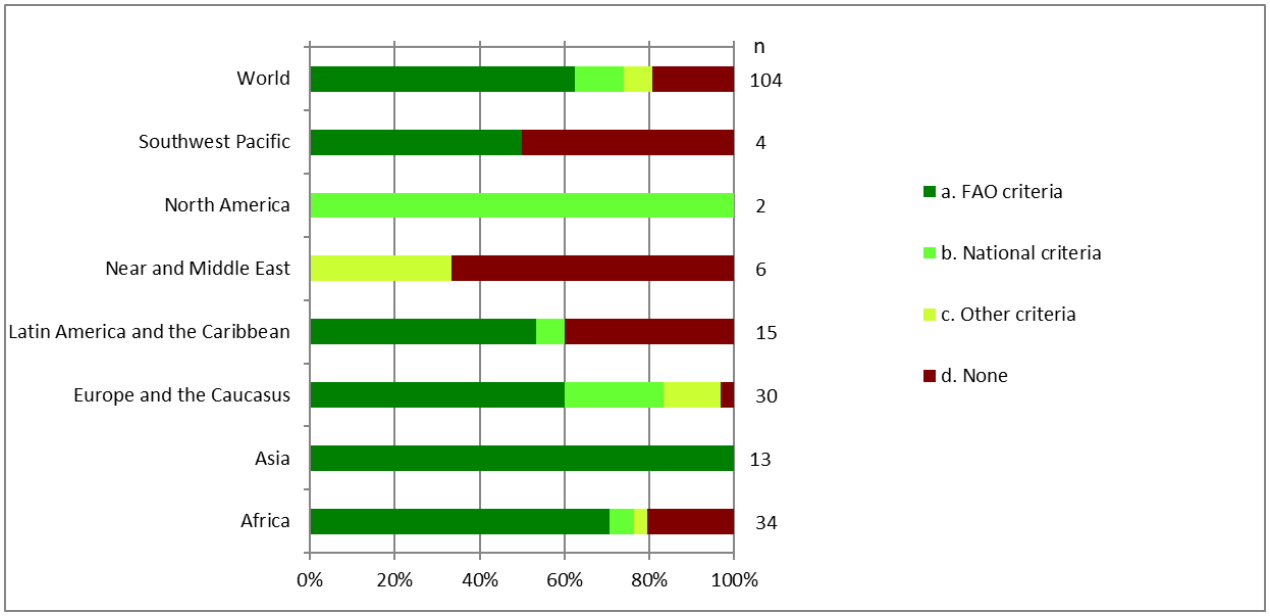
these countries had established their protocols before the adoption of the Global Plan of Action. Protocols for monitoring are particularly lacking in Africa, Latin America and the Caribbean, the Southwest Pacific and the Near and Middle East. Moreover, some countries that report such protocols also note that they are not fully developed or require further elaboration.

Figure A2.8 Q7. Are the population status and trends of your country's animal genetic resources being monitored regularly for all livestock species of economic importance (SP 1, Action 2)?



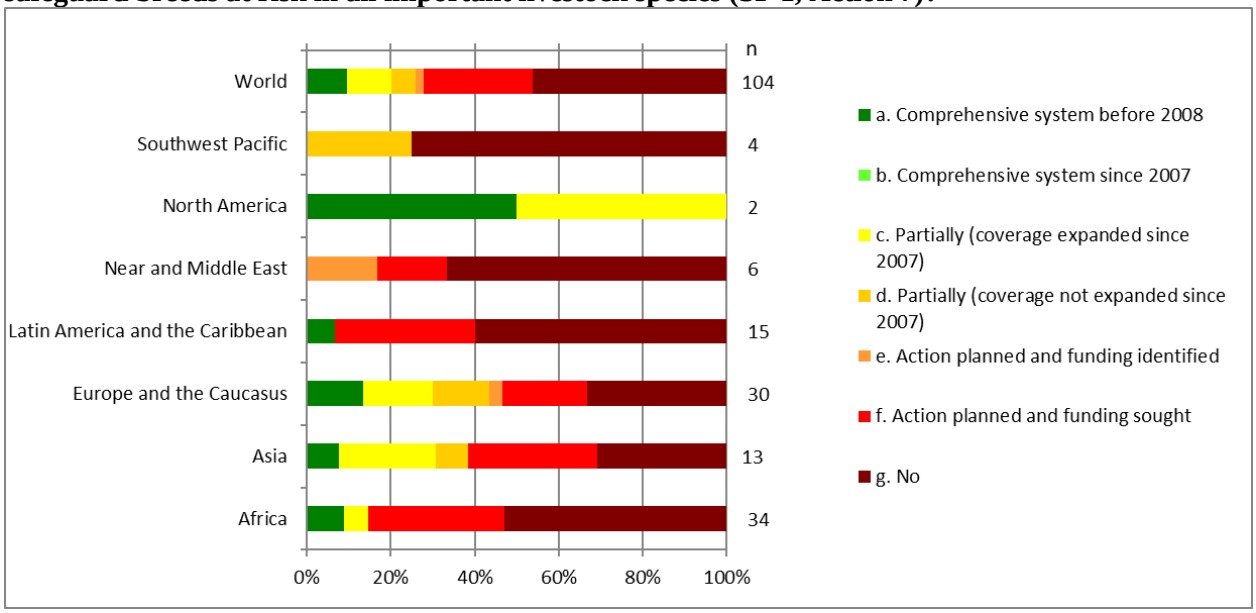
Less than 30 percent of reporting countries have commenced regular monitoring of the population status and trends of their animal genetic resources in all livestock species of economic importance. Action is particularly required in the countries of regions other than North America and Europe and the Caucasus.

Figure A2.9 Q8. Which criteria does your country use for assessing the risk status of its animal genetic resources (SP 1, Action 7)?



More than 80 percent of reporting countries have criteria for assessing the status for risk of extinction of their animal genetic resources. FAO criteria are the most widely used. However, more than 60 percent of the countries of the Near and Middle East and approximately 50 percent of the countries of Southwest Pacific and 40 percent of the countries of Latin American and the Caribbean do not use any criteria to assess the risk status of their animal genetic resources.

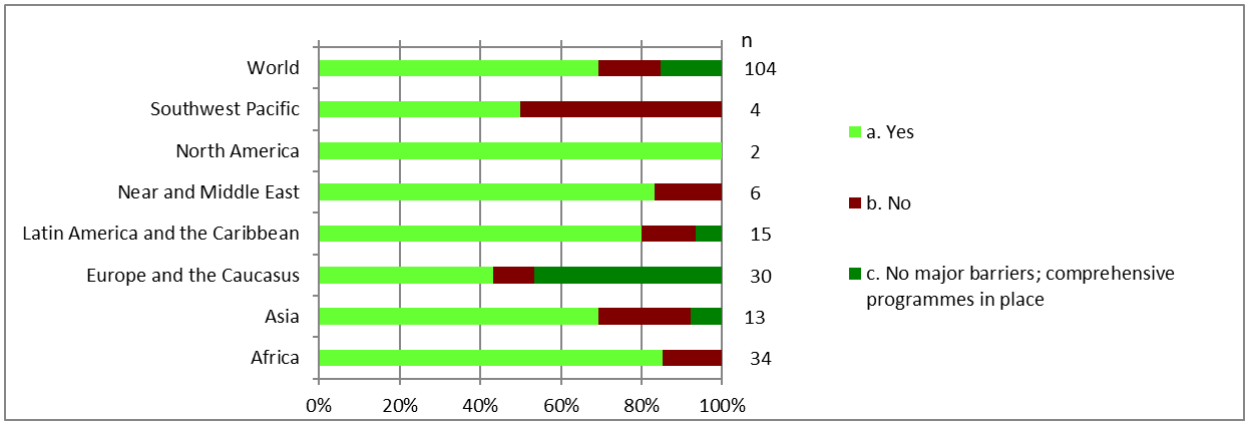
Figure A2.10 Q9. Has your country established an operational emergency response system (http://www.fao.org/docrep/meeting/021/K3812e.pdf) that provides for immediate action to safeguard breeds at risk in all important livestock species (SP 1, Action 7)?



Approximately 10 percent of reporting countries have established an operational emergency response system that provides for immediate action to safeguard breeds at risk in all important livestock species. None of these countries are in the Near and Middle East or in Southwest Pacific. Substantial further action is required in all regions.

Additional questions contributing to Indicator SPA1

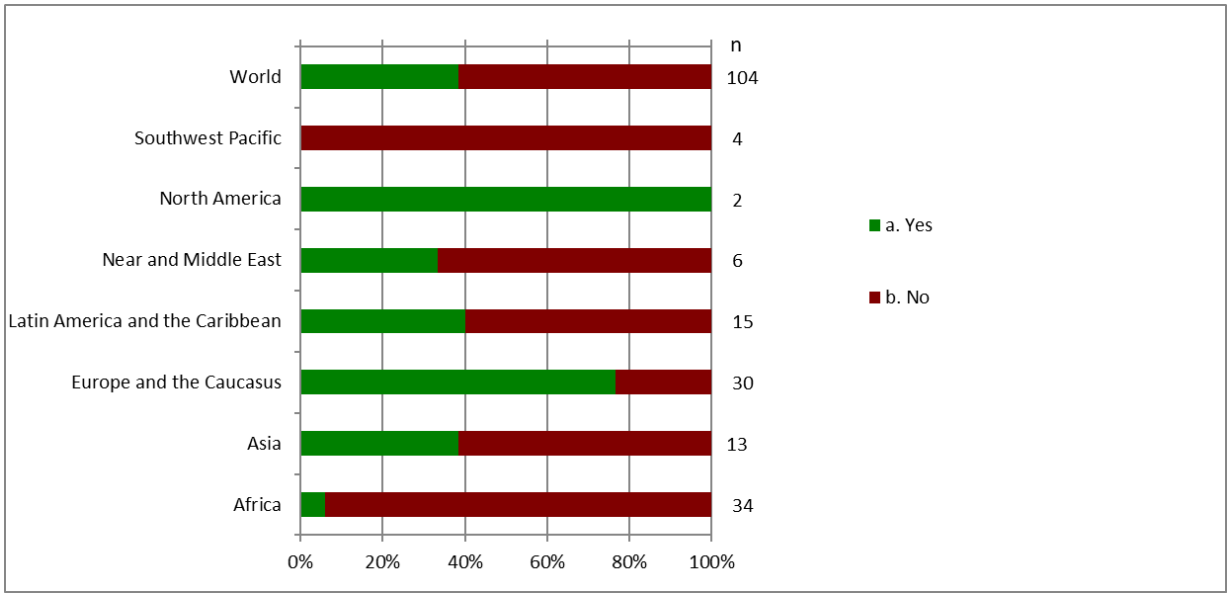
Figure A2.11 Q11. Has your country identified the major barriers and obstacles to enhancing its inventory, characterization and monitoring programmes?



Almost 20 percent of countries report that no major barriers or obstacles have been identified because comprehensive characterization and monitoring programmes are already in place. In almost 70 percent of countries, barriers have been identified. Less than 20 percent of countries have not yet identified any barriers. This lack of information and analysis is particularly prevalent in the countries of the Southwest Pacific.

The most frequently reported barriers and obstacles relate to a lack of financial support. However, lack of technical and human capacity as well as institutional strategic support are also frequently reported.

Figure A2.12 Q59. Are there any national NGOs active in your country in the fields of: Characterization?



Just less than 40 percent of reporting countries indicate that national NGOs are active in the field of characterization. NGOs engaged in characterization work are relatively common in Europe and the Caucasus (almost 80 percent of the countries) and North America (100 percent of countries). In contrast, no country in Southwest Pacific reported any national NGOs active in the field of characterization.

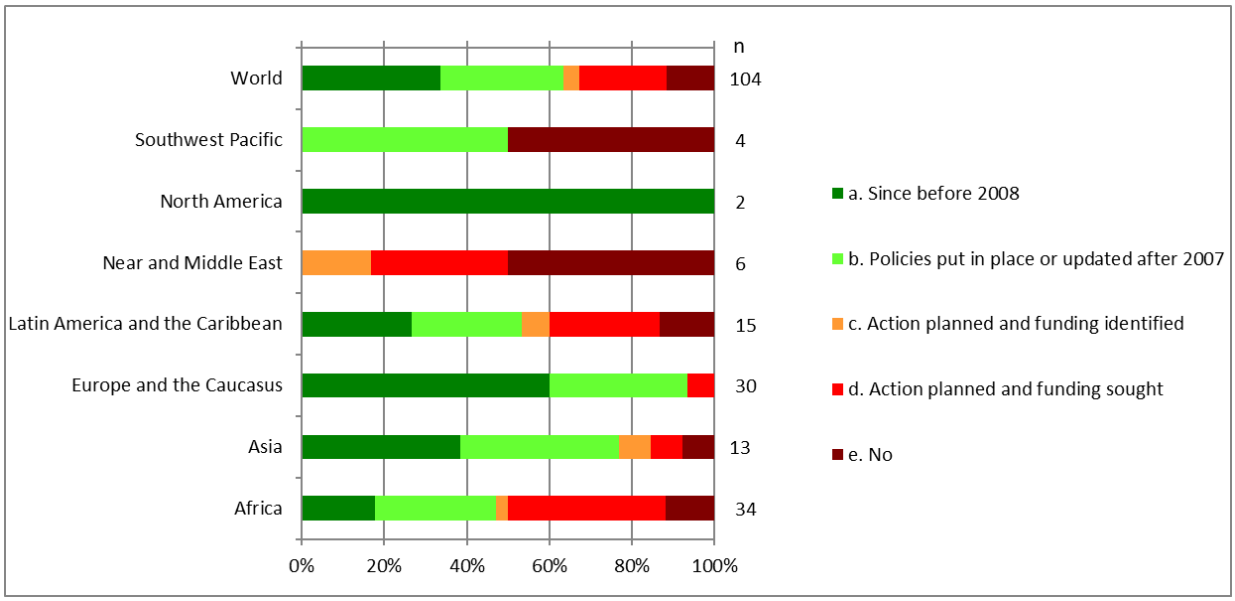
Strategic Priority Area 2: Sustainable use and development

Long-term goal: Enhanced sustainable use and development of animal genetic resources in all relevant production systems, as a key contribution to achieving sustainable development, poverty eradication and adaptation to the effects of climate change.

SP3: Establish and strengthen national sustainable use policies

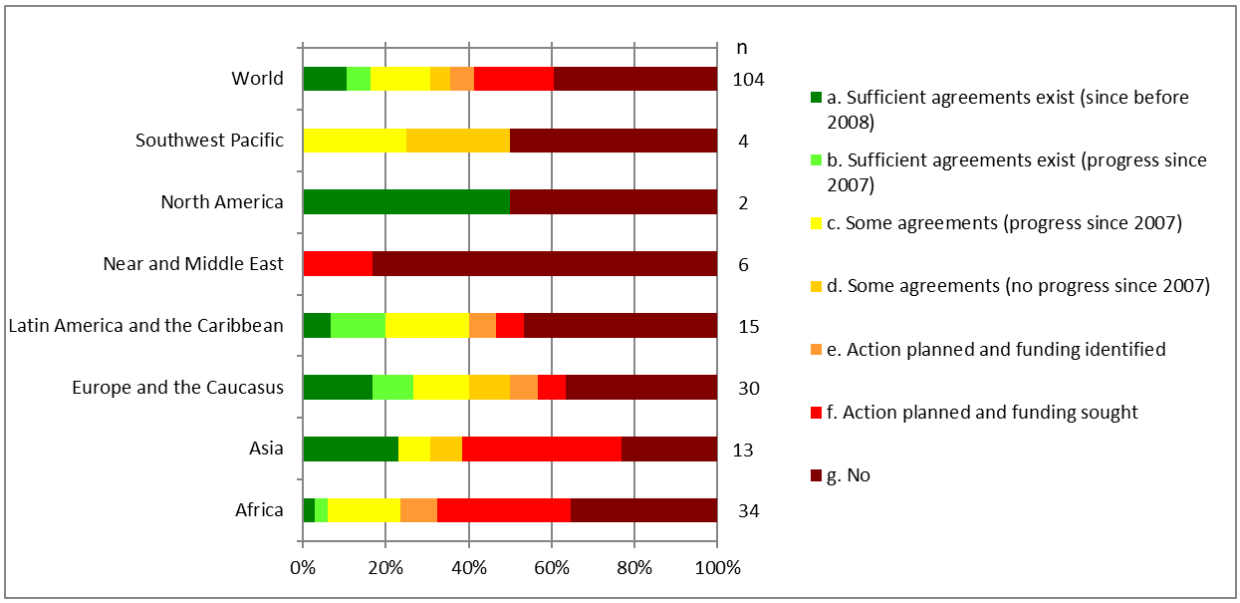
Indicator SP3: The state of national sustainable use policies

Figure A2.13 Q14. Does your country have adequate national policies in place to promote the sustainable use of animal genetic resources (see also questions 46 and 54)?



Over 60 percent of reporting countries state that they have adequate national policies in place to promote the sustainable use of their animal genetic resources. About half of these report that this level of capacity has been established since the adoption of the Global Plan of Action. Many countries, however, still need establish or strengthen their policies. This is particularly the case in the Near and Middle East.

Figure A2.14 Q23. Has your country developed a national policy or entered specific contractual agreements for access to and the equitable sharing of benefits resulting from the use and development of animal genetic resources and associated traditional knowledge (SP3, Action 2)?

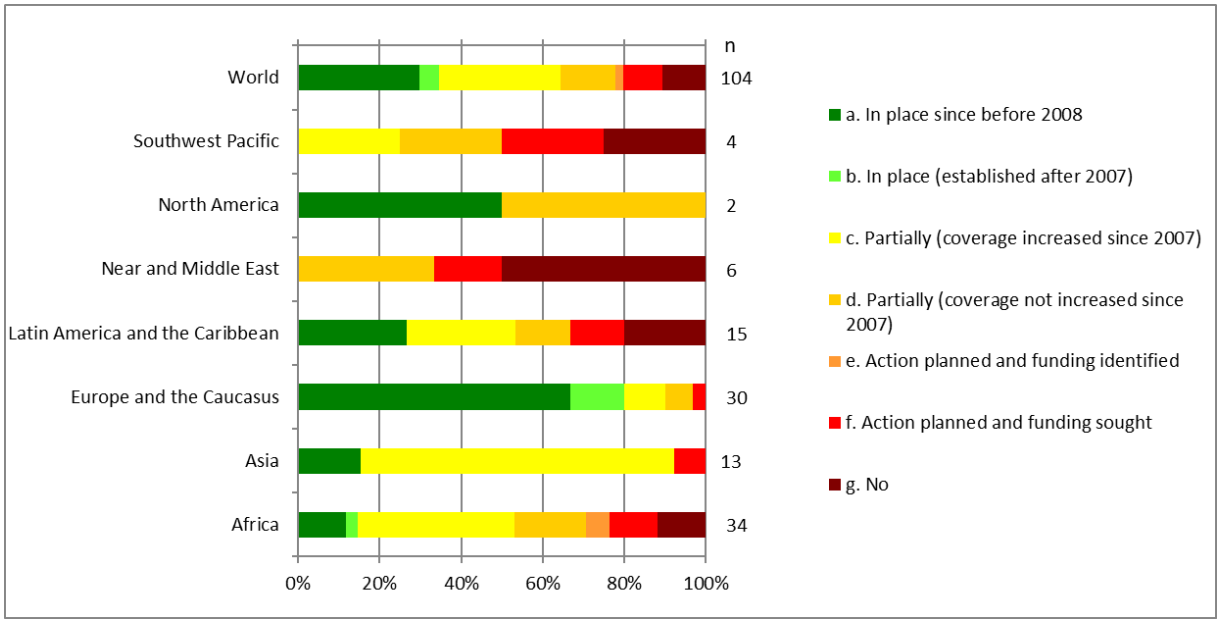


Globally, the percentage of reporting countries that have developed any agreements for equitable sharing of benefits resulting from access to and use and development of animal genetic resources and associated traditional knowledge is low (around 30 percent). Approximately 20 percent of responding countries regard these policies or agreements as sufficient. Although this obviously represents a minority of countries, substantial increases have occurred since 2014, when only 20 percent of countries had policies and only 5 percent had policies that were considered sufficient.

SP4: Establish national species and breed development strategies and programmes

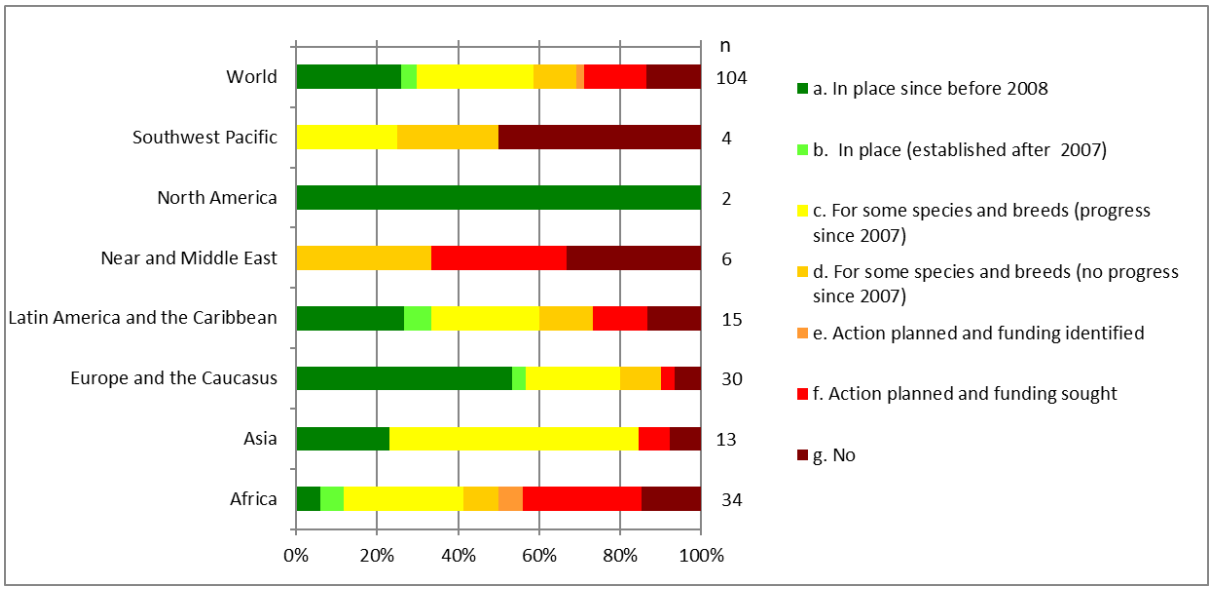
Indicator SP4: The state of national species and breed development strategies and programmes

Figure A2.15 Q16. Do breeding programmes exist in your country for all major species and breeds, and are these programmes regularly reviewed, and if necessary revised, with the aim of meeting foreseeable economic and social needs and market demands (SP4, Action 2)?



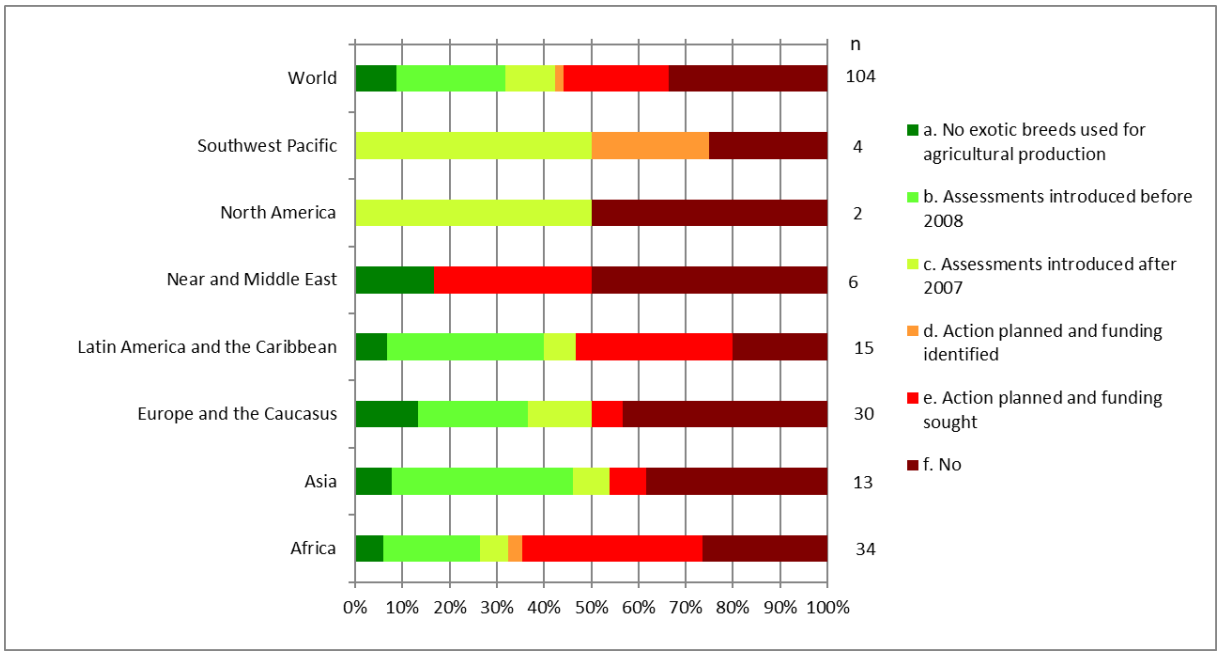
Almost 40 percent of reporting countries report have breeding programmes in place for all major species and breeds. Almost all these countries had achieved this before the adoption of the Global Plan of Action. Almost 80 percent of countries report that they have some breeding programmes in place. About half of these have increased their coverage since 2007. Nonetheless, coverage needs to be increased in all regions, especially the Southwest Pacific and the Near and Middle East. Across the world, breeders' organizations are the most frequently mentioned stakeholders in the development, revision and implementation of breeding programmes. Research institutions are also commonly reported as playing a role in this task, especially outside Europe and the Caucasus. The definition of "major" breeds and species is left to the interpretation of the country, which may lead to differences among countries.

