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COMMISSION ON GENETIC RESOURCES FOR FOOD AND AGRICULTURE

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

Fifth Session

Rome, 28-30 January 2009

STATUS AND TRENDS OF ANIMAL GENETIC RESOURCES – 2008 [1]

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[1] Based on data reported by National Coordinators for the Management of Animal Genetic Resources to DAD-IS by 31st December 2008.

I. INTRODUCTION

1. At its Fourth session, the Intergovernmental Technical Working Group on Animal Genetic Resources for Food and Agriculture (Working Group)[2] stressed the importance of continuing efforts to update and improve data and information on animal genetic resources. It noted that breed inventory and characterization efforts were continuous and dynamic processes, and recommended that the Commission on Genetic Resources for Food and Agriculture (the Commission) request countries to routinely update and enhance data and information on animal genetic resources in order to better understand diversity and status, and trends at all levels.

2. The, Commission, at its Eleventh Regular Session, noted that for the first time ever, *The State of the World's Animal Genetic Resources for Food and Agriculture* provided a comprehensive global assessment of the roles, values and status of animal genetic resources, which highlights the importance of the livestock sector within agriculture. It also noted that there are gaps in information on breed identification, diversity and status, particularly in developing countries, and the special need to strengthen the capacity of developing countries in characterization, inventory and monitoring of breeds.

3. The stated long-term goal of Strategic Priority Area 1, Characterization, Inventory and Monitoring of Trends and Associated Risks, of the *Global Plan of Action of Action for Animal Genetic Resources* (*Global Plan of Action*) is "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."[3] Strategic Priority 1, "Inventory and characterize animal genetic resources, monitor trends and risks associated with them, and establish country-based early-warning and response systems", lists under Action 1: "conduct or complete inventories of the location, population status, trends and characteristics of animal genetic resources", and reinforces the need for up-to-date status and trends data and information.

4. *The Global Plan of Action* recognizes that understanding the diversity, distribution, basic characteristics, comparative performance and the current status of each country's animal genetic resources is essential for their efficient and sustainable use, development and conservation. Complete national inventories, supported by periodic monitoring of trends and associated risks, are a basic requirement for the effective management of animal genetic resources. Without such information, some breed populations and their unique characteristics may decline significantly, or be lost, before their value is recognized and measures taken to conserve them.

5. The *Global Plan of Action* notes that it will be necessary to periodically assess the status and trends of animal genetic resources, especially in light of the large number of breeds that are at risk of being lost and that "the Commission on Genetic Resources for Food and Agriculture should regularly receive, from countries, status and trends reports on national animal genetic resources and factors influencing change, in order to review progress and further develop country-based early-warning and response systems for animal genetic resources."[4]

6. The *Global Plan of Action* calls for FAO to strengthen the Domestic Animal Diversity Information System (DAD-IS) and the Global Databank for Animal Genetic Resources for Food and Agriculture to obtain, evaluate and condense information from national databases and monitoring systems, and distribute this information, highlighting threats and needs. Up-to-date data and information on animal genetic resources will enable FAO to contribute to global biodiversity assessments. For example, FAO as a partner to the 2010 Biodiversity Indicators

[2] http://www.fao.org/ag/againfo/programmes/en/genetics/documents/ITWG4_en.pdf
[3] *Global Plan of Action for Animal Genetic Resources*, paragraph 26.
[4] *Global Plan of Action for Animal Genetic Resources,* paragraph 53.

Partnership project has been requested to contribute information and analysis to the next edition of the publication *Biodiversity Outlook* produced by the Convention on Biological Diversity.[5]

7. The Commission, at its Eleventh Regular Session, requested that the Working Group recommend the form and content of future status and trends reports on animal genetic resources, and options for responding to the identification of breeds at risk.

8. The current document presents a status and trends synthesis report as outlined in the document *Format and content of future status and trends reports on animal genetic resources*[6]. The analysis is based on FAO's Global Databank for Animal Genetic Resources for Food and Agriculture, as it is the only such resource that provides worldwide coverage. It updates (in condensed form) the data published in the third edition of the World Watch List for Domestic Animal Diversity (WWL–DAD:3)[7] published in 2000 and in *The State of the World's Animal Genetic Resources for Food and Agriculture*[8] published in 2007. The document begins by describing the state of reporting on animal genetic resources, and the progress made during the reporting period. A description of the current regional distribution of livestock species and breeds is then presented, followed by an overview of the risk status of the world's livestock breeds. Finally, trends in risk status over the reporting period are assessed. The annexes to the document provide a detailed breakdown of the status of data entry by country and region. Countries can use this information to review their progress and assess where they stand in relation to other countries in the region.