Figure A2.16 Q17. Is long-term sustainable use planning – including, if appropriate, strategic breeding programmes – in place for all major livestock species and breeds (SP4, Action 1)?



Long-term sustainable use planning is in place for all major livestock species and breeds in approximately 30 percent of reporting countries. Approximately 40 percent of countries have planning of this type in place for some species. Significant progress since 2007 is reported in some regions, particularly Asia.

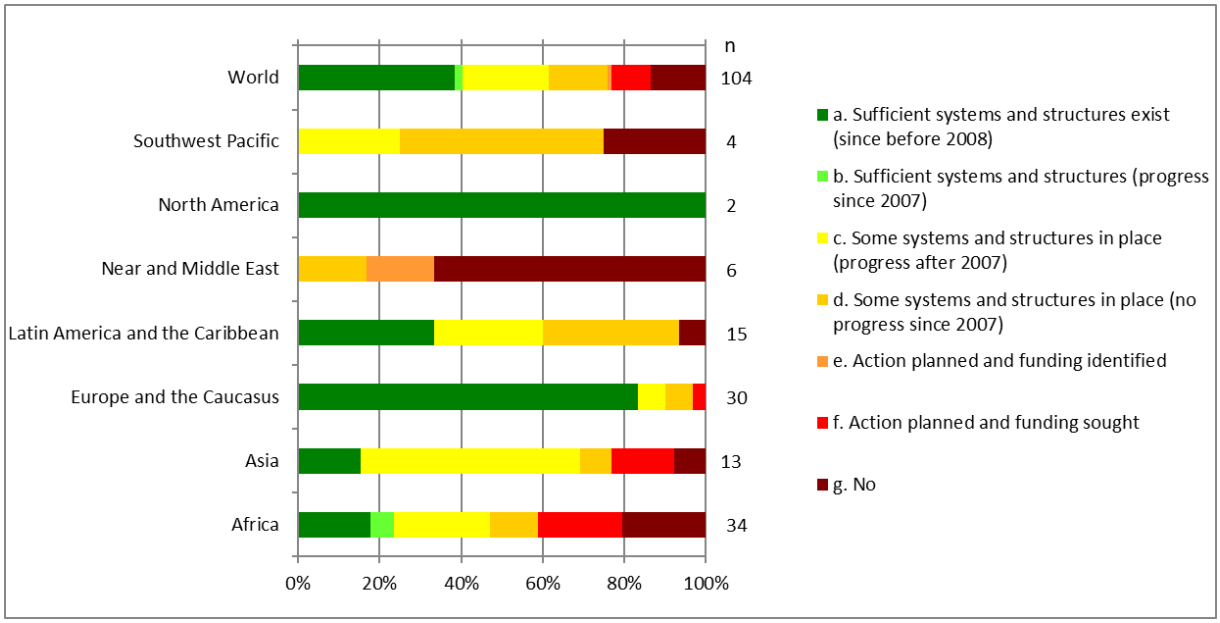
Figure A2.17 Q19. Have the long-term impacts of the use of exotic breeds on locally adapted breeds (e.g. economic, environmental or genetic impacts) and on food security been assessed in your country (SP4, Action 1)?



Assessments of the impact of introducing exotic breeds have been undertaken in over 30 percent of reporting countries. Such assessments are particularly lacking in Africa and the Near and Middle East. Several countries note adverse effects on genetic diversity due to the introduction of exotic breeds. Other countries reported the importance of imported exotic breeds for their contributions to enhancing food

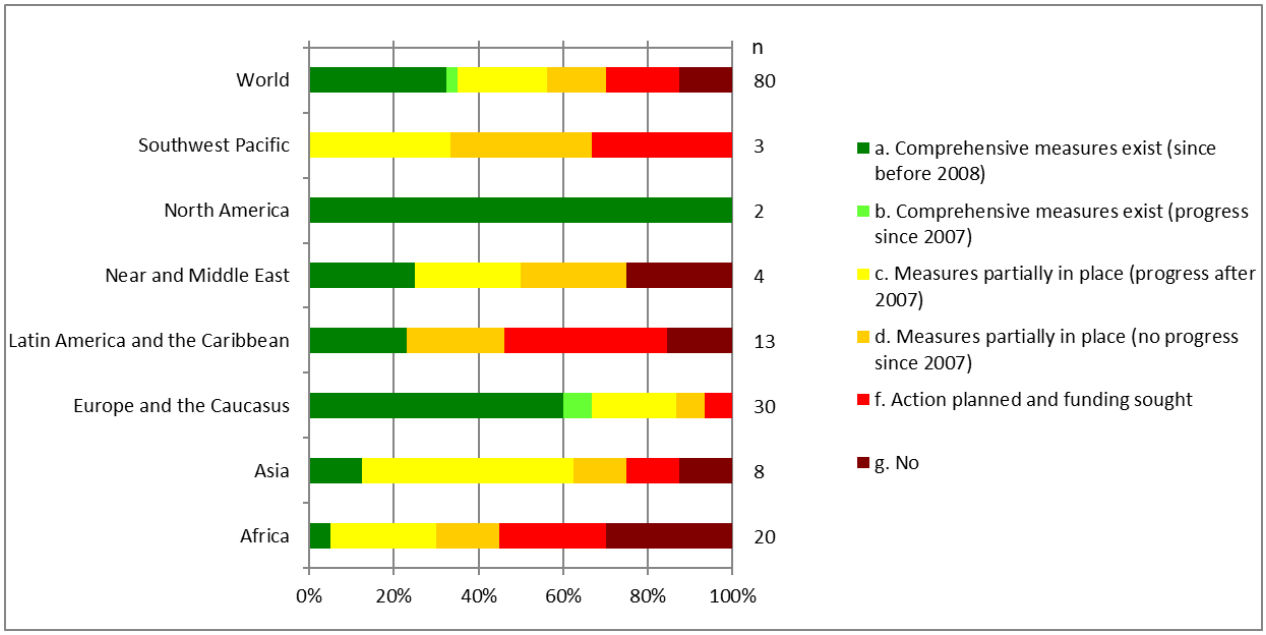
production and food self-sufficiency, while at the same time noting their lack of adaptedness and negative impact on the environment and local agrobiodiversity.

Figure A2.18 Q20. Have recording systems and organizational structures for breeding programmes been established or strengthened (SP4, Action 3)?



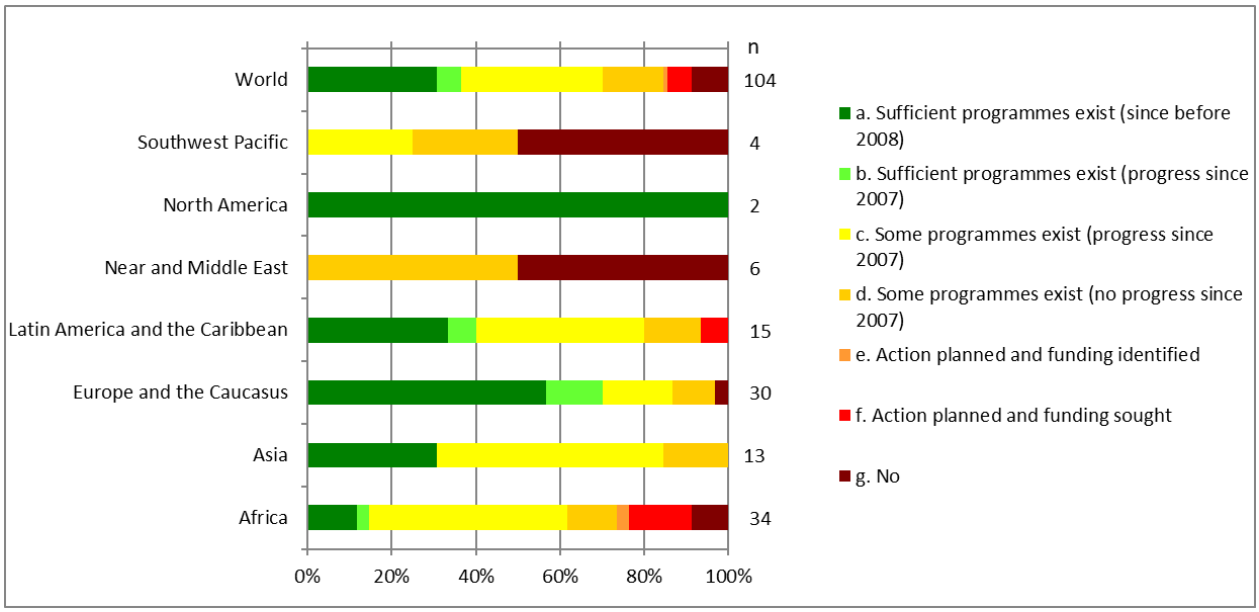
Approximately 40 percent of reporting countries consider that they have sufficient recording systems and organizational structures in place for their breeding programmes. However, further progress is required in most countries outside of Europe and the Caucasus and North America. In the Near and Middle East, where the least progress has been made, little evidence of dedicated funding is reported, indicating that progress will be limited until such funding can be identified and allocated.

Figure A2.19 Q22. Have measures been implemented in your country to provide farmers and livestock keepers with information that facilitates their access to animal genetic resources (SP 4, Action 7)?



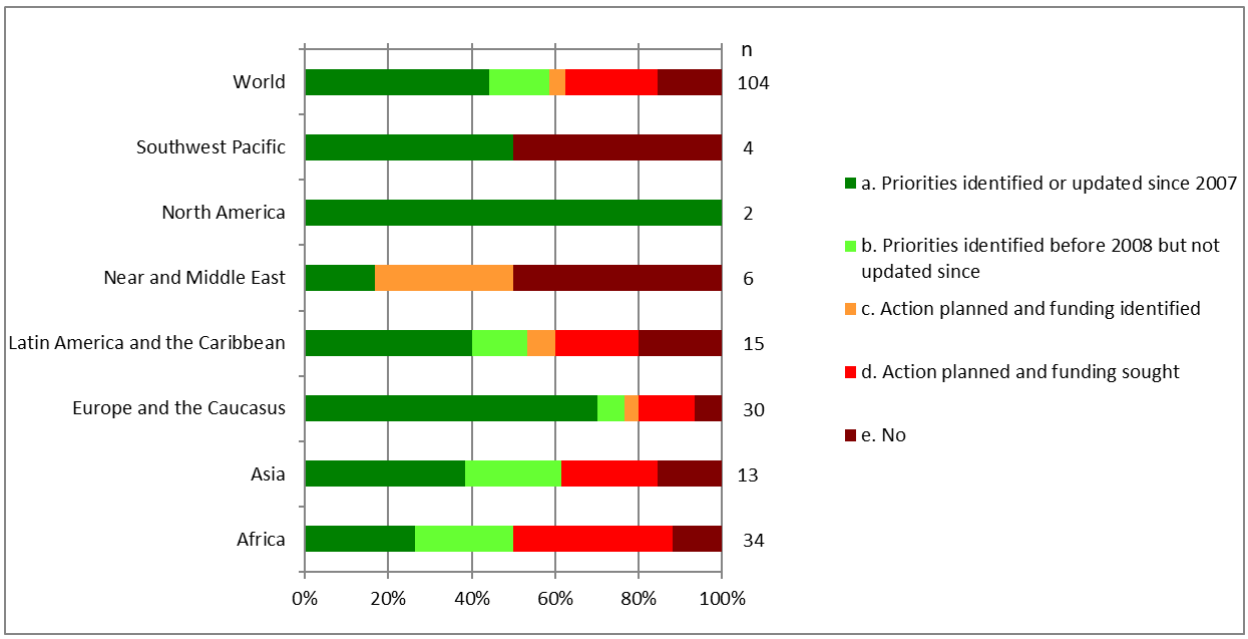
About 40 percent of reporting countries have comprehensive measures in place for providing farmers and livestock keepers with information that facilitates their access to genetic resources. However, approximately 20 percent of countries, and over 60 percent of those in the Near and Middle East report that they have no such measures in place. About 30 percent of countries report that they have made progress in the introduction of such measures since 2007.

Figure A2.20 Q24. Have training and technical support programmes for the breeding activities of livestock-keepers been established or strengthened in your country (SP 4, Action 1)?



Almost 40 percent of reporting countries indicate that they have sufficient training and technical support programmes for the breeding activities of livestock-keeping communities in place. Around 85 percent of countries have some programmes of this type. Malwai, for example, report that academic and farmer training institutions have breeding courses in their training programmes and that the national artificial insemination centre provides training in the use of crossbreeding. The Philippine Native Animal Development Program conducts seminars, workshops, and other training events; and has made available training modules for native pig, chicken and duck production.

Figure A2.21 Q25. Have priorities for future technical training and support programmes to enhance the use and development of animal genetic resources in your country been identified (SP 4, paragraph 42)?

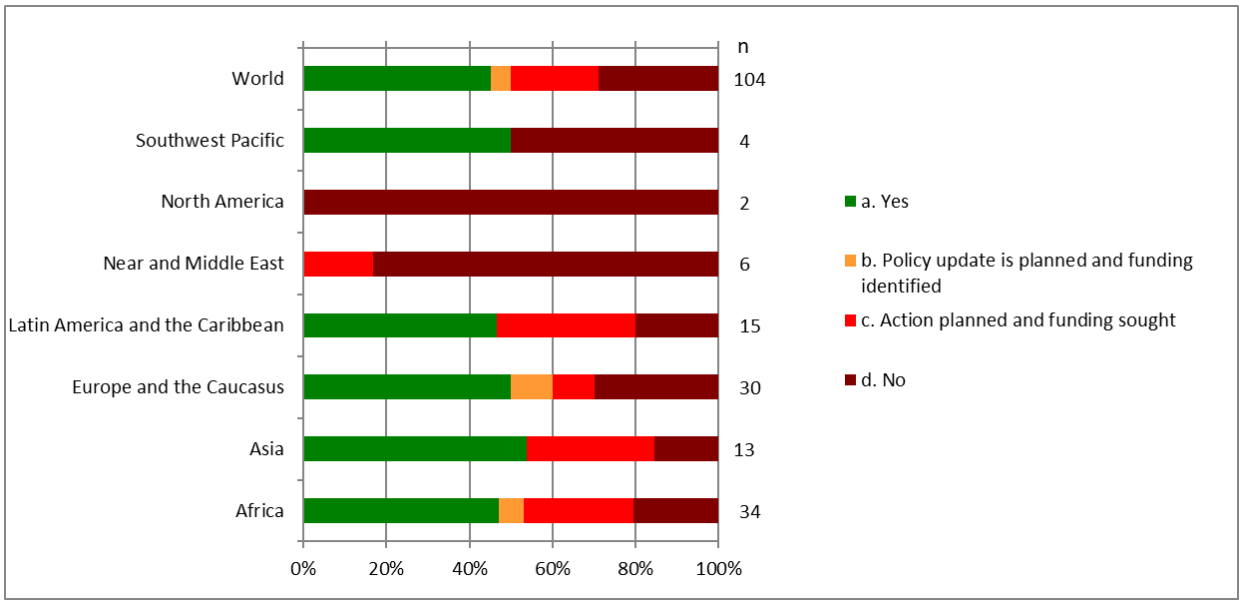


Approximately 60 percent of reporting countries have identified priorities for training and support programmes to enhance the use and development of animal genetic resources. Since 2014, improvements have been in particular made in the Southwest Pacific and Europe and the Caucasus.

SP5: Promote agro-ecosystems approaches to the management of animal genetic resources

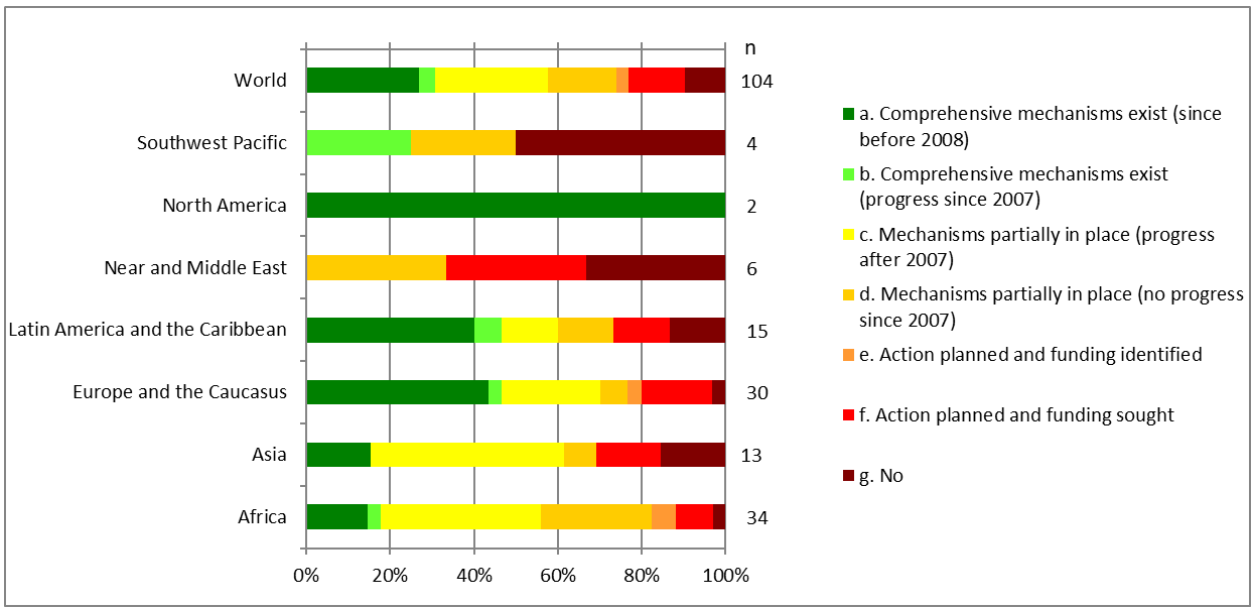
Indicator SP5: The state of efforts to promote agro-ecosystems approaches to the management of animal genetic resources

Figure A2.22 Q15. Do these policies address the integration of agro-ecosystem approaches into the management of animal genetic resources in your country (SP5) (see also questions 46 and 54)?



Over 40 percent of reporting countries have policies that address the integration of the agro-ecosystem approach into the management of their animal genetic resources. In 2014, nearly 50 percent of countries reported no plans to undertake this activity. Now that proportion has decreased to less than 30 percent.

Figure A2.23 Q21. Are mechanisms in place in your country to facilitate interactions among stakeholders, scientific disciplines and sectors as part of sustainable use development planning (SP5, Action 3)?

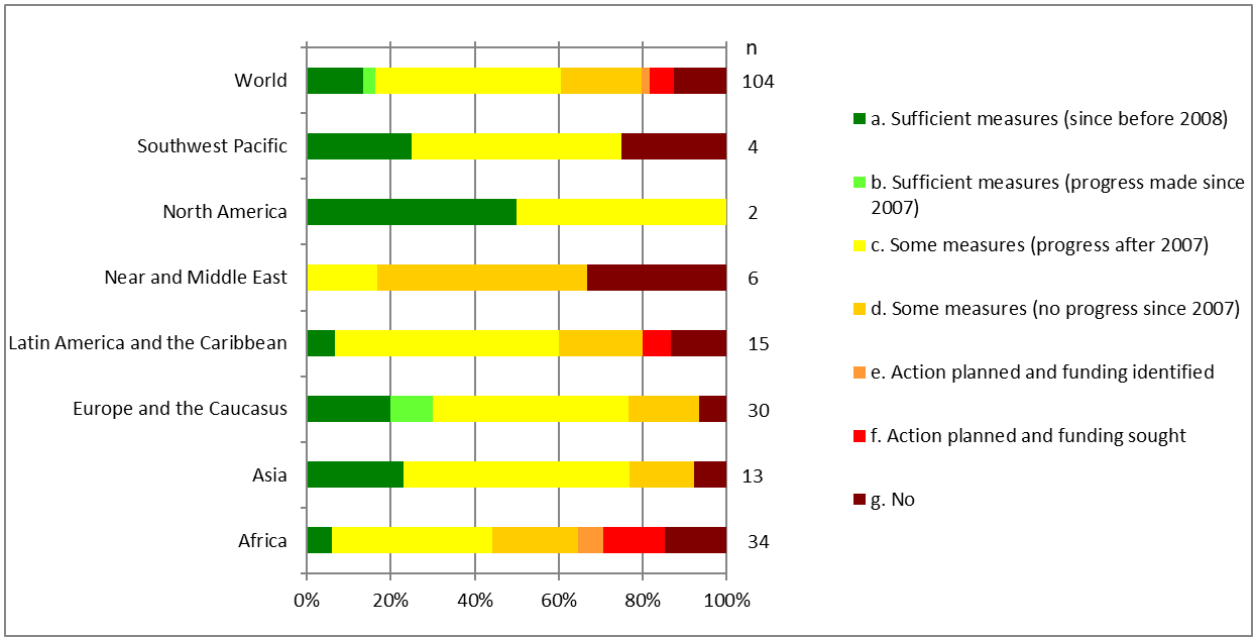


Approximately 30 percent of reporting countries have comprehensive mechanisms in place to facilitate interactions among stakeholders as part of sustainable use planning for animal genetic resources. A further 40 percent, approximately, have at least some such mechanisms in place. However, three of the four reporting countries in the Southwest Pacific and all countries in the Near and Middle East report that they have no such mechanisms in place.

SP6: Support indigenous and local production systems and associated knowledge systems of importance to the maintenance and sustainable use of animal genetic resources

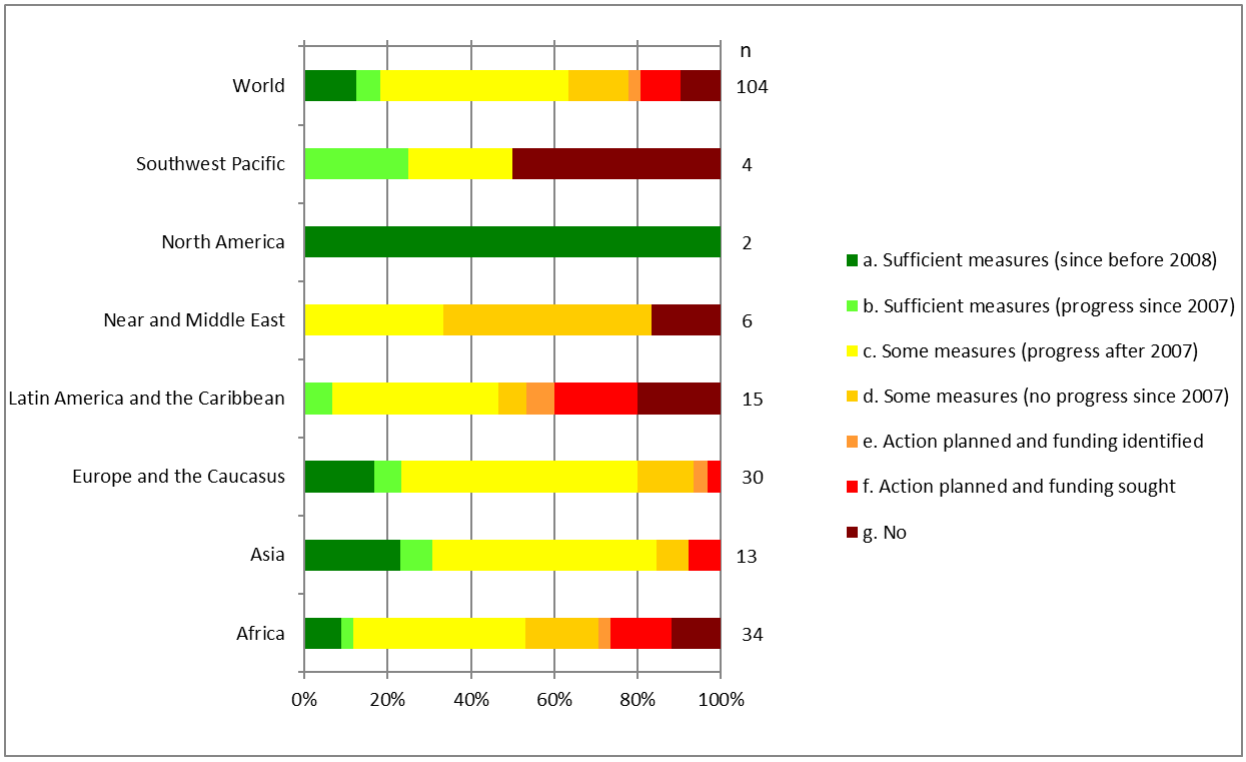
Indicator SP6: The state of efforts to support indigenous and local production systems and associated knowledge systems of importance to the maintenance and sustainable use of animal genetic resources

Figure A2.24 Q26. Have efforts been made in your country to assess and support indigenous or local production systems and associated traditional knowledge and practices related to animal genetic resources (SP 6, Action 1, 2)?



Less than 20 percent of reporting countries consider that they have put sufficient measures in place to assess and support indigenous or local production systems and associated traditional knowledge and practices related to animal genetic resources. More than 60 percent have some measures in place, however, so that now fewer than 20 percent of reporting countries have no such measures for these strategic actions.

Figure A2.25 Q27. Have efforts been made in your country to promote products derived from indigenous and local species and locally adapted breeds, and facilitate access to markets (SP 6, Action 2, 4)?

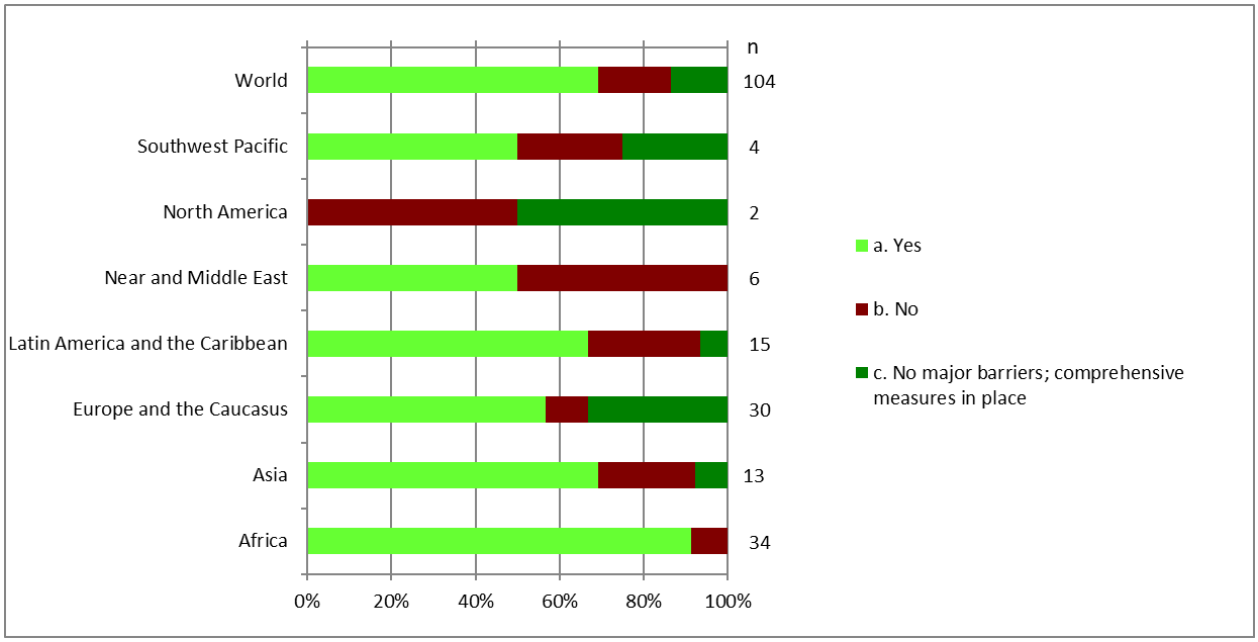


Less than 20 percent of reporting countries consider that their measures to promote products derived from indigenous and local species and breeds and promote access to markets are sufficient, which has changed little from 2014. Almost 65 percent of countries have implemented some measures of this type, however, which is a marked improvement over 2014 (approximately 45 percent). All regions report progress since the adoption of the Global Plan of Action with the exception North America, where sufficient measures were already in place. Many countries indicate that governments, research institutions, NGOs or producers of products derived from indigenous and local species play roles promoting and marketing the products.

One example is from Namibia, where skins and hides from sheep and cattle are marketed as special products. Another was reported by Latvia, where a study undertaken by a local breeding organization determined that consumers preferred the taste of pork from the Latvian White pigs over that from exotic breeds.

Additional questions contributing to Indicator SPA2

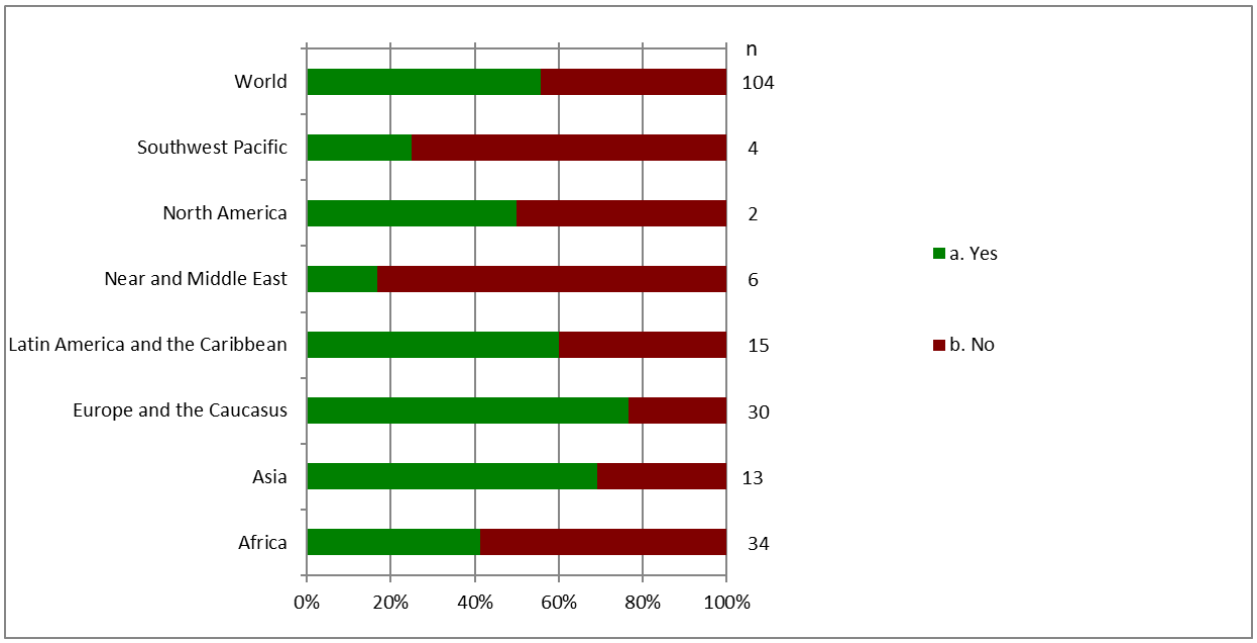
Figure A2.26 Q18. Have the major barriers and obstacles to enhancing the sustainable use and development of animal genetic resources in your country been identified?



About 70 percent of reporting countries have identified the major barriers and obstacles to enhancing the sustainable use and development of their animal genetic resources. An additional 14 percent have no major barriers.

A diversity of constraints was reported, including lack of financial resources, lack of characterization of local breeds and products, lack of technical and organizational capacity and lack of an adequate legal framework. In addition, barriers related to the market or the environment (including the consequences of climate change) were reported by several countries.

Figure A2.27 Q59. Are there any national NGOs active in your country in the fields of: Sustainable use and development?



More than 50 percent of reporting countries have national NGOs that are active in the field of sustainable use and development of animal genetic resources. However, the majority of countries in regions such as Africa, the Near and Middle East and the Southwest Pacific, have no national NGOs active in this field.

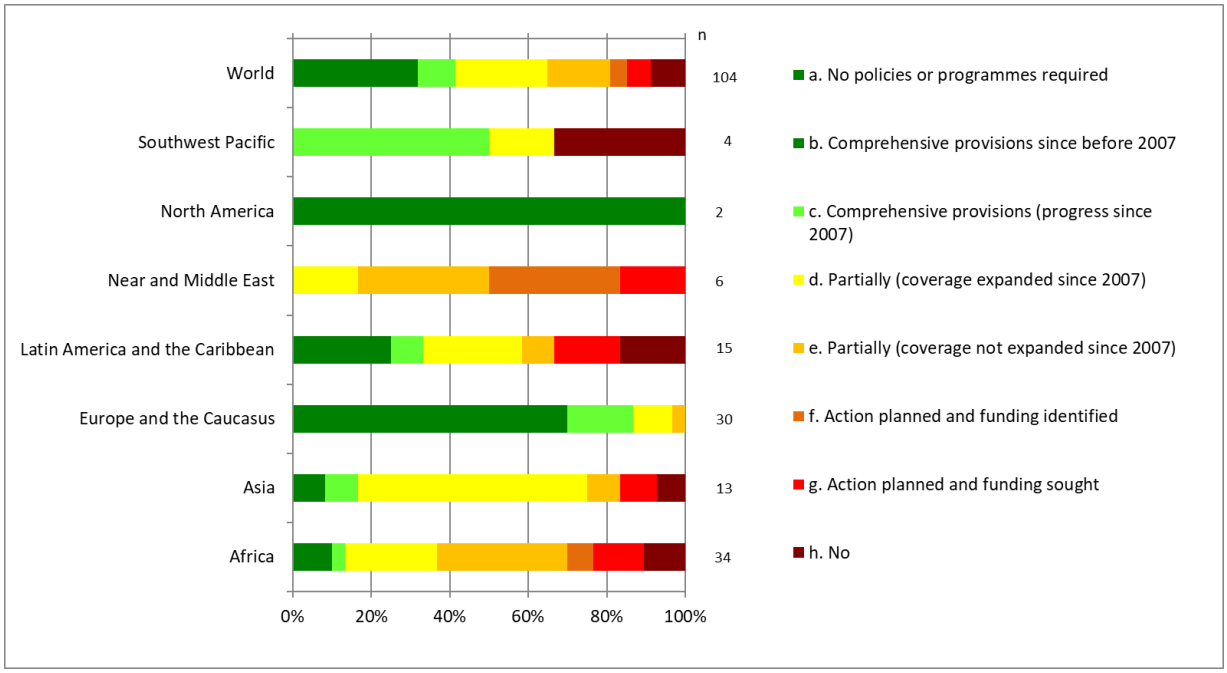
Strategic Priority Area 3: Conservation

Long-term goal: Secure the diversity and integrity of the genetic base of animal genetic resources by better implementing and harmonizing measures to conserve these resources, both *in situ* and *ex situ*, including in the context of emergencies and disasters.

SP7: Establish national conservation policies

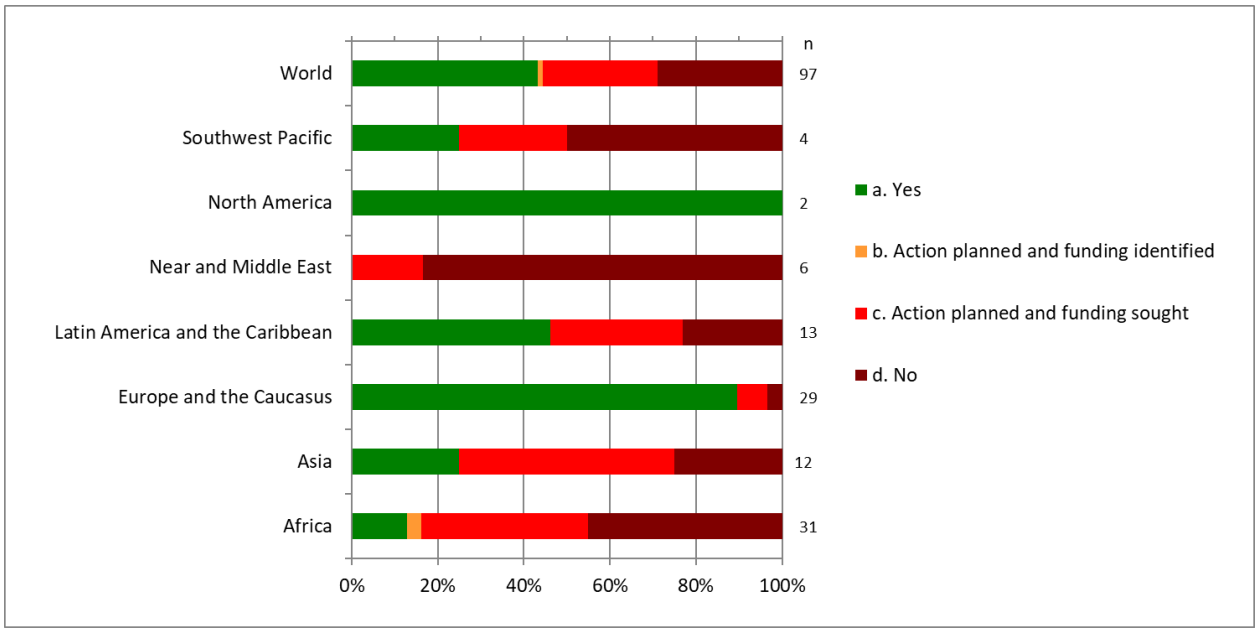
Indicator SP7: The state of national conservation policies

Figure A2.28 Q32. Does your country have conservation policies and programmes in place to protect locally adapted breeds at risk in all important livestock species (SP 7, SP 8 and SP 9)?



For the questions related to conservation policies and programmes, countries had the option of indicating that they have no such provisions in place because all their locally adapted breeds are secure (and hence additional conservation measures are unnecessary). Three of the reporting countries chose this option in response to this question (Bolivia, Austria and Poland). Approximately 40 percent of reporting countries consider that they have comprehensive conservation policies and programmes in place to protect breeds at risk in all important livestock species. Partial coverage is reported by an additional 40 percent of countries. The level of coverage, however, varies from region to region. Countries in the Near and Middle East and Africa have reported mostly partial or no coverage. Progress since the adoption of the Global Plan of Action is most frequently reported by the countries of the Southwest Pacific and Asian regions.

Figure A2.29 Q33. If conservation policies and programmes are in place, are they regularly evaluated or reviewed (SP 7, Action 1; SP 8, Action 1; and SP 9, Action 1)?

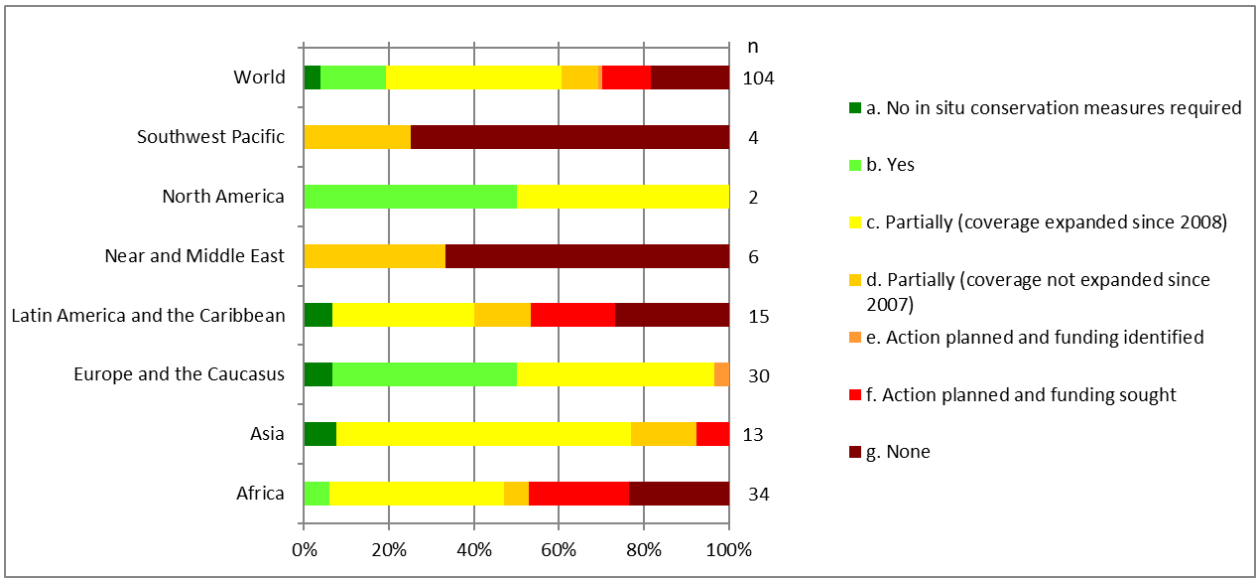


This question is not considered in the calculation of the indicator because it was only addressed to the subset of countries responding positively to question 32. In more than 40 percent of reporting countries that have conservation programmes, the programmes are evaluated or reviewed regularly. Regular evaluations and revisions are rare in some regions, including Africa and Near and Middle East.

SP8: Establish or strengthen in situ conservation programmes

Indicator SP8: The state of in situ conservation programmes

Figure A2.30 Q34. Does your country have *in situ* conservation measures in place for locally adapted breeds at risk of extinction to prevent breeds from becoming at risk (SP 8 and SP 9)?



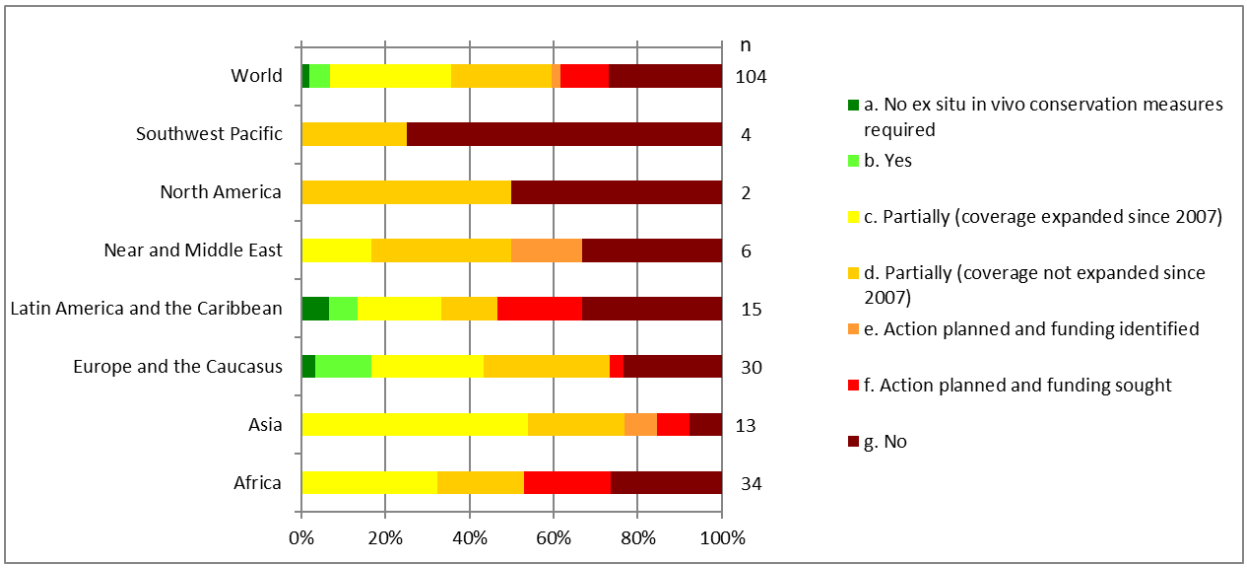
About 70 percent of reporting countries have at least some *in situ* conservation measures for animal genetic resources in place. Approximately 20 percent consider their measures to be comprehensive. A majority of countries in the Near and Middle East and the Southwest Pacific have no measures of this type in place.

In situ conservation measures are most widespread in Europe and the Caucasus and North America. Conservation measures mentioned by countries from various regions include financial incentives and breeding programmes.

SP9: Establish or strengthen ex situ conservation programmes

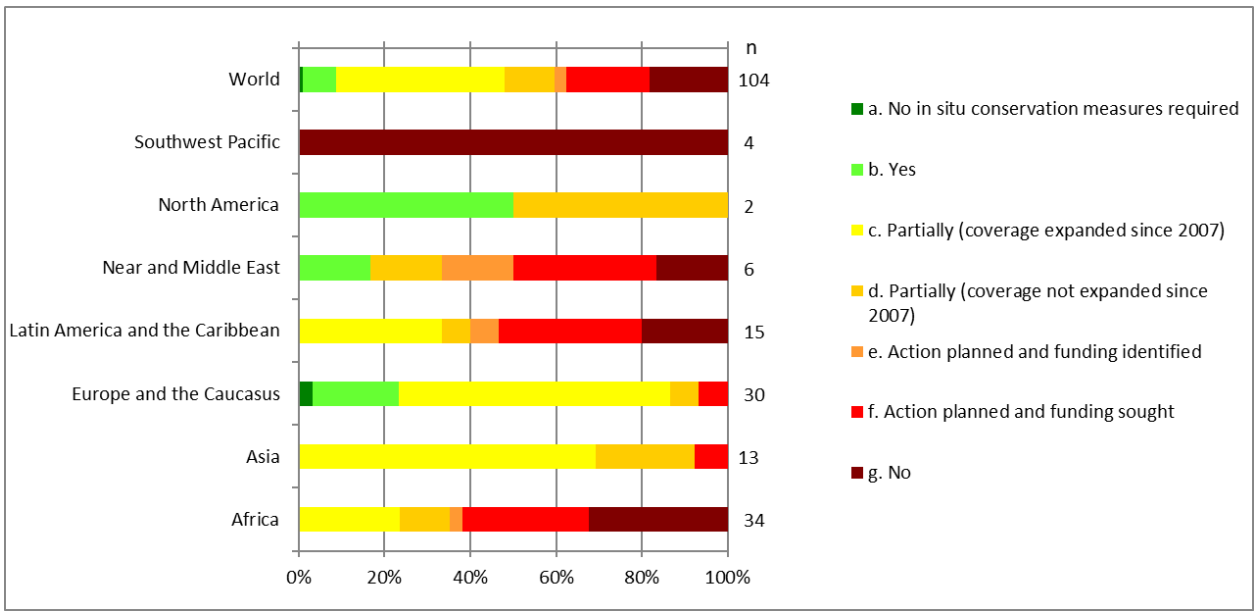
Indicator SP9: The state of ex situ conservation programmes

Figure A2.31 Q35. Does your country have *ex situ in vivo* conservation measures in place for locally adapted breeds at risk of extinction and to prevent breeds from becoming at risk (SP 8 and SP 9)?