II. STATE OF REPORTING

9. The Global Databank for Animal Genetic resources currently contains data from 181 countries and 37 species. The total number of breed records in the Global Databank for Animal Genetic Resources has increased greatly since the publication of the WWL–DAD:3 (Table 1). The total number of entries rose from 6 379 in December 1999 to 14 017 in January 2006. The increase was particularly marked in the case of avian breed populations, for which the number of records increased from 1 049 to 3 505. While the number of breeds recorded has increased, the percentage of breeds for which population data are available, decreased from 77 to 39 percent for avian breeds, and from 63 to 43 percent for mammalian breeds during the period 2000–2006. This large decline can largely be explained by the fact that during the period in question many of the breeds entered into the Global Databank were extracted from the Country Reports on animal genetic resources submitted to FAO during the preparation of *The State of the World's Animal Genetic Resources for Food and Agriculture*. In many cases, no details of the population size for these breeds were included in the Country Reports. By the end 2008 the figures have changed slightly (10 550 mammalian and 3 450 avian entries compared to 10 512 and 3 505, respectively, in 2006). These changes are due to corrections made by National Coordinators.

10. In comparison to 2006 it is important to note a significant increase in the percentage of breeds for which population data are available – from 39 to 47 percent for birds and from 43 to 52 for mammals (Table 1 and Figure 1). The majority of this recent reporting has occurred in Europe and Caucasus region (the number of records with population data increased by 865, while the number of records without population data decreased by 80). Some updates have occurred in Africa (83 more records with population data than in 2006 and 28 more records without population data) and Asia (78 more records with population data then in 2006 and 17 more records without population data). The pre-eminence of the European region in terms of updating

[5] COP9 decision IX/10 (http://www.cbd.int/decisions/cop9/?m=COP-09&id=11653&lg=0).
[6] CGRFA/WG-AnGR-5/09/3.2. (http://www.fao.org/ag/againfo/programmes/en/genetics/documents/ITWG_AnGR_5_09_3_2.pdf).
[7] FAO/UNEP 2000. *World watch list for domestic animal diversity*, 3rd edition, edited by B.D. Scherf, Rome. (available at http://www.fao.org/docrep/009/x8750e/x8750e00.HTM).
[8] http://www.fao.org/docrep/010/a1250e/a1250e00.htm

data is the effect of the establishment of European regional and country nodes of the FABISnet network[9].

[9] http://www.fao.org/ag/againfo/programmes/en/genetics/documents/ITWG_AnGR_5_09_3_2.pdf

TABLE 1

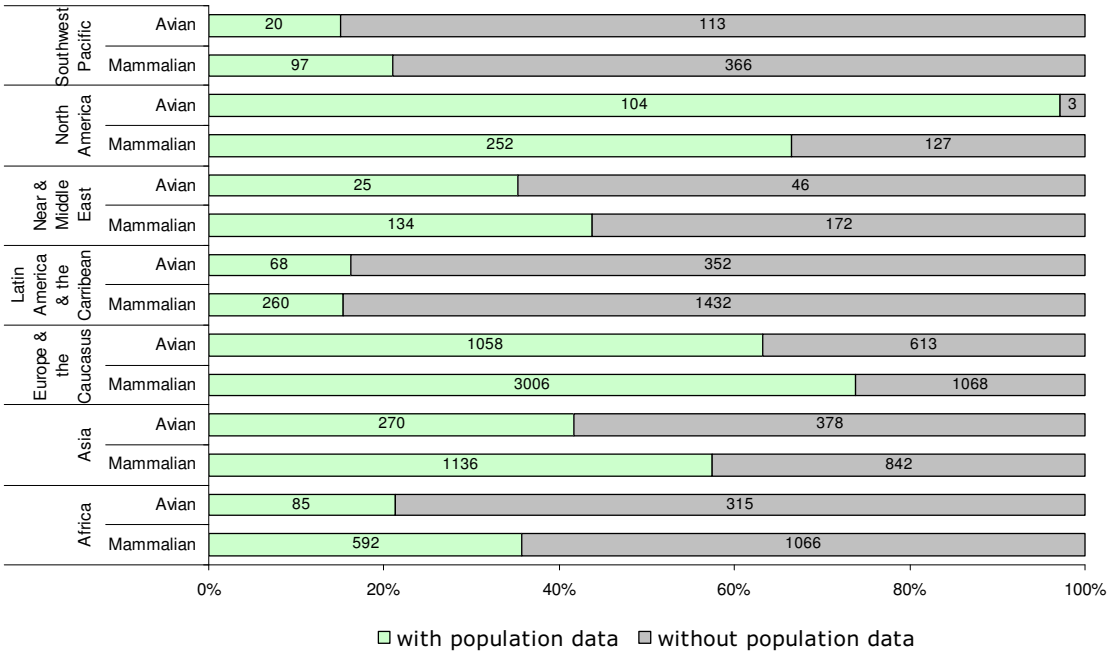
Status of information recorded in the Global Databank for Animal Genetic Resources