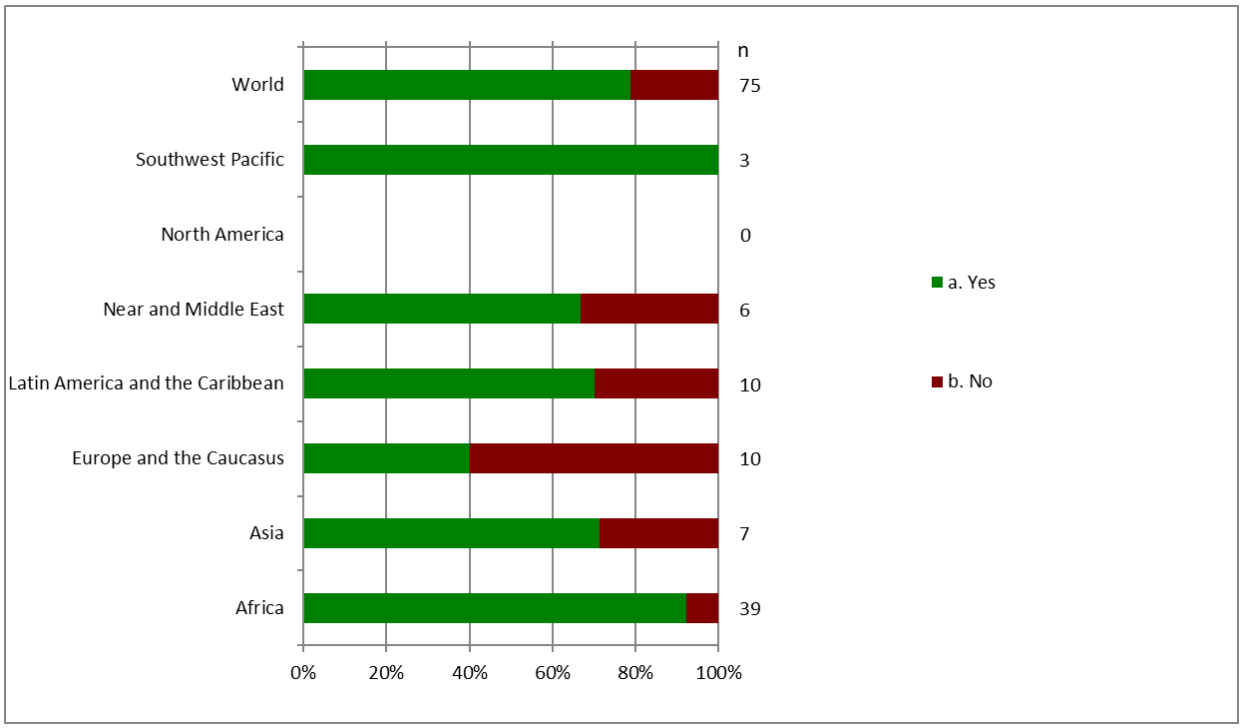
Ex situ in vivo measures for animal genetic resources are in place or partially in place in 60 percent of reporting countries. Various types of *ex situ in vivo* conservation are mentioned in the country reports, including zoos, NGO and governmental farms and national parks. Sudan, for example, reports undertaking e*x situ in vivo* conservation on research stations.

Figure A2.32 Q36. Does your country have *ex situ in vitro* conservation measures in place for locally adapted breeds at risk of extinction and to prevent breeds from becoming at risk (SP 8 and SP 9)?



Approximately 60 percent of reporting countries have *ex situ in vitro* conservation measures in place or partially in place for animal genetic resources. Less than 10 percent consider that their measures are comprehensive, however. The extent of coverage varies greatly from region to region. No *ex situ in vitro* measures are reported from the Southwest Pacific, and few are reported in the Near and Middle East and Africa. Several countries reported issues related to a lack of technical skills.

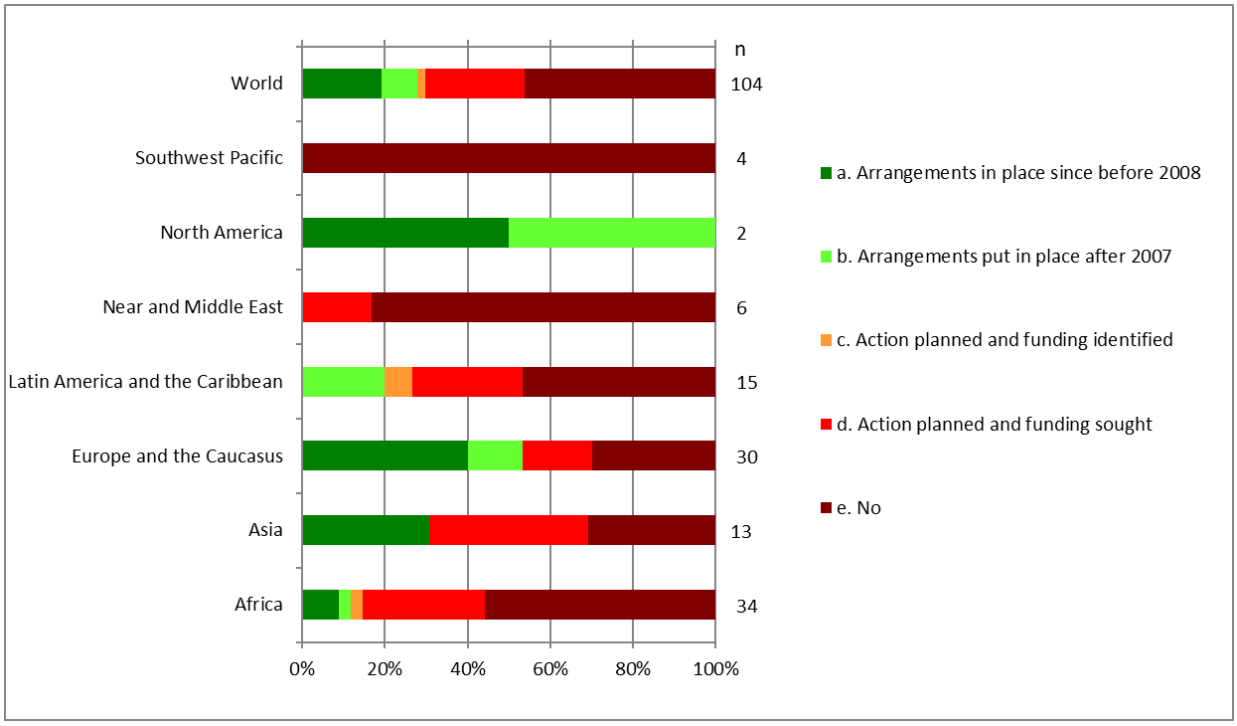
Figure A2.33 Q38. If your country has not established any conservation programmes, is this a future priority?



The above question is not considered in the calculation of the indicator because it was only addressed to the subset of countries responding positively to prior questions. The overwhelming majority of

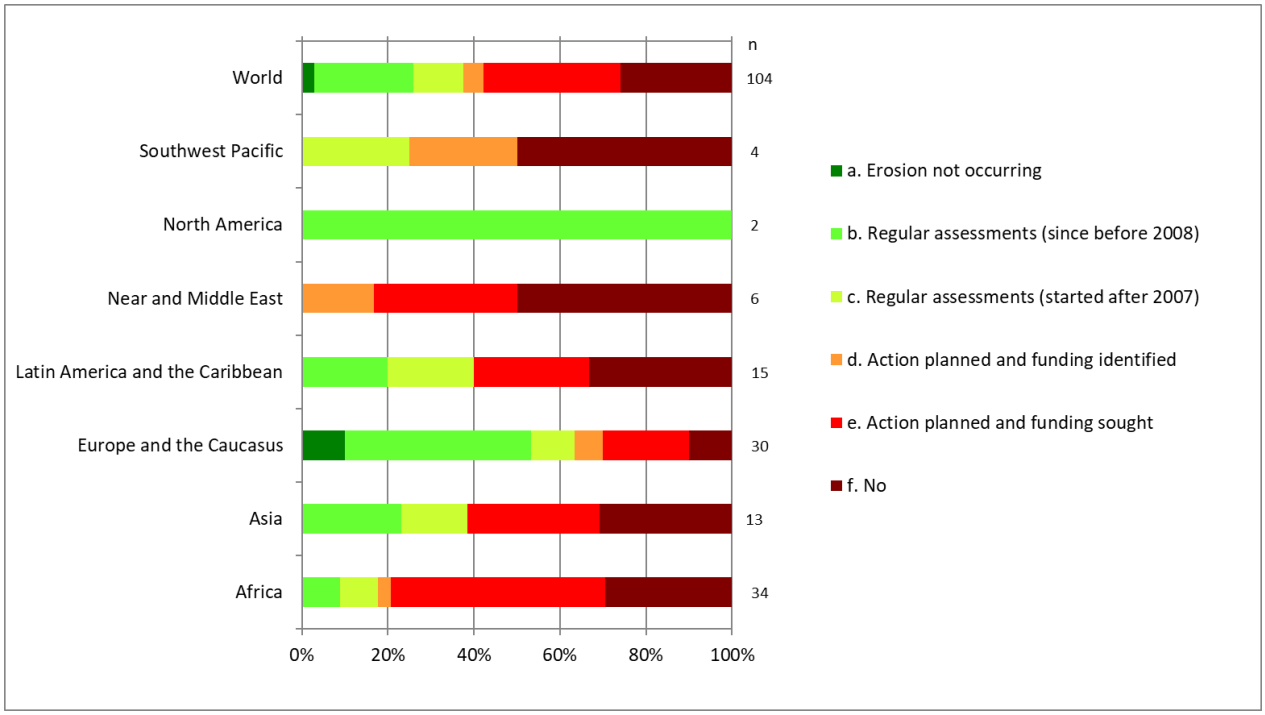
countries that have not yet established conservation programmes report that this is a future priority.

Figure A2.34 Q42. Are arrangements in place in your country for extraction and use of conserved genetic material following loss of animal genetic resources (e.g. through disasters), including arrangements to enable restocking (SP 9, Action 3)?



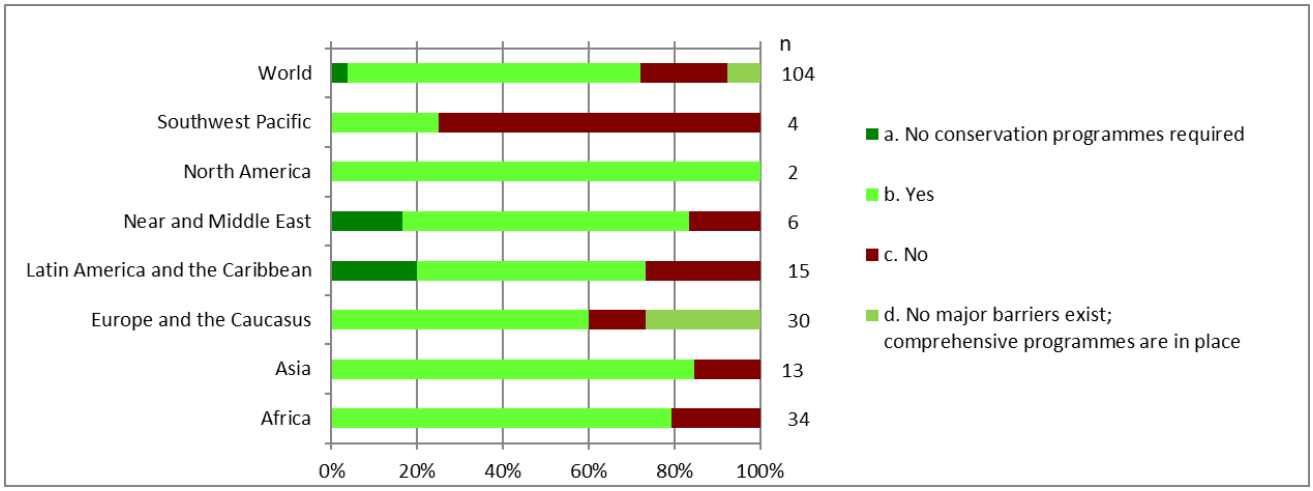
About 30 percent of reporting countries have arrangements in place country for extraction and use of conserved genetic material. No such arrangements are reported from the Southwest Pacific or from the Near and Middle East, and few from Latin America and the Caribbean, Asia or Africa. Most of the countries in North America and Europe and the Caucasus have such arrangements.

Figure A2.35 Q30. Does your country regularly assess factors leading to the erosion of its animal genetic resources (SP 7, Action 2)?



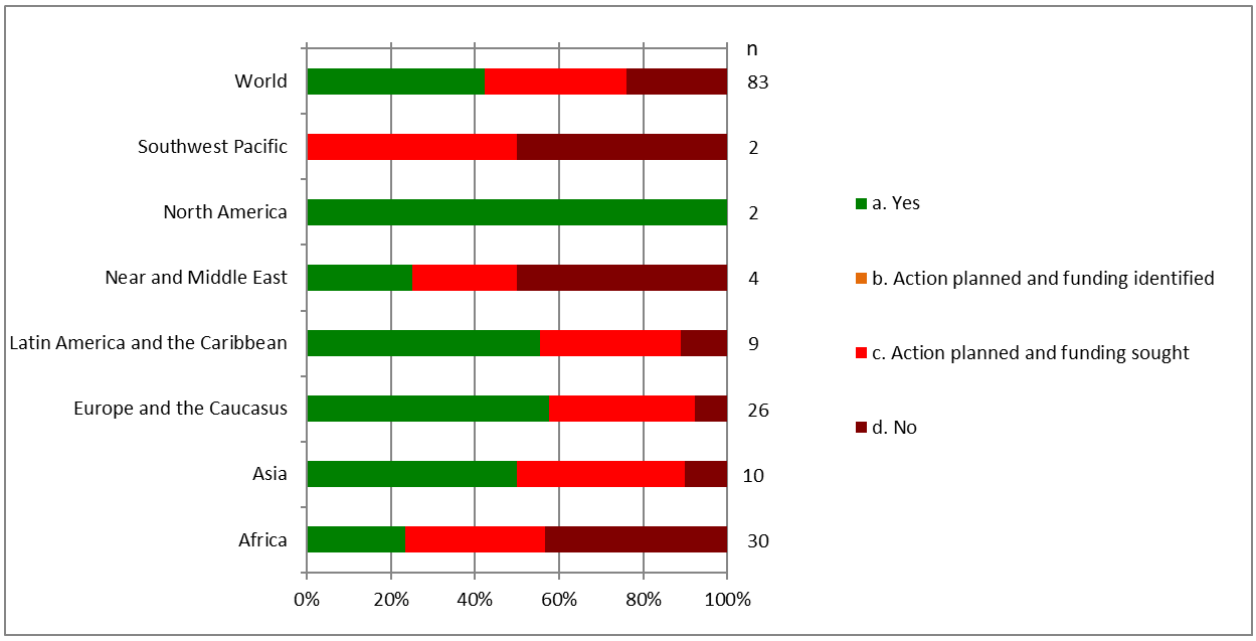
Almost 40 percent of reporting countries regularly assess factors leading to the erosion of their animal genetic resources for food and agriculture. No such assessments are reported from the Near and Middle East, and few from the Southwest Pacific and Africa. Japan reports a system for monitoring disease as a way to help limit this potential source of genetic erosion.

Figure A2.36 Q39. Has your country identified the major barriers and obstacles to enhancing the conservation of its animal genetic resources?



The majority of reporting countries have identified the major barriers and obstacles to enhancing the conservation of their animal genetic resources. However more than 70 percent of countries in the Southwest Pacific report that they have not identified barriers and obstacles. The predominant obstacle reported is a lack of financial resources. Other frequently mentioned obstacles include lack of technical capacities and infrastructure, as well as national strategies and policy framework.

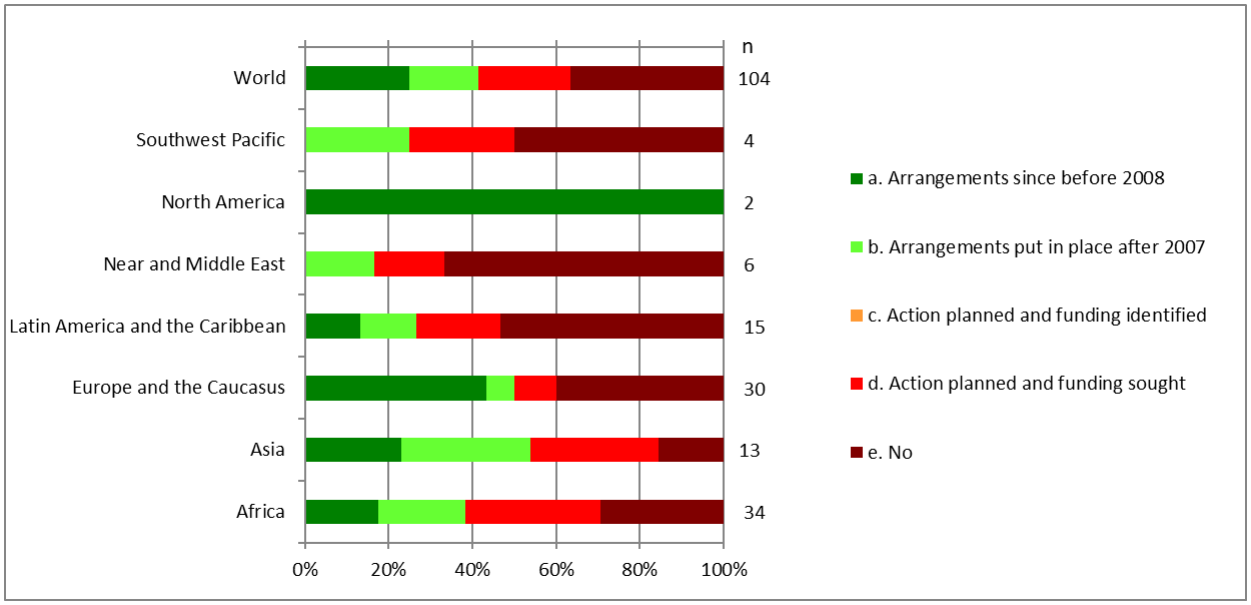
Figure A2.37 Q40. If your country has existing *ex situ* collections of animal genetic resources, are there major gaps in these collections (SP 9, Action 5)? If yes, have priorities for filling the gaps been established?



Question 40 is not considered in the calculation of the indicator because it was only addressed to the

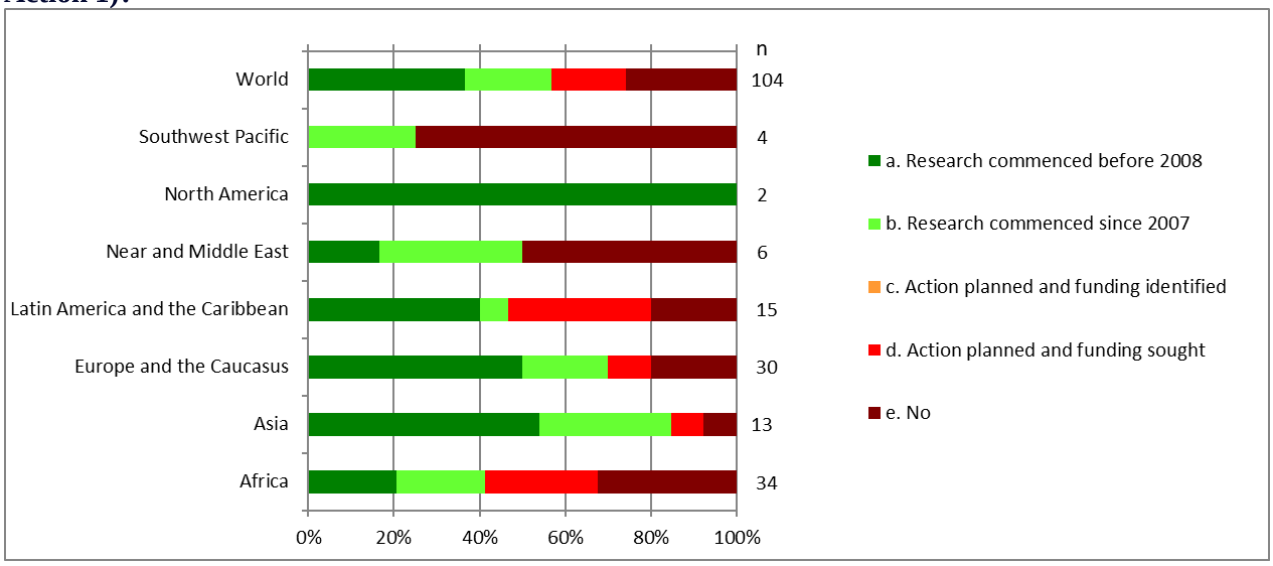
subset of countries responding positively to prior questions. Over 40 percent of the countries that reported gaps in existing *ex situ* collections of animal genetic resources indicate that priorities for filling the gaps have been established. In over 20 percent of countries, no priorities have been established. This is particularly observed in Southwest Pacific, Near and Middle East, and Africa.

Figure A2.38 Q41. Are arrangements in place in your country to protect breeds and populations that are at risk from natural or human-induced disasters (SPA 3)?



Approximately 40 percent of reporting countries have arrangements in place to protect their breeds and populations from natural or human-induced disasters. The most comprehensive coverage is reported by North America. The regions with the largest deficits in this respect are the Southwest Pacific, Latin America and the Near and Middle East. Of the countries that have reported having planned this action, none have identified suitable funding, indicating mitigation of such risk is a low priority in all regions.

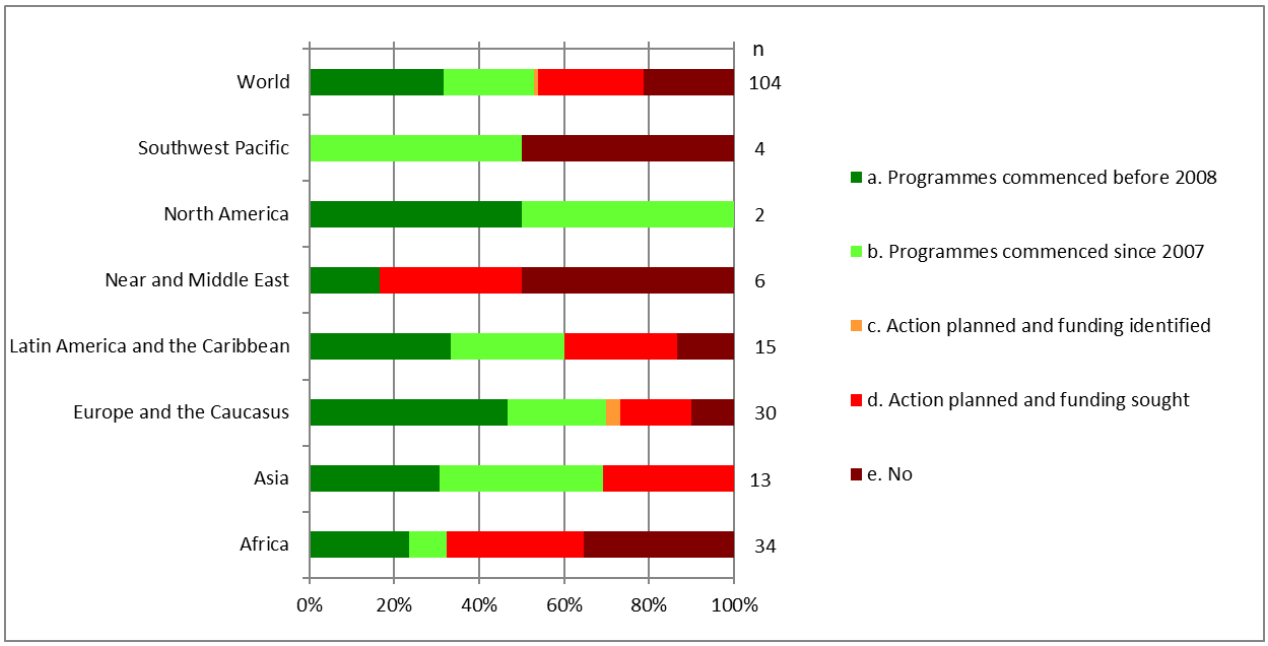
Figure A2.39 Q43. Is your country conducting research to adapt existing, or develop new, methods and technologies for in situ and ex situ conservation of animal genetic resources (SP 11, Action 1)?



Almost 60 percent of reporting countries indicate that they are undertaking research on conservation methods for animal genetic resources. However, there is significant regional variation. In the Southwest Pacific, approximately 20 percent of countries are undertaking research on conservation methods.

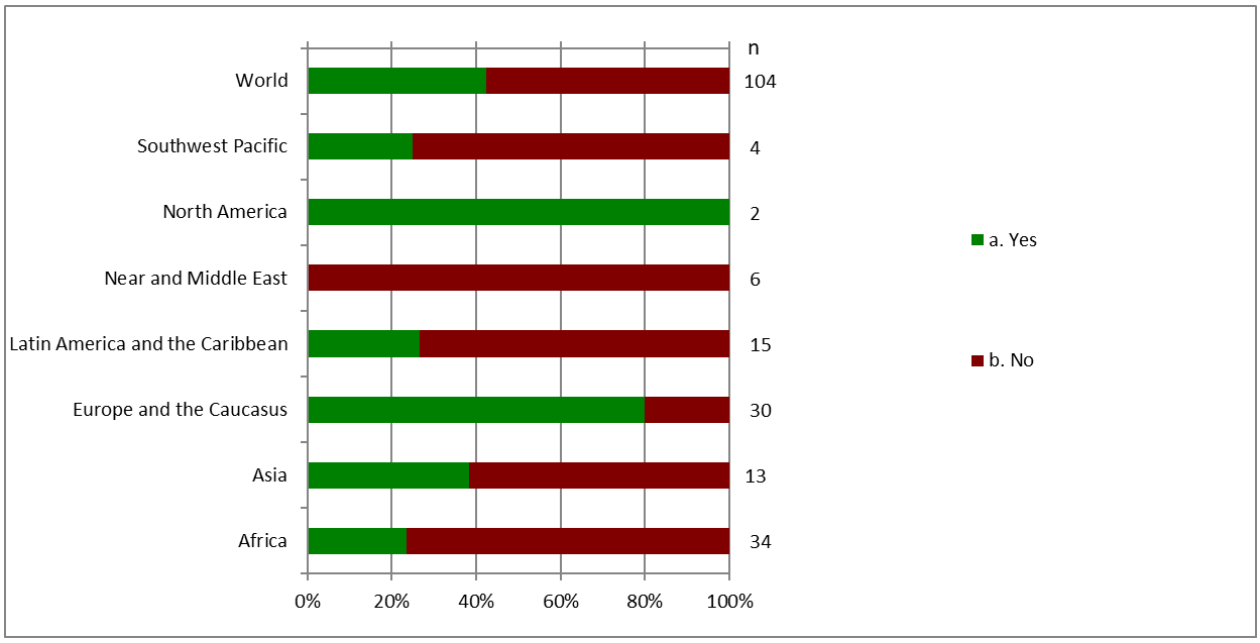
Among the examples given by countries, Austria reported on a study to improve cryopreservation of semen from a native pig breed. Canada allocates research funding every year to improve gene banking methods or to develop new reproductive technologies to improve the genetic gain of animal producers.

Figure A2.40 Q44. Does your country implement programmes to promote documentation and dissemination of knowledge, technologies and best practices for conservation (SP 11, Action 2)?



Approximately half the reporting countries indicate that they implement programmes to promote documentation and dissemination of knowledge, technologies and best practices for conservation. Such programmes are relatively uncommon in Africa and the Near and Middle East. Almost 20 percent of countries commenced programmes of this type after 2007.

Figure A2.41 Q59. Are there any national NGOs active in your country in the fields of: Conservation of breeds at risk?



More than 40 percent of reporting countries indicate that they have national NGOs active in the field of conservation. Such NGOs are widespread in North America and Europe and the Caucasus, but rare elsewhere. No countries from the Near and Middle East report any national NGOs involved in conservation.

Q31: What factors or drivers are leading to the erosion of animal genetic resources?

This was an open-ended rather than multiple-choice question and did not contribute to any of the indicators. The most frequently mentioned cause of genetic erosion is indiscriminate cross breeding and breed replacement by exotic breeds. This problem is reported particularly frequently by countries from Africa. Other frequently mentioned causes of erosion include lack of competitiveness of locally adapted breeds, intensification of production and market constraints, poor or absent animal genetic management policies and programmes, or climate change.

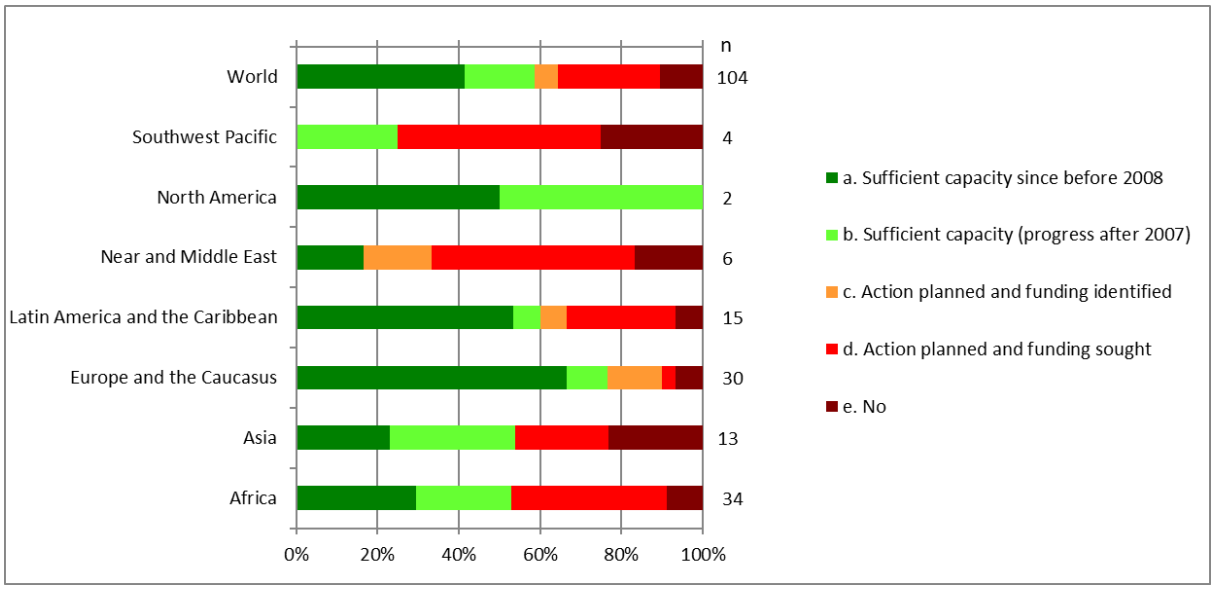
Strategic Priority Area 4: Policies, institutions and capacity-building

Long-term goal: Established cross-cutting policies and legal frameworks, and strong institutional and human capacities to achieve successful medium- and long-term planning for livestock sector development, and the implementation of national programmes for the long-term.

SP12: Establish or strengthen national institutions, including national focal points, for planning and implementing animal genetic resources measures, for livestock sector development

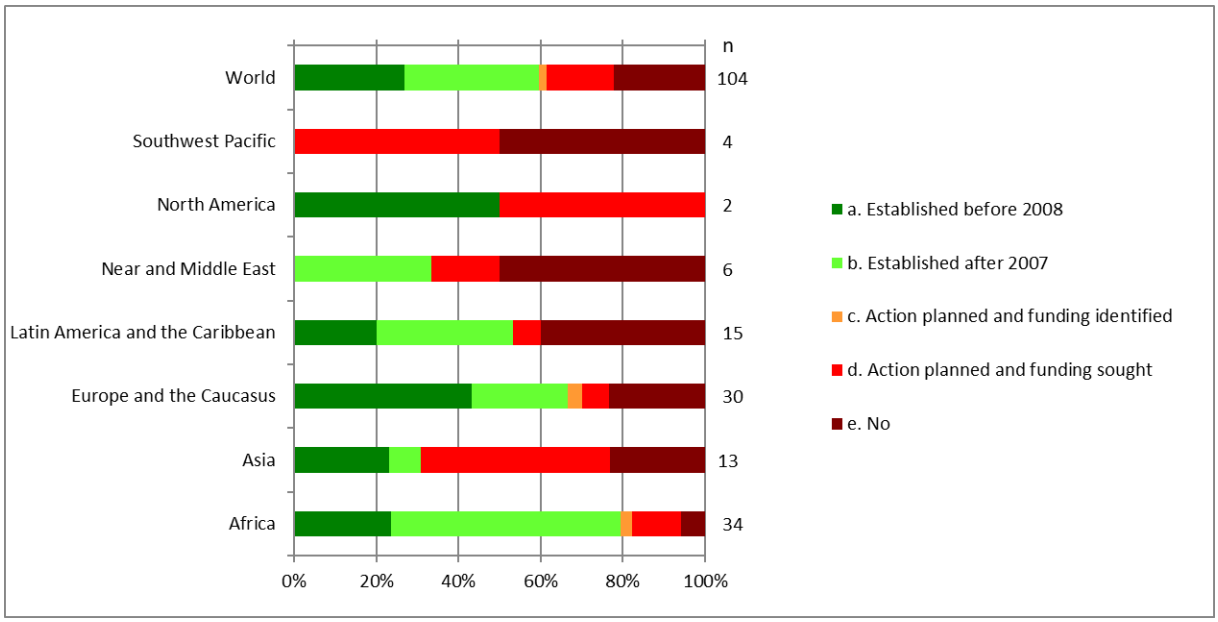
Indicator SP12: The state of efforts to strengthen national institutions for planning and implementing animal genetic resources measures

Figure A2.42 Q47. Does your country have sufficient institutional capacity to support holistic planning of the livestock sector (SP 12, Action1)?



Almost 60 percent of reporting countries indicate that their national institutional capacity to support holistic planning of the livestock sector is sufficient. The regions with the lowest proportions of countries reporting that their capacity is sufficient are the Near and Middle East and the Southwest Pacific.

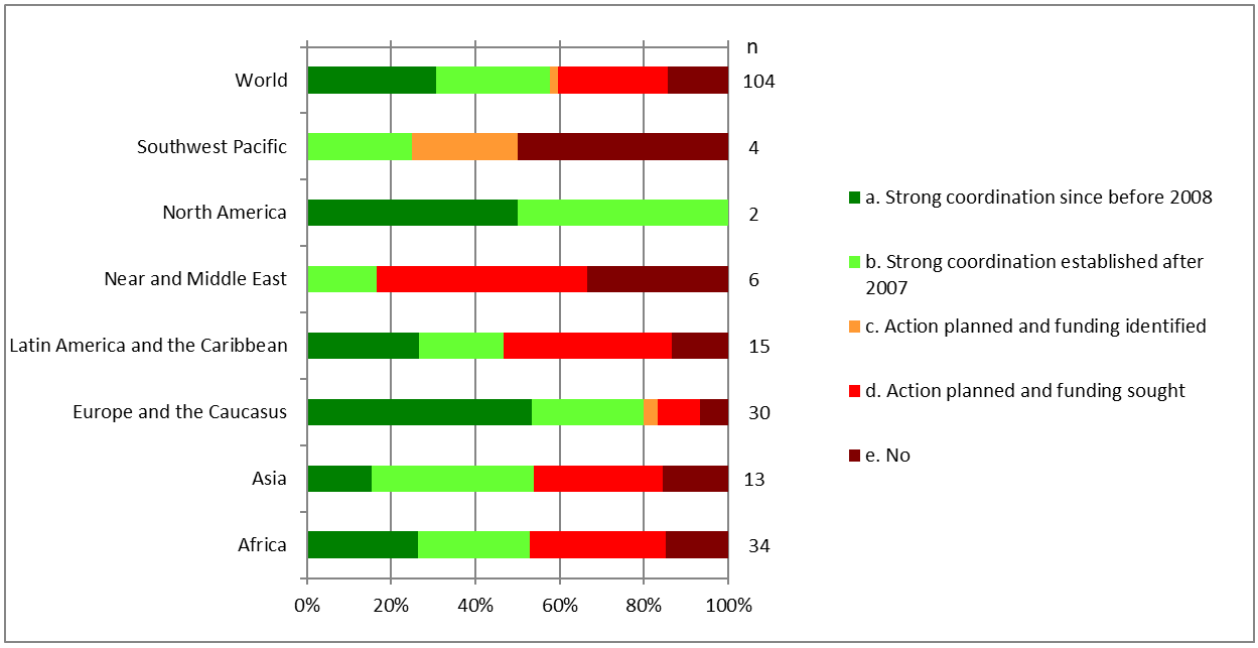
Figure A2.43 Q53. Has your country established a National Advisory Committee for Animal Genetic Resources (SP 12, Action 3)?



Approximately 60 percent of reporting countries have established a national advisory committee for animal genetic resources, which is nearly exactly the same as in 2017. Such committees are relatively rare in the Near and Middle East and not existing in the Southwest Pacific. Approximately 30 percent of countries report that their committees were established after 2007.

Generally, the committees play an advisory and consultative role on a range of animal genetic resources management issues at national level. Some countries mention that their committees contribute to mobilizing resources, evaluating actions toward animal genetic resources, raising public awareness or promoting linkages and exchange of information among stakeholders. A few countries report that the committee, although established, has been meeting on a sporadic basis during the last years.

Figure A2.44 Q54. Is there strong coordination and interaction between the National Focal Point and stakeholders involved with animal genetic resources, such as the breeding industry, livestock keepers, government agencies, research institutes and civil society organizations (SP 12, Action 3)?

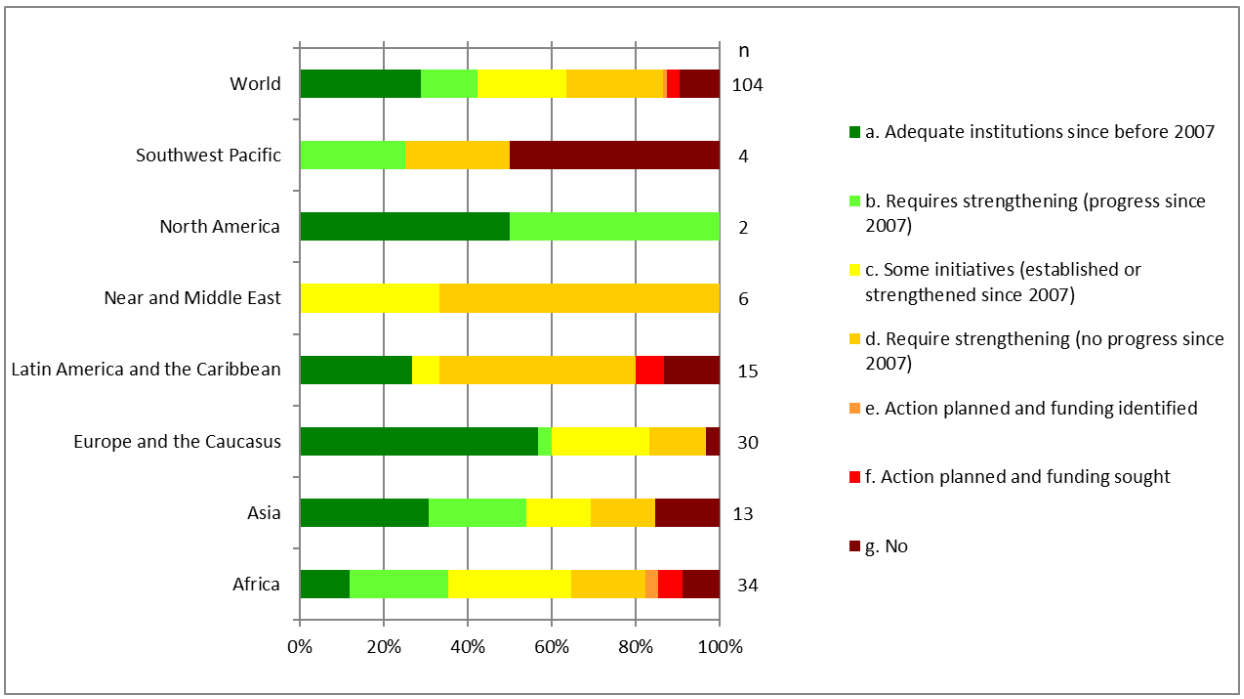


Approximately 60 percent of reporting countries indicate that strong coordination exists between their National Focal Points for Animal Genetic Resources and other stakeholders in the sector. The weakest regions in this respect are the Near and Middle East and the Southwest Pacific. More than 20 percent of countries report that strong coordination exists because of progress made after 2007.

SP13: Establish or strengthen national educational and research facilities

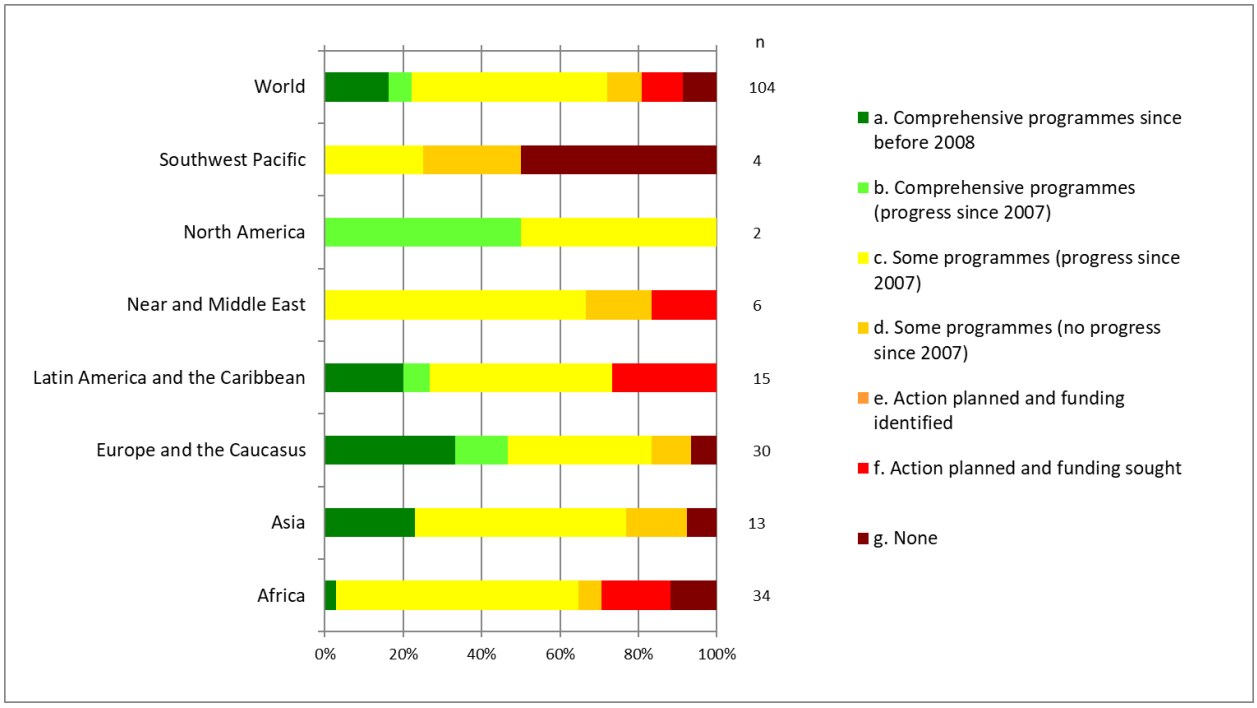
Indicator SP13: The state of efforts to strengthen national educational and research facilities

Figure A2.45 Q60. Has your country established or strengthened research or educational institutions in the field of animal genetic resources management (SP 13, Action 3)?



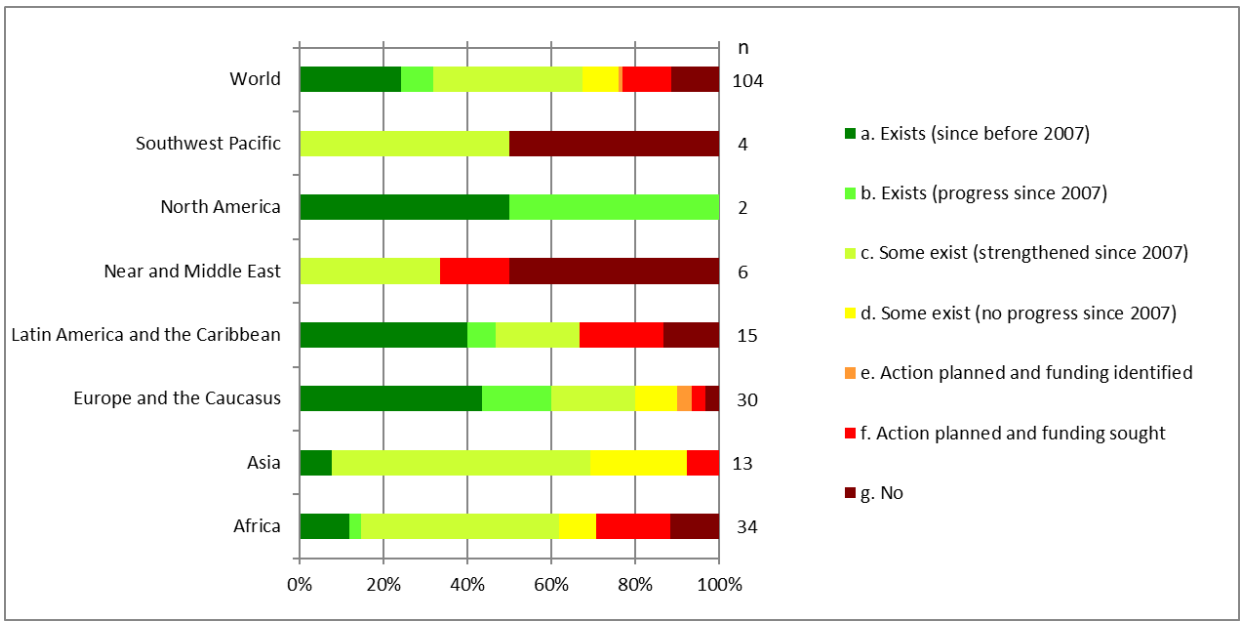
About 30 percent of reporting countries indicate that they consider their existing research and education programmes in the field of animal genetic resources management to be adequate. A further 60 percent, approximately, report that they have some institutions in place, but that these require strengthening. Although still not optimal, these data represent a substantial improvement over 2014, when about 30 percent of countries reported a lack of educational institutions working with animal genetic resources.

Figure A2.46 Q57. Which of the following options best describes the state of training and technology transfer programmes in your country related to inventory, characterization, monitoring, sustainable use, development and conservation of animal genetic resources (SP14, Action 1)?



Approximately 20 percent of countries indicate the presence of comprehensive training and technology transfer programmes related to inventory, characterization, monitoring, sustainable use, development and conservation of animal genetic resources. A majority of countries in all regions report that they have some measures in place in this field, except for the Southwest Pacific. More than 50 percent of countries report that they have made progress since 2007.

Figure A2.47 Q58. Have organizations (including where relevant community-based organizations), networks and initiatives for sustainable use, breeding and conservation been established or strengthened (SP 14, Action 3)?

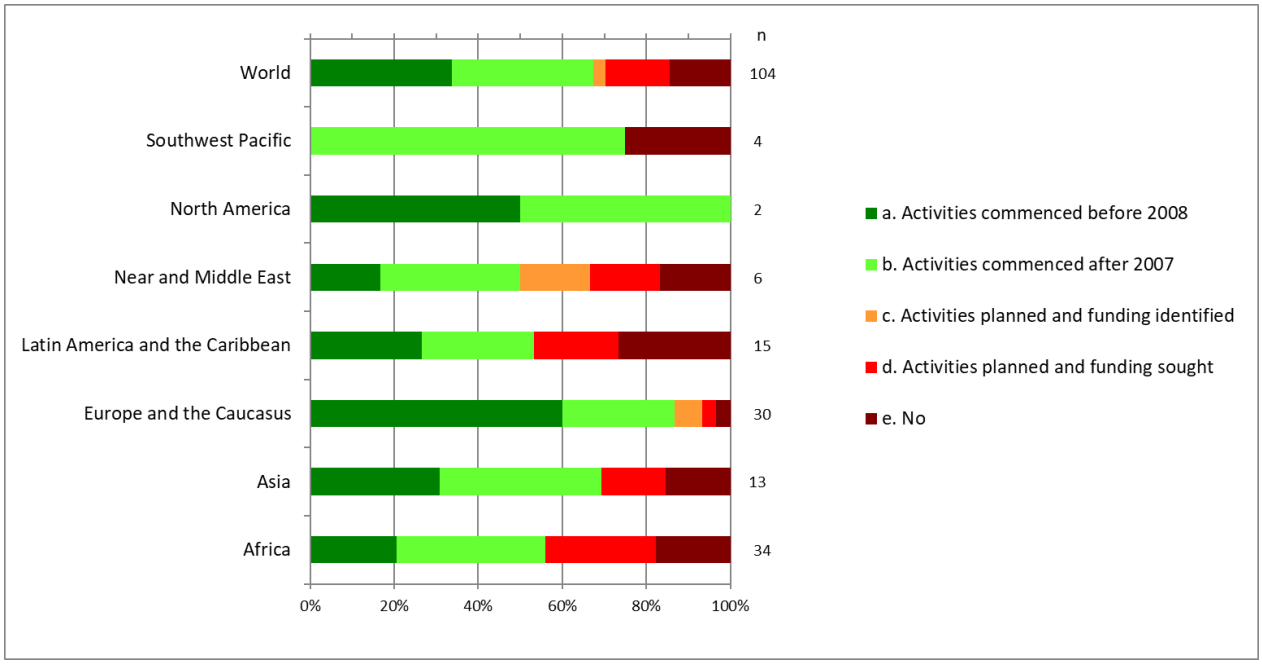


Organizations (including, where relevant, community-based organizations), networks and initiatives for sustainable use, breeding and conservation exist in almost 80 percent of reporting countries. Organizations, networks and initiatives of this type are less frequently reported by countries from the Near and Middle East and the Southwest Pacific than by those from other parts of the world.

SP18: Raise national awareness of the roles and values of animal genetic resources

Indicator SP18: The state of efforts to raise national awareness of the roles and values of animal genetic resources

Figure A2.48 Q55. Does the National Focal Point (or other institutions) undertake activities to increase public awareness of the roles and values of animal genetic resources (SP 18)?



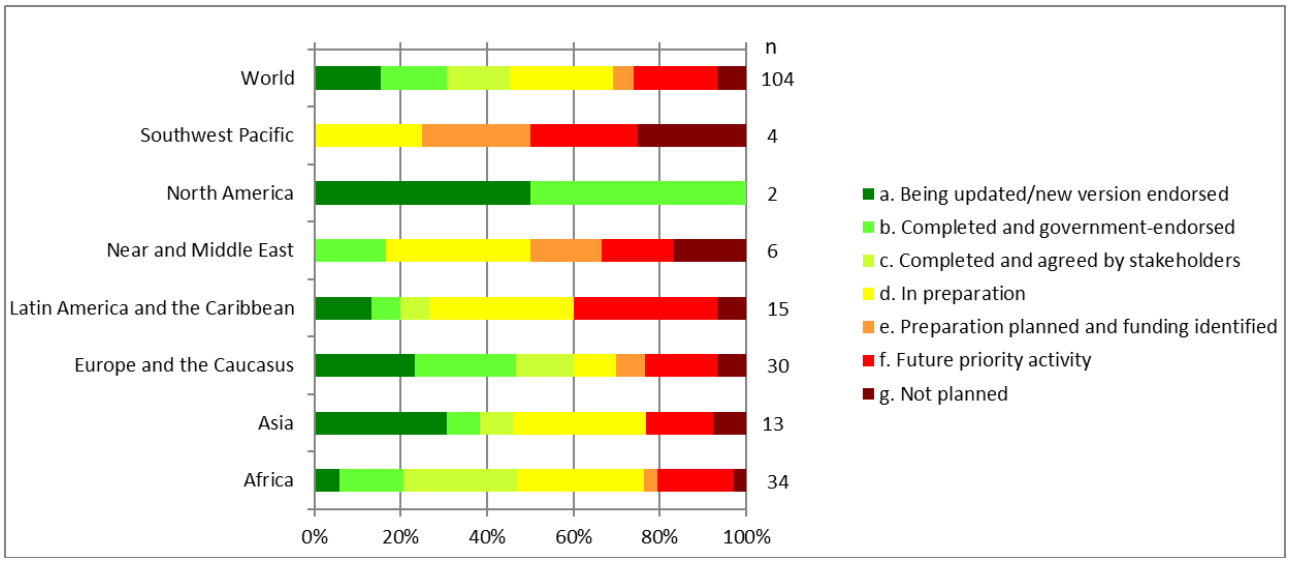
Almost 70 percent of reporting countries indicate that their National Focal Points undertake activities to increase public awareness of the roles and values of animal genetic resources. About 30 percent of National Focal Points commenced their public awareness-raising activities after 2007.

In Estonia, the National Focal Point is the Ministry of Rural Affairs. The activities to increase public awareness of the roles and values of animal genetic resources are carried out by breeding and conservation organizations as part of their breeding and conservation programmes. To increase the public awareness a variety of different activities are used, including animal shows and competitions in different regions and publication of printed and on-line journals. In Cameroon, there been regular sensitization campaigns which culminated in the creation of cooperatives for the preservation of three threatened cattle breeds.

SP20: Review and develop national policies and legal frameworks for animal genetic resources

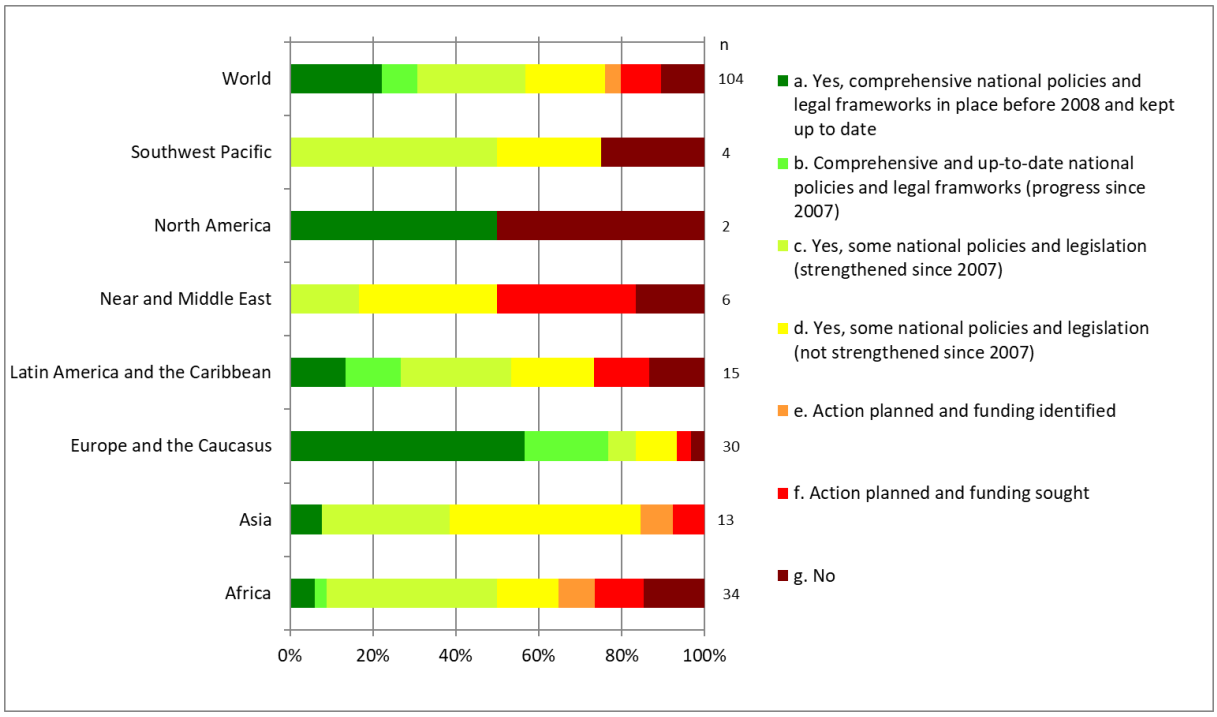
Indicator SP20: The state of national policies and legal frameworks for animal genetic resources

Figure A2.49 Q48. What is the current status of your country's national strategy and action plan for animal genetic resources (SP 20)?



More than 40 percent of countries indicate that they have completed the preparation of a national strategy and action plan for animal genetic resources. Some strategies and action plans have been endorsed by the respective government; others have been agreed by stakeholders but not yet endorsed by the government. Some countries have already developed or are in the process of updating previously developed instruments. Another 20 percent of countries, approximately, are in the process of preparing their strategies and plans. Progress in terms of the proportion of countries that have started to prepare a national strategy and action plan has been slowest in the Southwest Pacific and the Near and Middle East. Less than 10 percent of all reporting countries indicate that they have no plans to develop a national strategy and action plan. About 20 percent consider it a priority but have not yet identified the necessary funding.

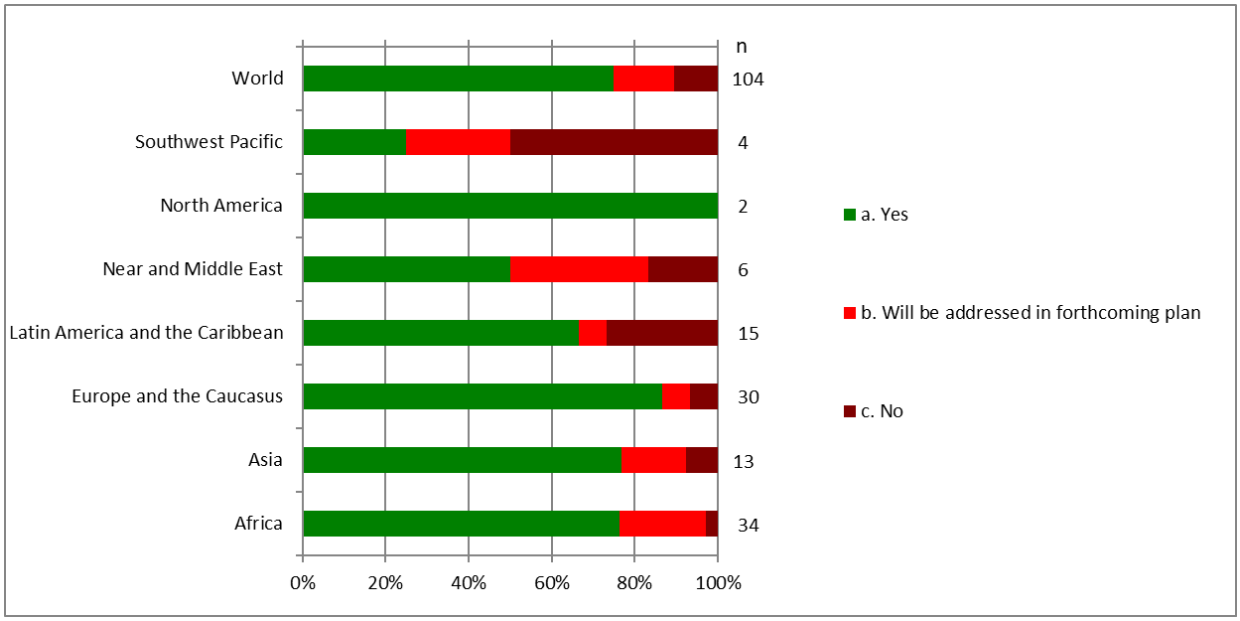
Figure A2.50 Q56. Does your country have national policies and legal frameworks for animal genetic resources management (SP 20)?



Approximately 30 percent of reporting countries indicate that their national policies and legal frameworks for animal genetic resources are comprehensive and up to date. Europe and the Caucasus is the only region in which the majority of reporting countries regard their polices and legal frameworks as being comprehensive and up to date. No countries in the Near and Middle East or Southwest Pacific regard their frameworks as being comprehensive and up to date. Among countries that have planned this action, only a few have managed to identify funding to support follow-through.

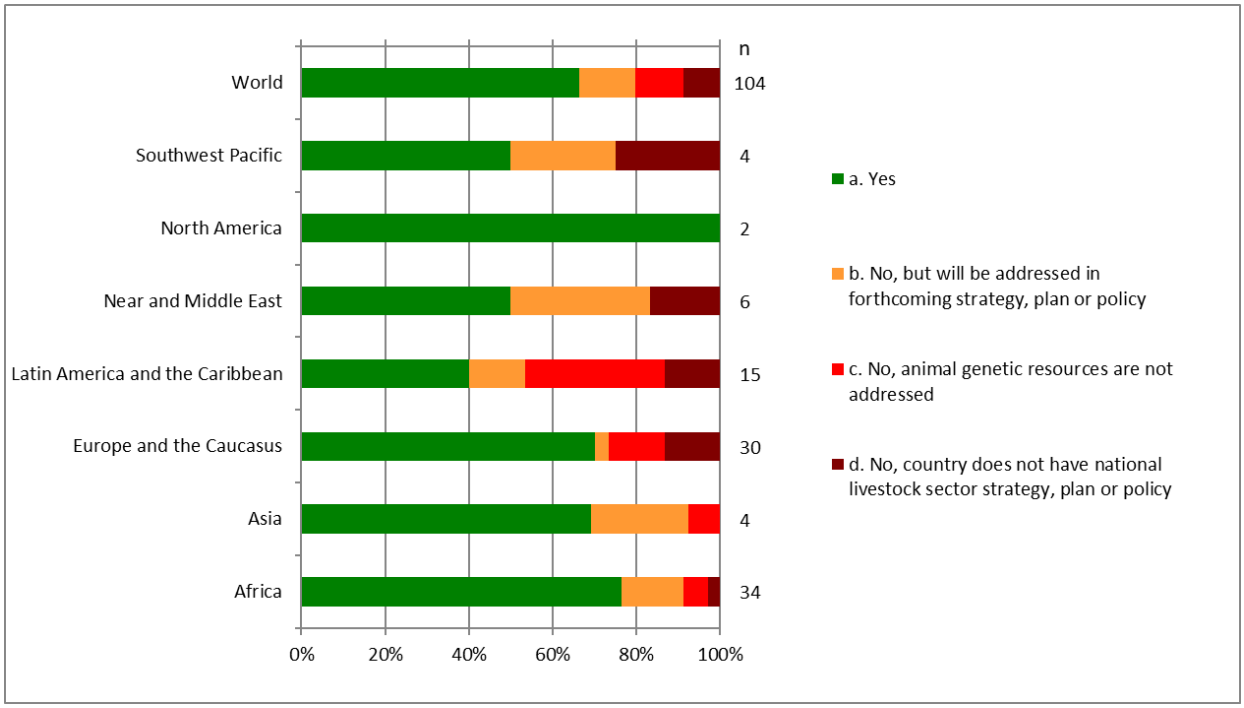
Additional questions contributing to Indicator SPA4

Figure A2.51 Q49. Are animal genetic resources addressed in your country's National Biodiversity Strategy and Action Plan (https://www.cbd.int/nbsap)



More than 70 percent of reporting countries indicate that animal genetic resources are addressed in their Biodiversity Strategy and Action Plans.[55] An additional 20 percent of countries report that animal genetic resources will be addressed in their forthcoming plan.

Figure A2.52 Q50. Are animal genetic resources addressed in your country's national livestock sector strategy, plan or policy (or equivalent instrument)?

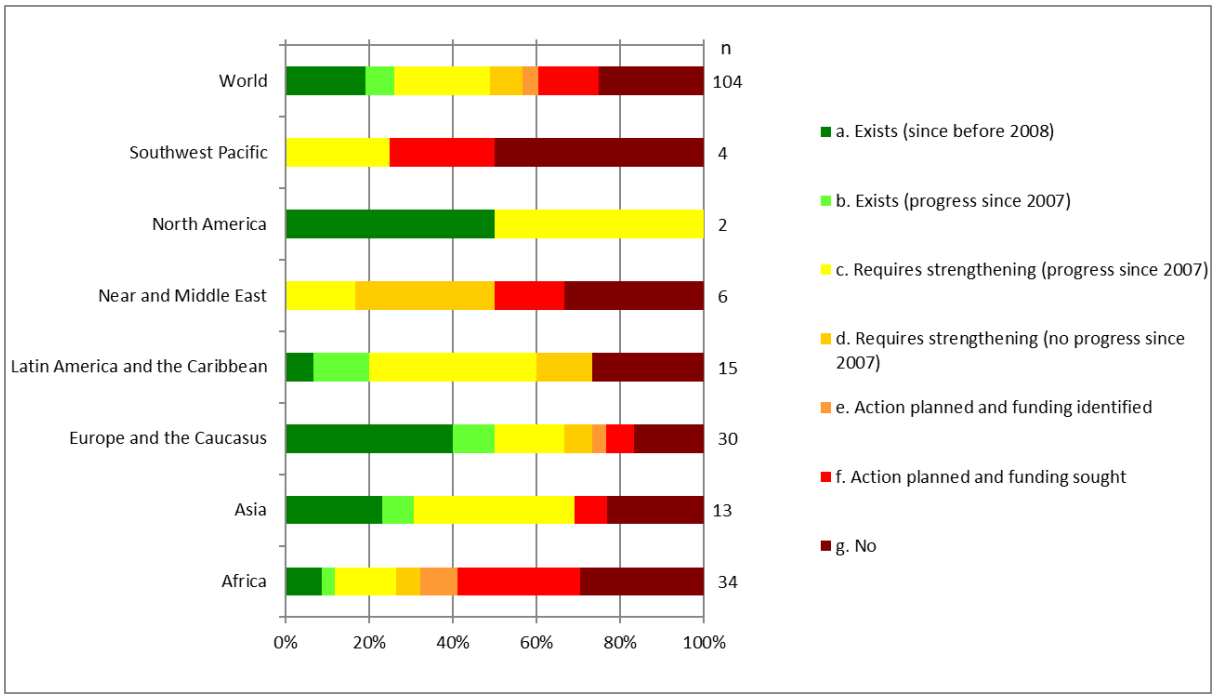


In more than 60 percent of reporting countries, animal genetic resources are addressed in the national livestock-sector strategy, plan or policy. In Africa, nearly 80 percent of countries address animal genetic resources in their general livestock policy instruments.

The only regions where a 50 percent or fewer of countries have no coverage of animal genetic resources in their instruments are the Near and Middle East and Latin America and the Caribbean.

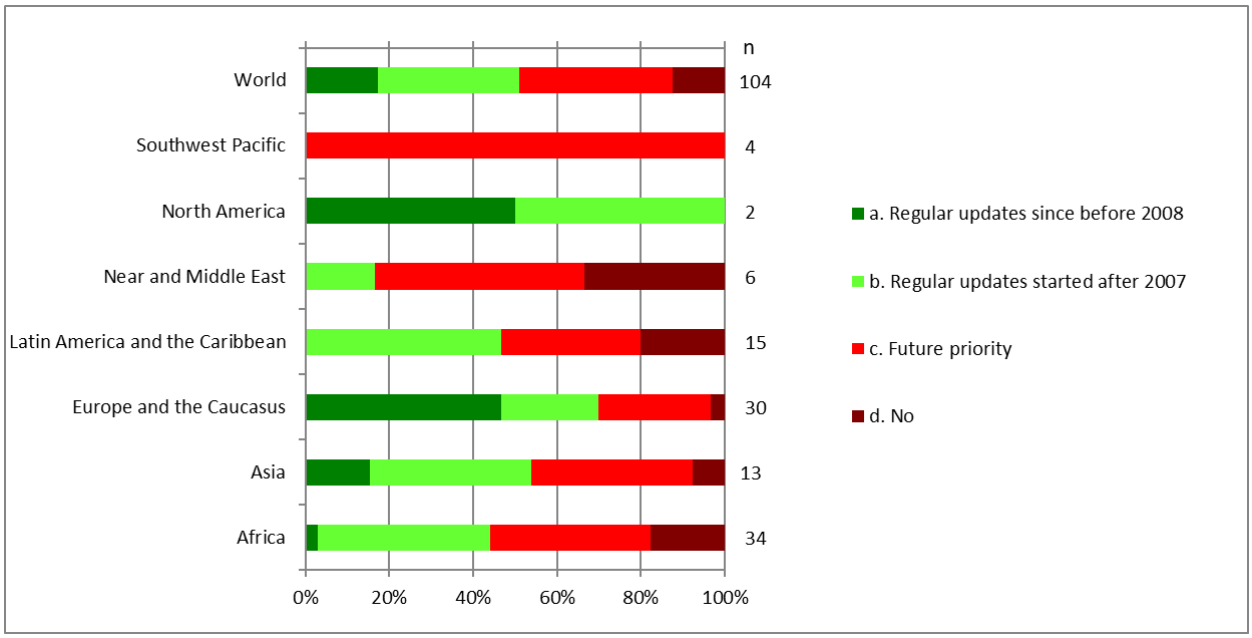
[55] Analysis of the 173 existing National Biodiversity Strategy and Action Plans revealed that 82 percent include animal genetic resources in their scope or include actions related to animal genetic resources.

Figure A2.53 Q51. Has your country established or strengthened a national database for animal genetic resources (independent from DAD-IS) (SP 15, Action 4)?



Approximately 60 percent of reporting countries indicate that they have established a national database for animal genetic resources for food and agriculture, of which about half require strengthening. Developments in this field have been limited in several regions, however, particularly in Africa and the Southwest Pacific, where fewer than half of the countries report a database for animal genetic resources.

Figure A2.54 Q52. Have your country's national data on animal genetic resources been regularly updated in DAD-IS?



About 50 percent of reporting countries indicate that their national data on animal genetic resources have been regularly updated in DAD-IS. The majority of these countries started their regular updates

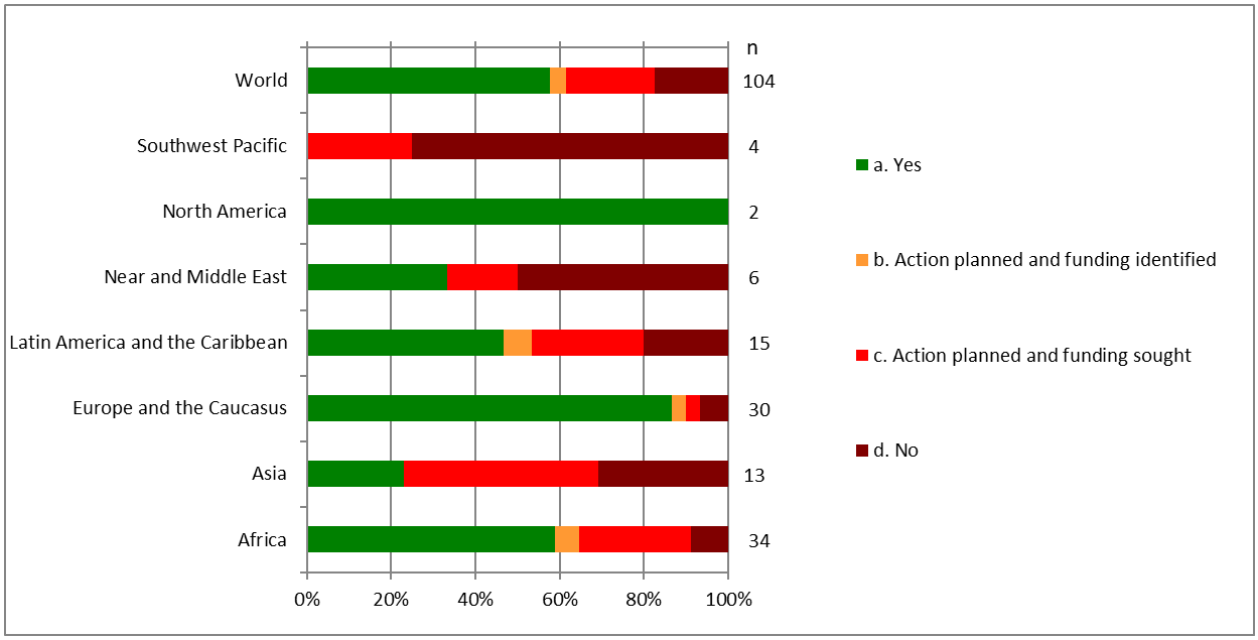
after 2007. Less than 20 percent of countries in the Near and Middle East and none from the Southwest Pacific report that their data are updated regularly. Common explanations across all regions for the lack of progress are limited staff and lack of funding.

Implementation and financing of the Global Plan of Action: collaboration

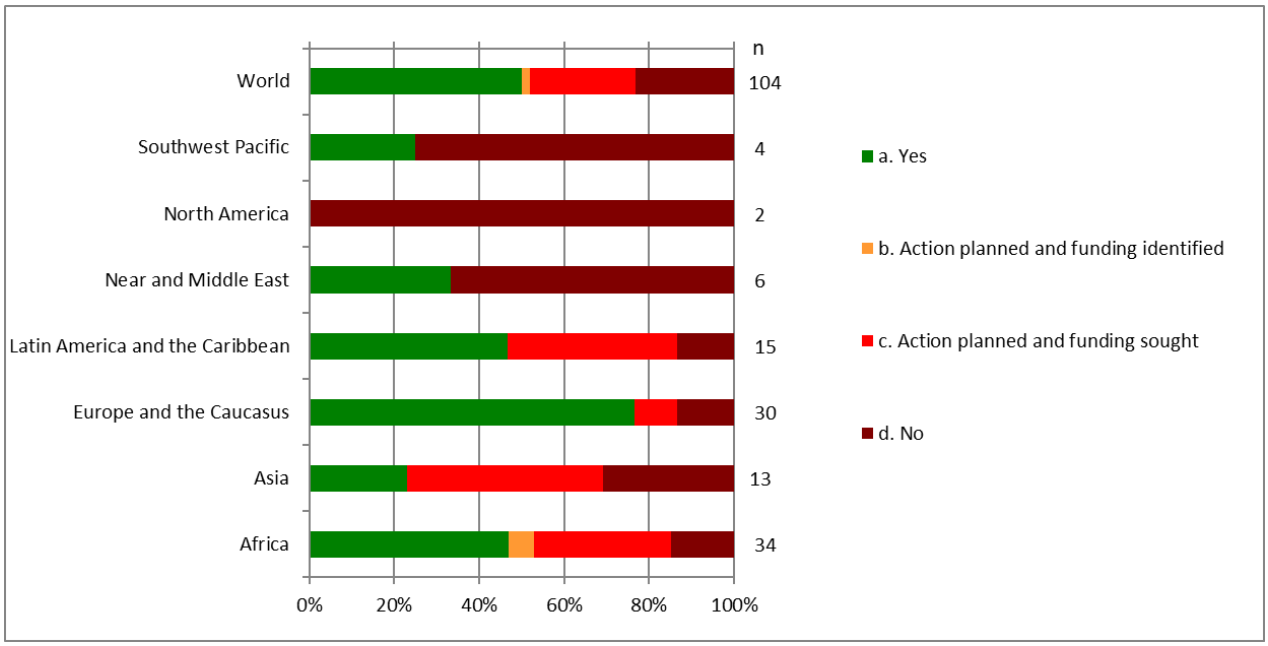
Indicator: The state of international collaboration for planning and implementing animal genetic resources measures

Figure A2.55 Q62. Has your country established or strengthened international collaboration in (SP 16):

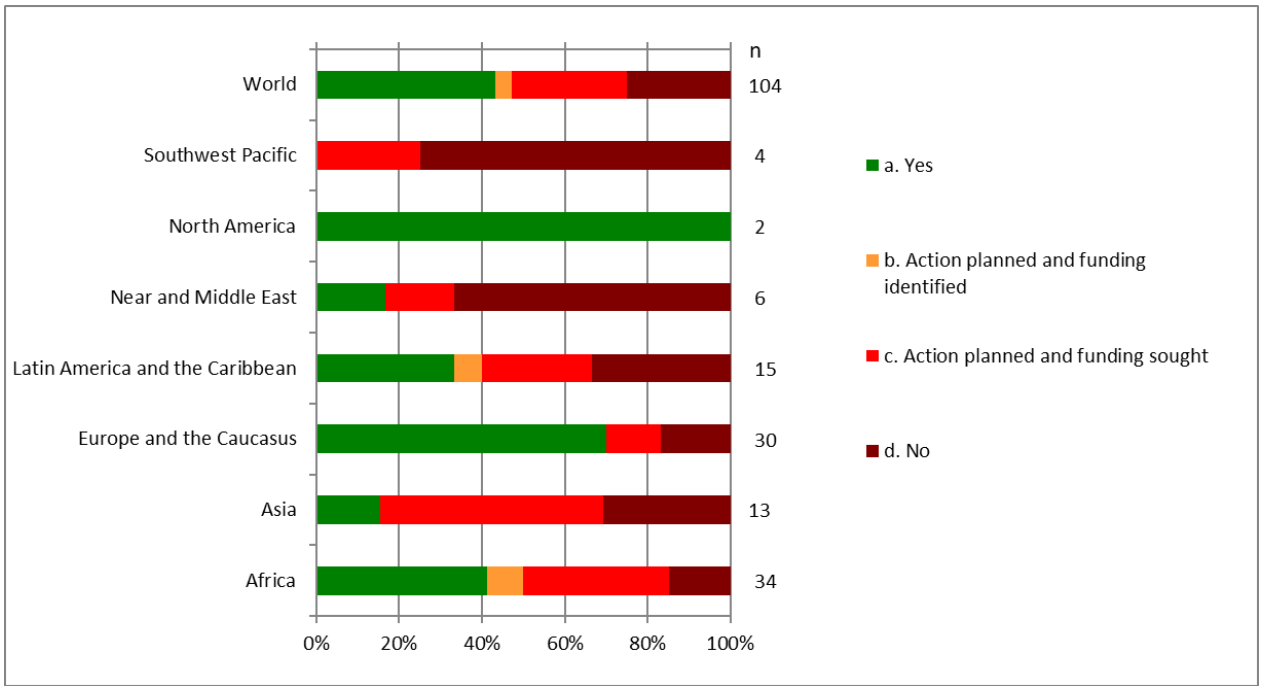
Characterization?



Sustainable use and development?



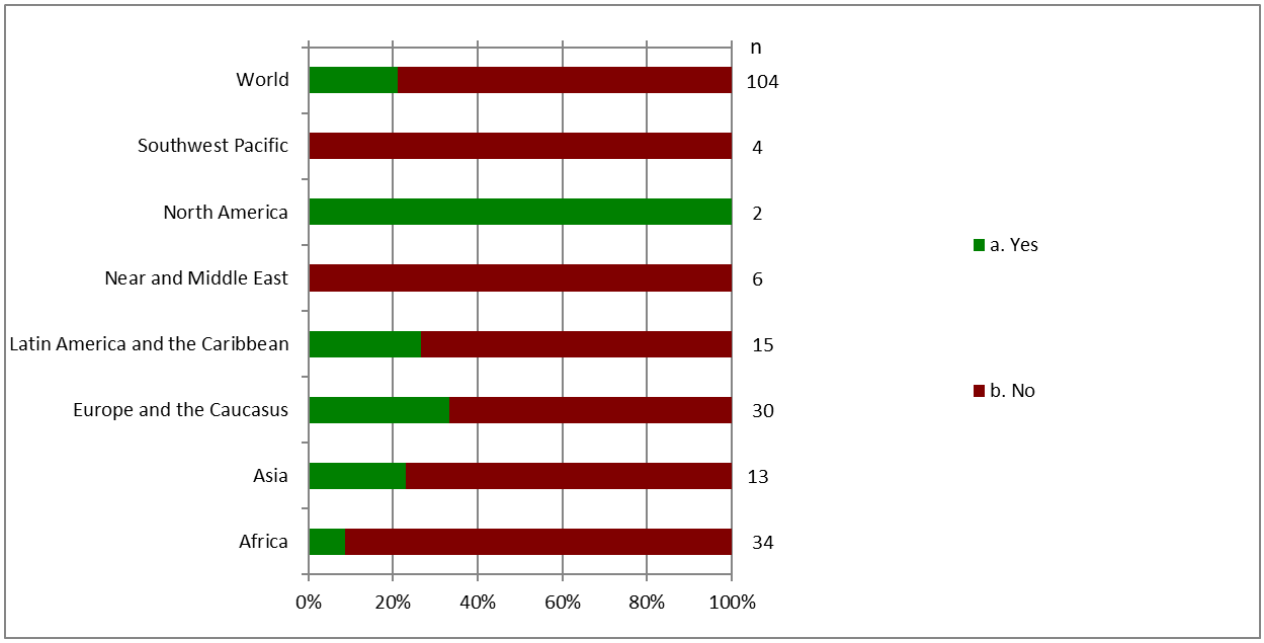
Conservation of breeds at risk?



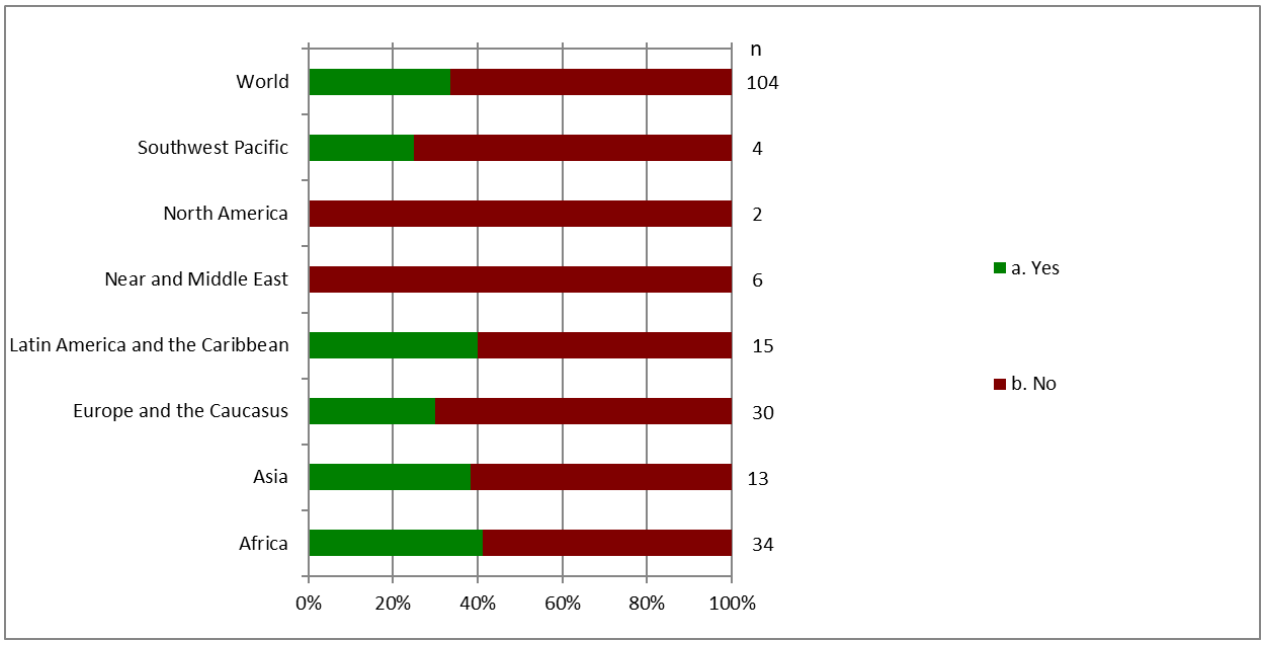
Almost 60 percent of reporting countries indicate that they have established or strengthened international collaborative activities in the field of characterization. More countries report international actions in this field than in other areas of animal genetic resources management. However, action is far more frequently reported in Europe and the Caucasus and North America than in other regions. In several regions, action to date has been very limited or non-existent. Approximately 50 percent of reporting countries indicate that they have established or strengthened international collaborative activities in the field of sustainable use and development. Such initiatives are far more commonly reported by countries from Europe and the Caucasus than those from any other region.

Slightly over 40 percent of reporting countries indicate that they have established or strengthened international collaborative activities in the field of conservation. No such initiatives are reported from the Southwest Pacific, and relatively few from the Near and Middle East and Asia.

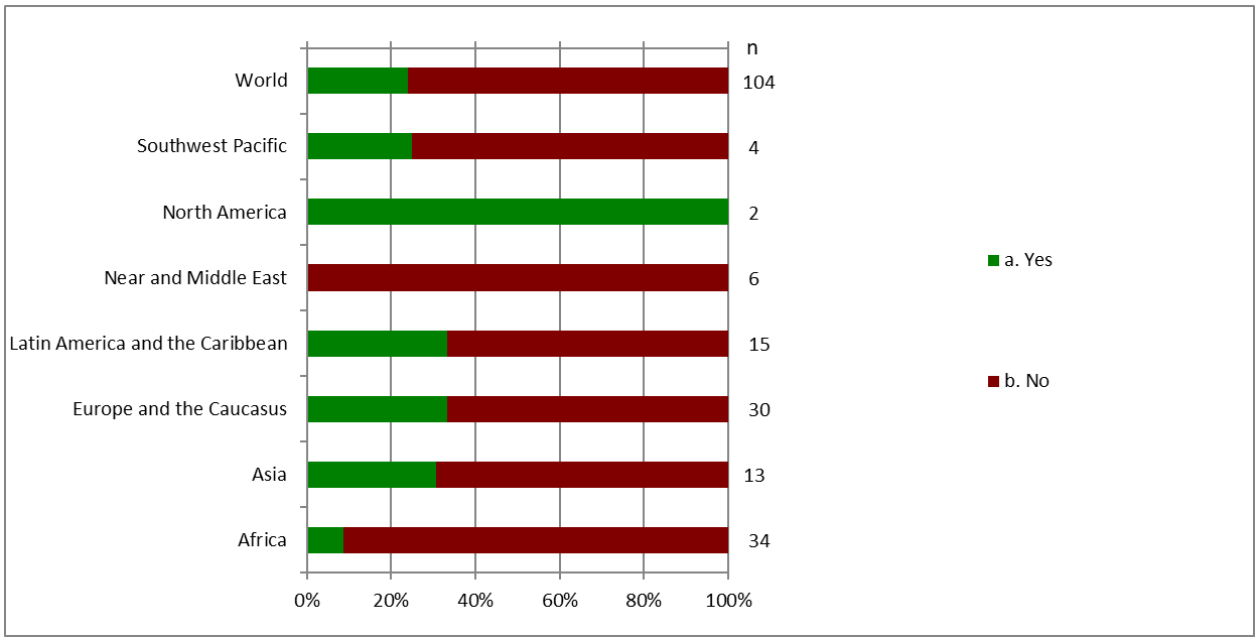
Figure A2.56 Q63. Are there any international NGOs active in your country in the fields of: Characterization?



Sustainable use and development?

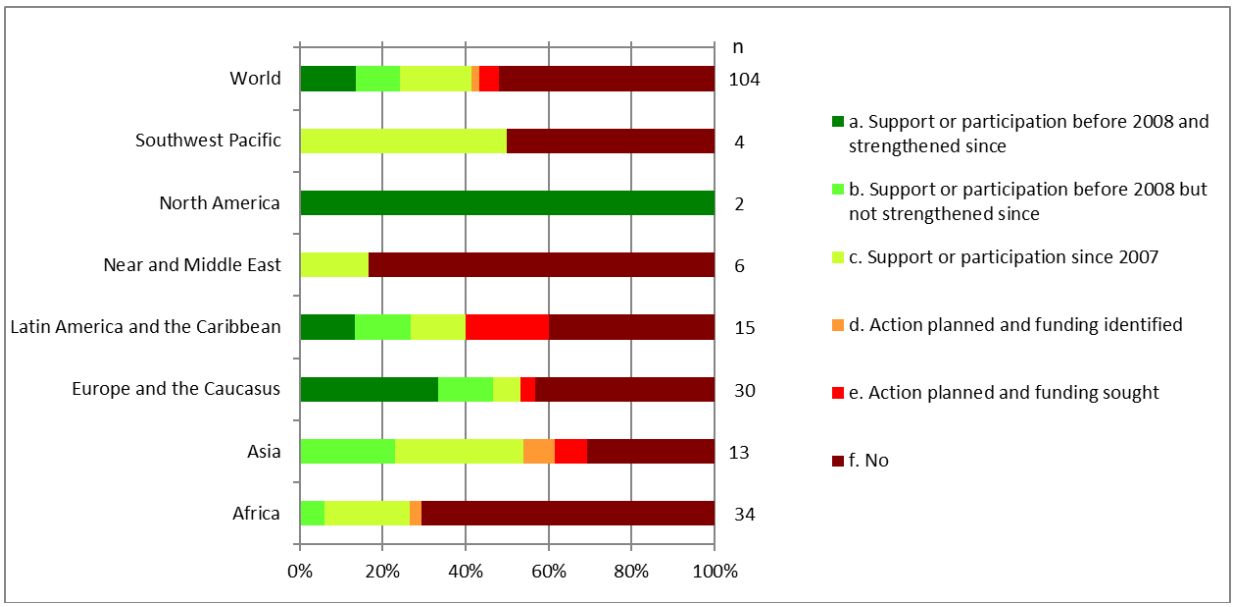


Conservation of breeds at risk?



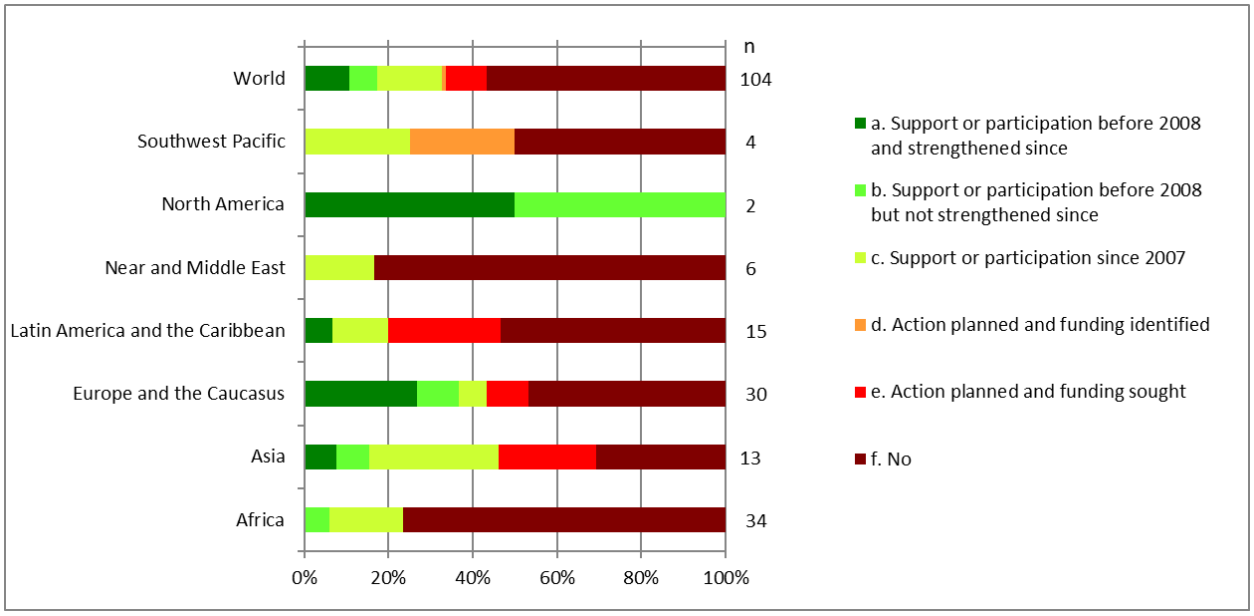
The reported activity of international NGOs working in the fields of characterization, conservation and sustainable use and development is less than 50 percent in all regions, except for North America in the areas of characterization and conservation. Several NGOs were mentioned multiple times, such as the SAVE Foundation in Europe, VSF for Africa, and Heifer International and the World Wildlife Fund (WWF) in different regions.

Figure A2.57 Q66. Has your country supported or participated in international research and education programmes assisting developing countries and countries with economies in transition to better manage animal genetic resources (SP 15 and 16)?



Approximately 40 percent of reporting countries indicate that they have supported or participated in international research and education programmes to assist developing countries and countries with economies in transition to better manage animal genetic resources. This participation was the least common among reporting countries from the Near and Middle East region, where only one country reported participation in international research and education programmes.

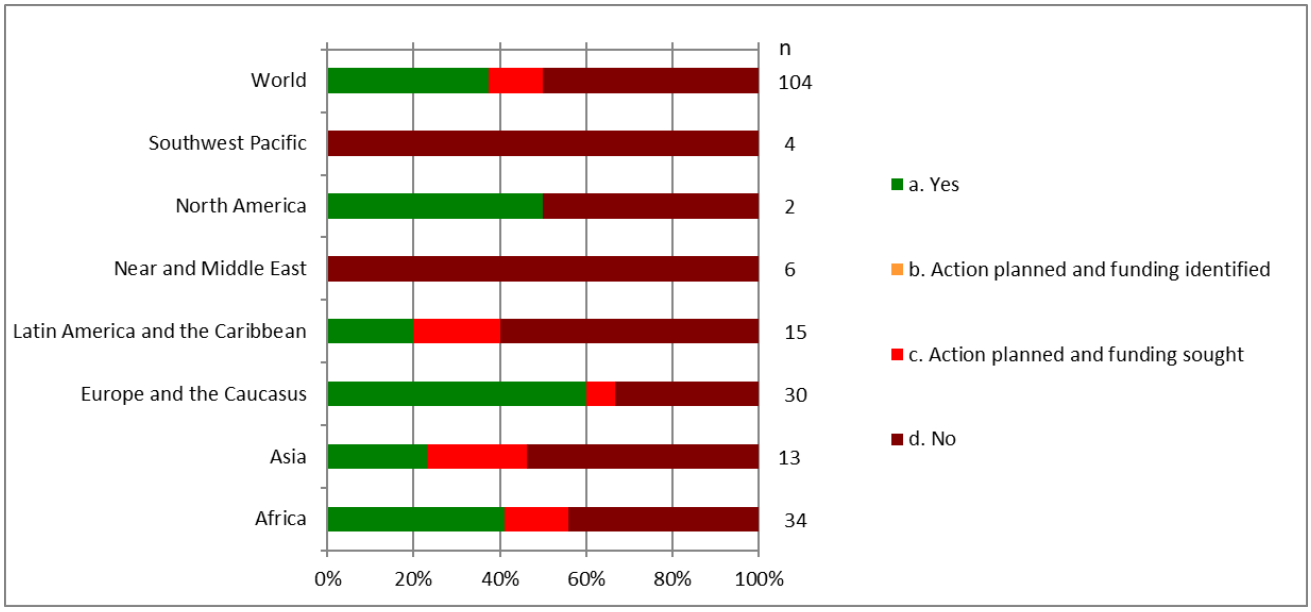
Figure A2.58 Q67. Has your country supported or participated in programmes aimed at assisting developing countries and countries with economies in transition to obtain training and technologies and to build their information systems (SP 15 and 16)?



Only slightly more than 30 percent of reporting countries have supported or participated in programmes

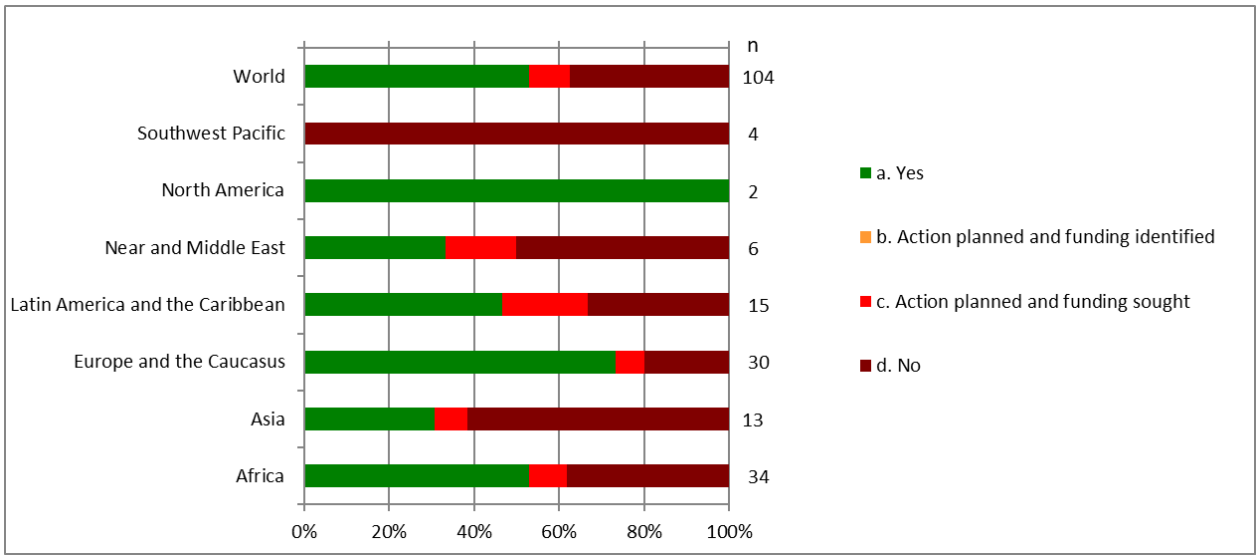
aimed at assisting developing countries and countries with economies in transition to obtain training and technologies and to build their information systems. Approximately 10 percent of countries have action planned, however. In Europe and the Caucasus, more 40 percent of countries have been involved to some extent in such support programmes.

Figure A2.59 Q69. Has your country contributed to international cooperative inventory, characterization and monitoring activities involving countries sharing transboundary breeds and similar production systems (SP 1, Action 5)?



Approximately 40 percent of reporting countries have contributed to international cooperative inventory, characterization and monitoring activities involving countries sharing transboundary breeds and similar production systems. Several African countries report activities of this type, for instance the conservation of the Azawakh Zebu breed (Burkina Faso, Mali, Niger) and Lagunaire and Somba cattle breeds (Benin, Cote d'Ivoire, Nigeria, Togo). Brazil and the United States of America collaborated to develop a custom DNA chip and then used it to characterize sheep breeds that have material stored in each country's gene bank.

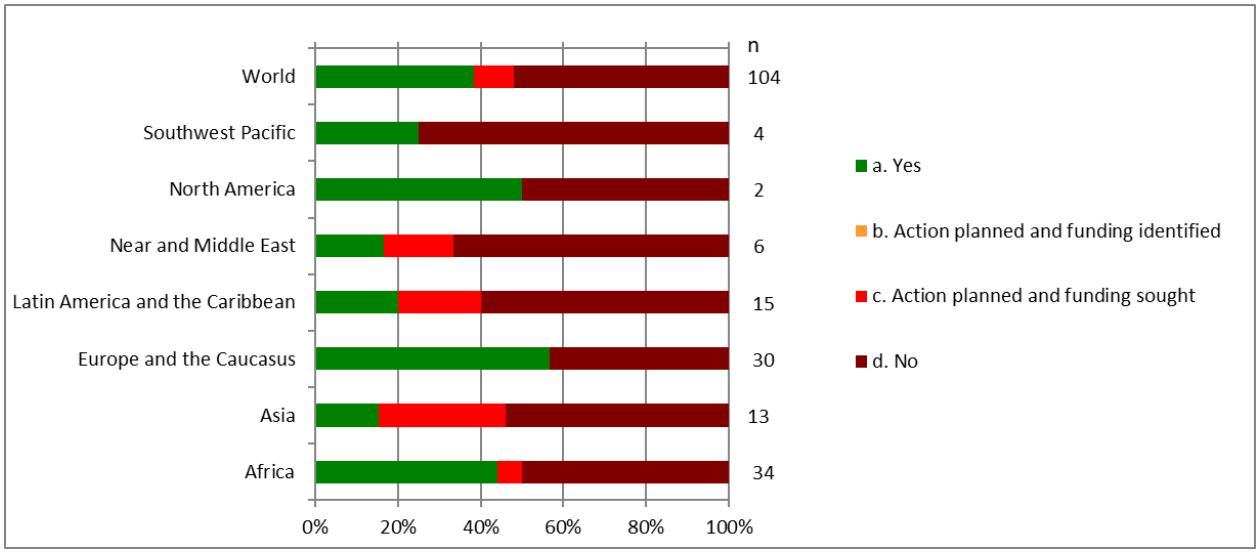
Figure A2.60 Q70. Has your country contributed to establishing or strengthening global or regional information systems or networks related to inventory, monitoring and characterization of animal genetic resources (SP 1, Action 6)?



About 50 percent of reporting countries have contributed to establishing or strengthening global or

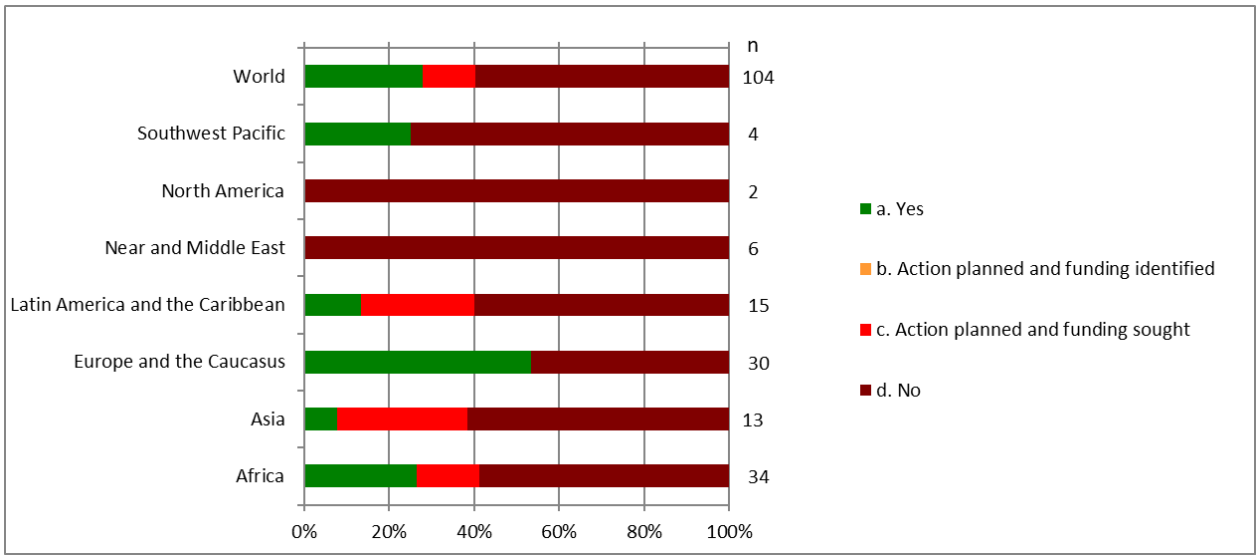
regional information systems or networks related to inventory, monitoring and characterization of animal genetic resources. Relative to 2014, Asia and Africa are the regions where most progress has been made in this respect. Outside of DAD-IS, different regional systems are reported, like EFABIS in Europe, Animal-GRIN in North and Latin America and the Caribbean, or ARIS in Africa.

Figure A2.61 Q71. Has your country contributed to the development of international technical standards and protocols for characterization, inventory and monitoring of animal genetic resources (SP2)?



Approximately 40 percent of reporting countries contribute to the development of international technical standards and protocols for characterization, inventory and monitoring of animal genetic resources. In Africa, several countries reported the development of AU-IBAR technical standards (AnGR-CIM) for the characterization, inventory and monitoring of animal genetic resources.

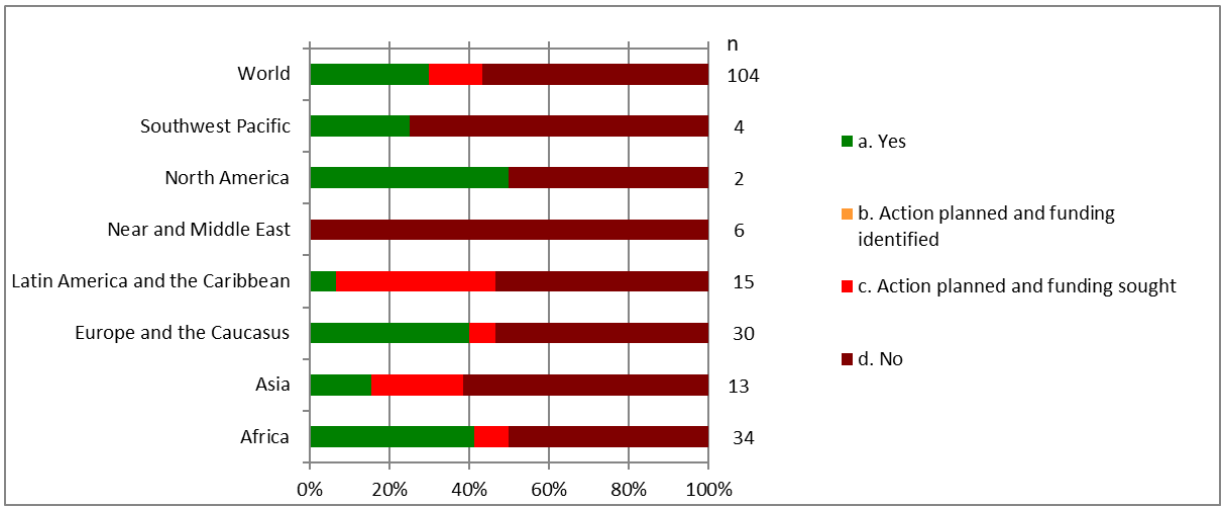
Figure A2.62 Q72. Has your country contributed to the development and implementation of regional *in situ* conservation programmes for breeds that are at risk (SP 8, Action 2; SP 10, Action 1)?



Less than 30 percent of reporting countries have contributed to the development and implementation of regional *in situ* conservation programmes for breeds that are at risk. This represents a decrease from 2014, consistent with results in Figure Again, more activity is reported from Europe and the Caucasus than other regions, but countries from other regions have been active as well. For example, countries in

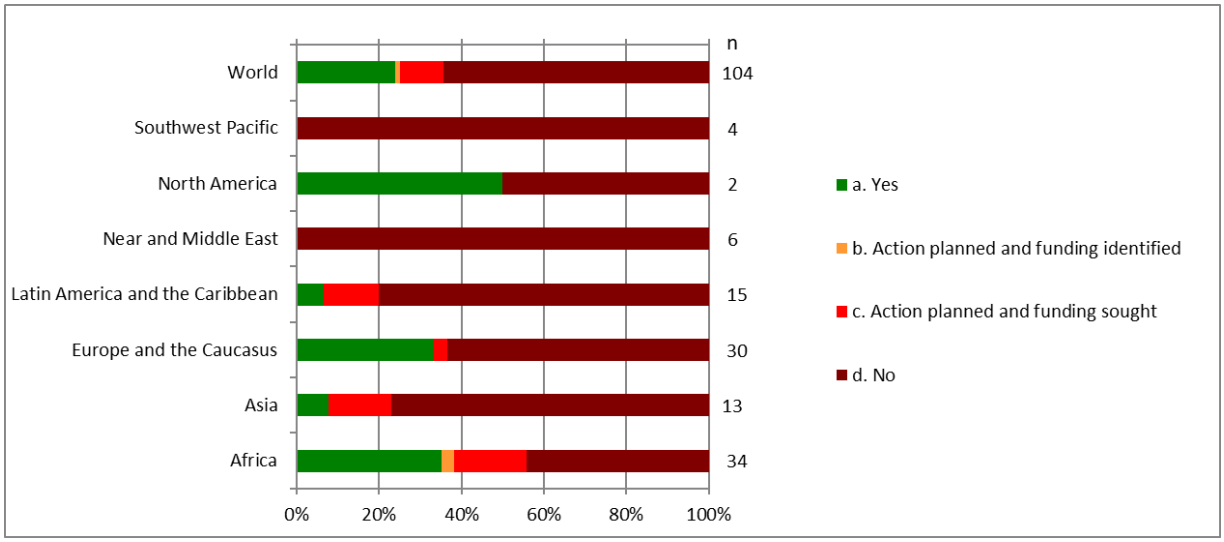
Africa reported information on the PROGEBE[56] project (Project for sustainable management of endemic ruminant livestock in Gambiae, Guinee, Mali and Senegal).

Figure A2.63 Q73. Has your country contributed to the development and implementation of regional *ex situ* conservation programmes for breeds that are at risk (SP 9, Action 2; SP 10, Action 3; SP 10, Action 4)?



Approximately 30 percent of reporting countries have contributed to the development and implementation of regional *ex situ* conservation programmes for breeds that are at risk. Several country reports from the Europe and the Caucasus region mention work on European gene bank networks. Brazil invited research scientists from South American countries to visit its gene bank facility and discuss development of *ex situ* conservation programmes.

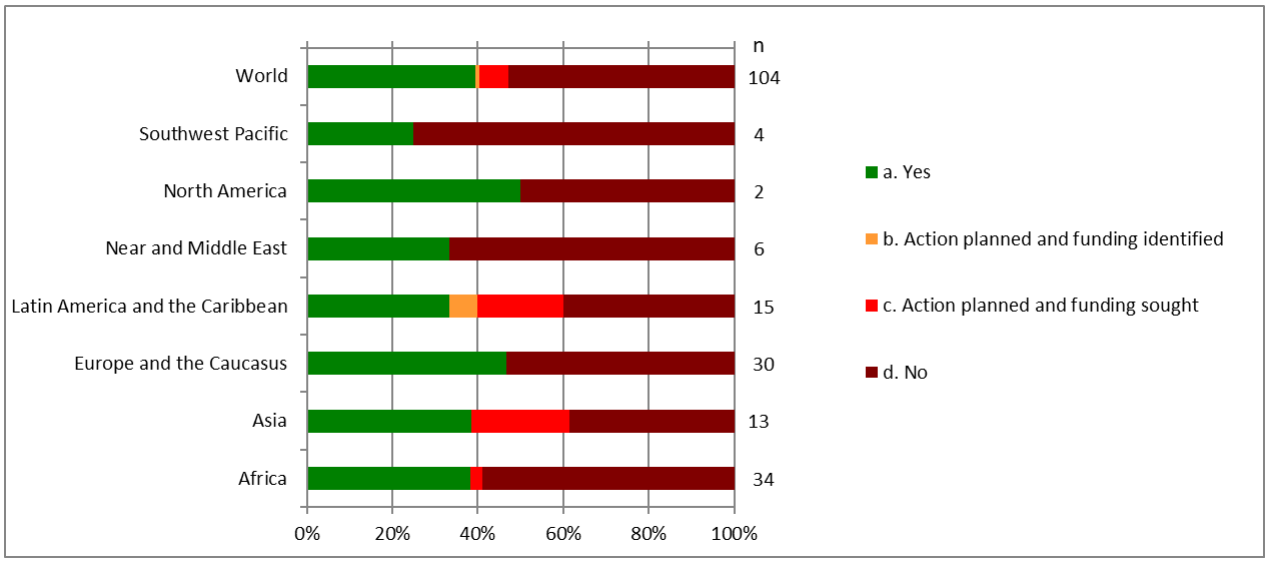
Figure A2.64 Q74. Has your country contributed to the establishment of fair and equitable arrangements for the storage, access and use of genetic material stored in supra-national ex situ gene banks (SP9, Action 3)?



More than 20 percent of reporting countries have contributed to the establishment of fair and equitable arrangements for the storage, access and use of genetic material stored in supra-national *ex situ* gene banks. Although activity is limited, advances have been made since 2014, when less than 10 percent of countries reported work on this topic.

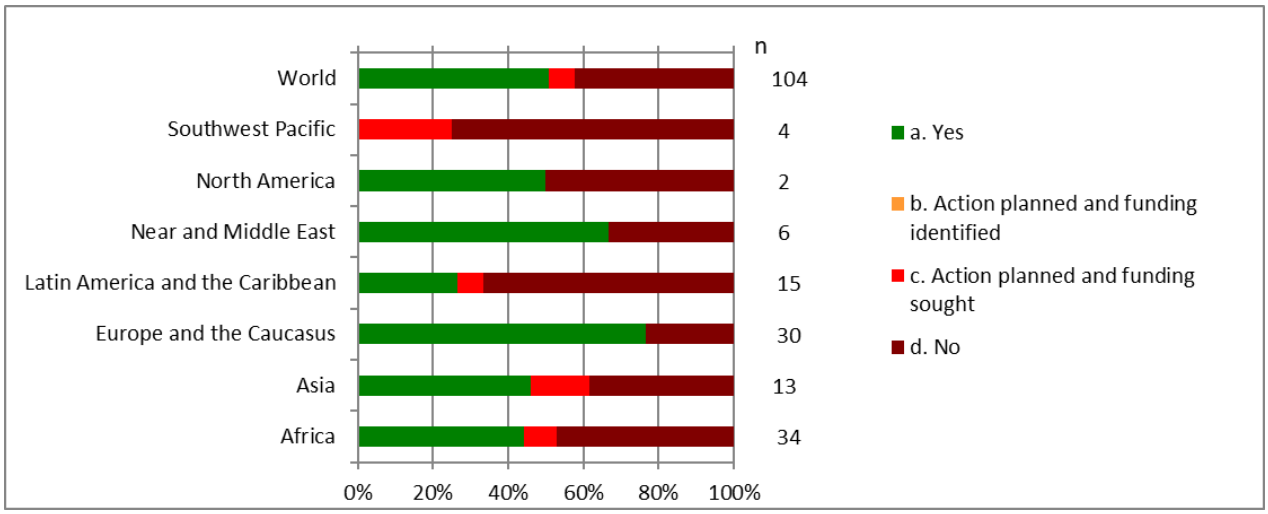
Figure A2.65 Q75. Has your country participated in regional or international campaigns to raise awareness of the status of animal genetic resources (SP19)?

[56] https://www.walic-wa.org/progebe/



Approximately 40 percent of reporting countries participate in regional or international campaigns to raise awareness of the status of animal genetic resources.

Figure A2.66 Q76. Has your country participated in reviewing or developing international policies and regulatory frameworks relevant to animal genetic resources (SP 21)?

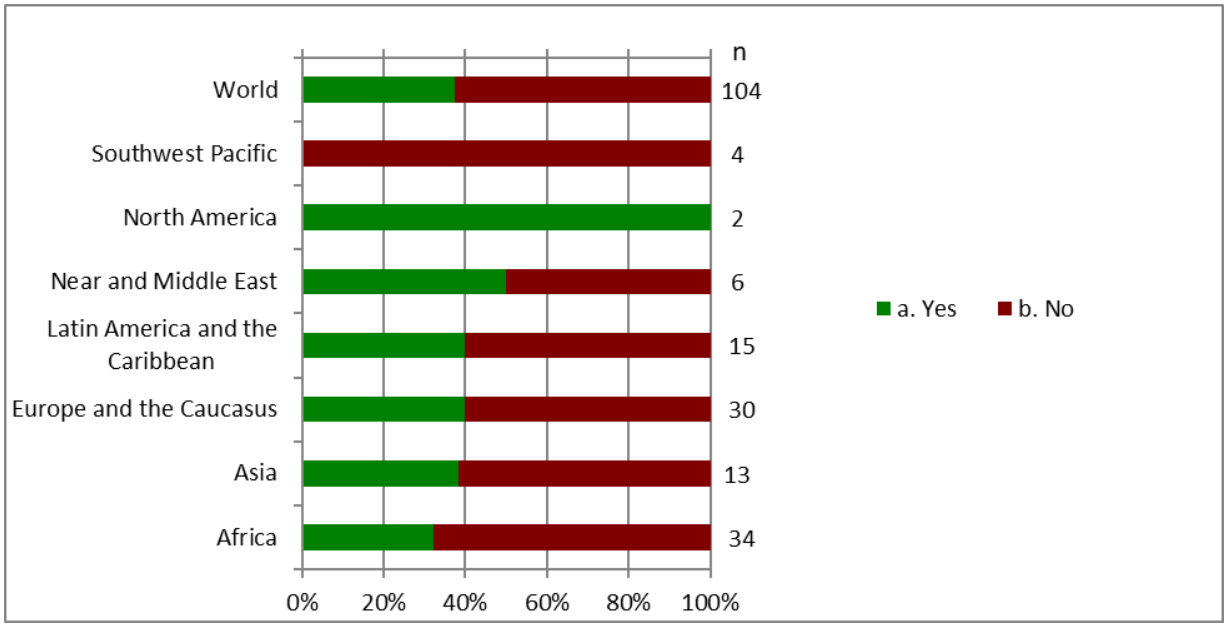


More than 50 percent of reporting countries participate in reviewing or developing international policies and regulatory frameworks relevant to animal genetic resources. The majority of these countries refer to work undertaken under the auspices of FAO, but work at the regional level (e.g. ERFP in Europe, SADC in Southern Africa, AOAD for Arabic countries) also was reported.

Implementation and financing of the Global Plan of Action: funding

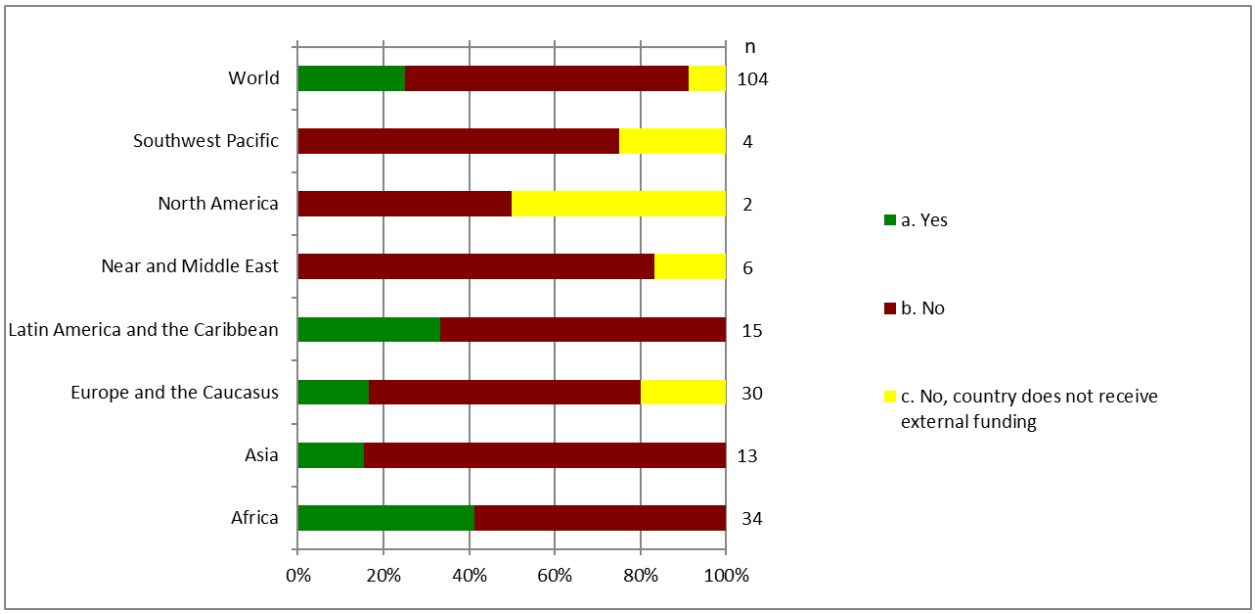
Indicator: The state of funding for the conservation, sustainable use and development of animal genetic resources

Figure A2.67 Q64. Has national funding for animal genetic resources programmes increased since the adoption of the GPA?



National funding for animal genetic resources management has increased since the adoption of the Global Plan of Action in approximately 40 percent of reporting countries. North America and the Near and Middle East are the regions with the highest proportion of countries that have increased funding.

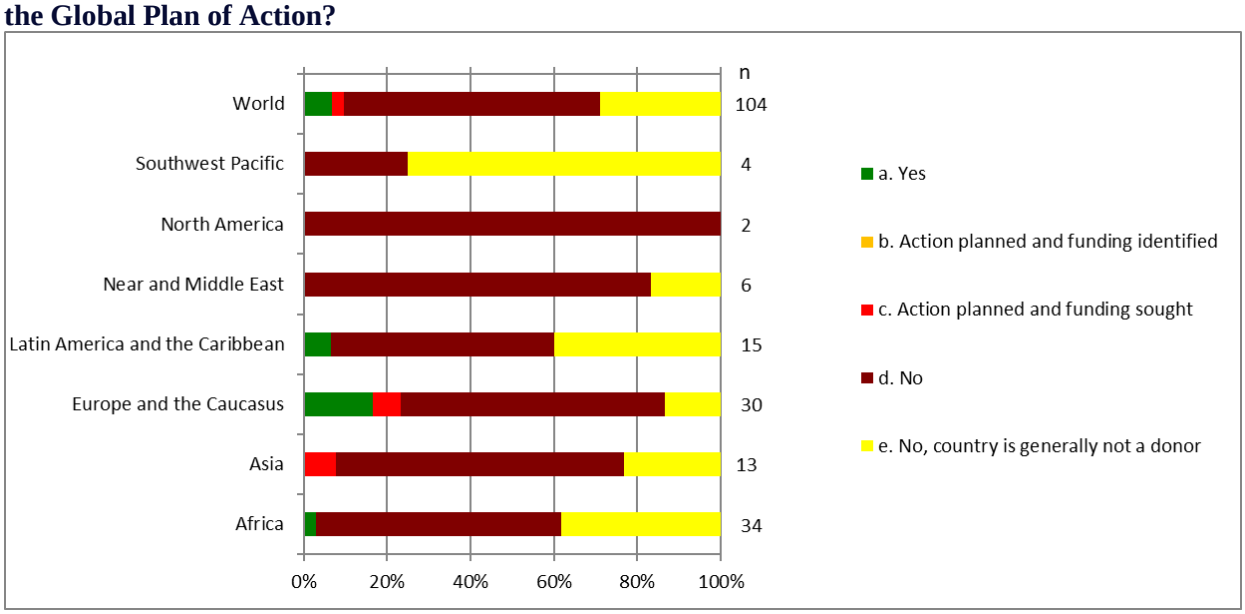
Figure A2.68 Q65. Has your country received external funding for implementation of the Global Plan of Action?



More than 20 percent of reporting countries received external funding for the implementation of the Global Plan of Action. In Africa and Latin America and the Caribbean more than 30 percent of countries reported receiving outside funding for implementation of the Global Plan of Action. No country from either the Near and Middle East or the Southwest Pacific reported receiving external funding. These are also the regions with the lowest overall level of implementation of the Global Plan of Action. Testing

for a potential cause/effect relationship was not possible, however.

Figure A2.69 Q68. Has your country provided funding to other countries for implementation of the Global Plan of Action?



Less than 10 percent of reporting countries have provided funding to other countries for the implementation of the Global Plan of Action. Countries from Europe and the Caucasus were the major donors, although countries in Latin America and the Caribbean and Africa also reported such activities, thus sustaining South-South cooperation.