Year of analysis	Mammalian species		Avian species		Countries covered
	Number of national breed populations	% with population data	Number of national breed populations	% with population data	
1993	2719	53	-		131
1995	3019	73	863	85	172
1999	5330	63	1049	77	172
2006	10512	43	3505	39	181
2008	**10550**	**52**	**3450**	**47**	181

No data recorded for Andorra, Brunei Darussalam, Gaza Strip, Holy See, Liechtenstein, Marshall Islands, Federated States of Micronesia, Monaco, Montenegro, Nauru, Qatar, San Marino, Singapore, Timor-Leste, United Arab Emirates, West Bank, Western Sahara.

FIGURE 1

Proportion of national breed populations for which population figures have been reported[10]



[10] The regions used throughout this document correspond to those used in *The State of the World's Animal Genetic Resources for Food and Agriculture*.

III. BREED DIVERSITY

11. A global total of 8 091 (compared to 7 616 in 2006) breeds have been reported; 7040 (compared to 6 536 in 2006) are local breeds and 1 051 (compared to 1 080 in 2006) are transboundary breeds. Among the transboundary breeds, 500 (compared to 523 in 2006) are regional transboundary breeds occurring only in one region (1 322 national-level entries); and 551 (compared to 557 in 2006) are international transboundary breeds with a wider distribution (5 435 national-level entries). A total of 695 (compared to 690 in 2006) breeds are classified as extinct, of which 7 (compared to 9 in 2006) are transboundary breeds. In the following analysis of breed diversity, extinct breeds are excluded.

12. Figure 3 shows the share of local, regional transboundary and international transboundary breeds among the mammalian and avian breeds of the world. More than two-thirds of reported breeds belong to mammalian species. The numbers of regional and international transboundary breeds are quite similar in mammalian species, while in avian species there are twice as many international transboundary breeds as there are regional transboundary breeds.

13. In all regions of the world, mammalian breeds outnumber avian breeds. In all regions except for Europe and the Caucasus, mammalian breeds make up nearly three-quarters of all breeds reported. There is, however, considerable variation between regions in terms of the share of the three breed categories in the total number of breeds (Figure 4). In Europe and the Caucasus, Asia, and the Near and Middle East, local breeds make up about three-quarters of all breeds. In Africa, and Latin America and the Caribbean, the share of local breeds is smaller, but still exceeds 60 percent of all breeds. Conversely, international transboundary avian and mammalian breeds dominate in the Southwest Pacific and North America.

14. Regional transboundary mammalian breeds are relatively numerous in Europe and the Caucasus, Africa, and to lesser extent Asia, while it is only in Europe and the Caucasus that there are a significant number of regional transboundary avian breeds.

FIGURE 2

Number of local and transboundary breeds at global level

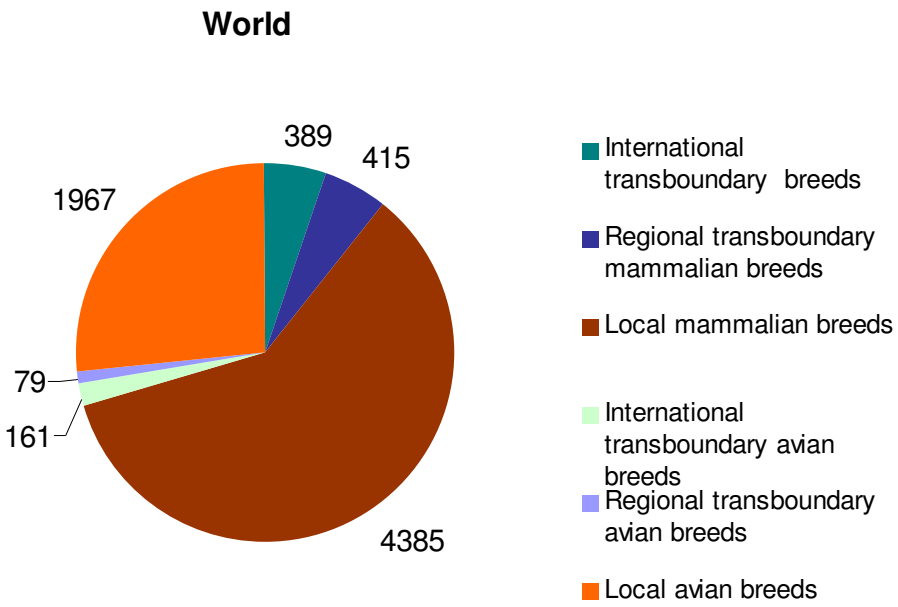
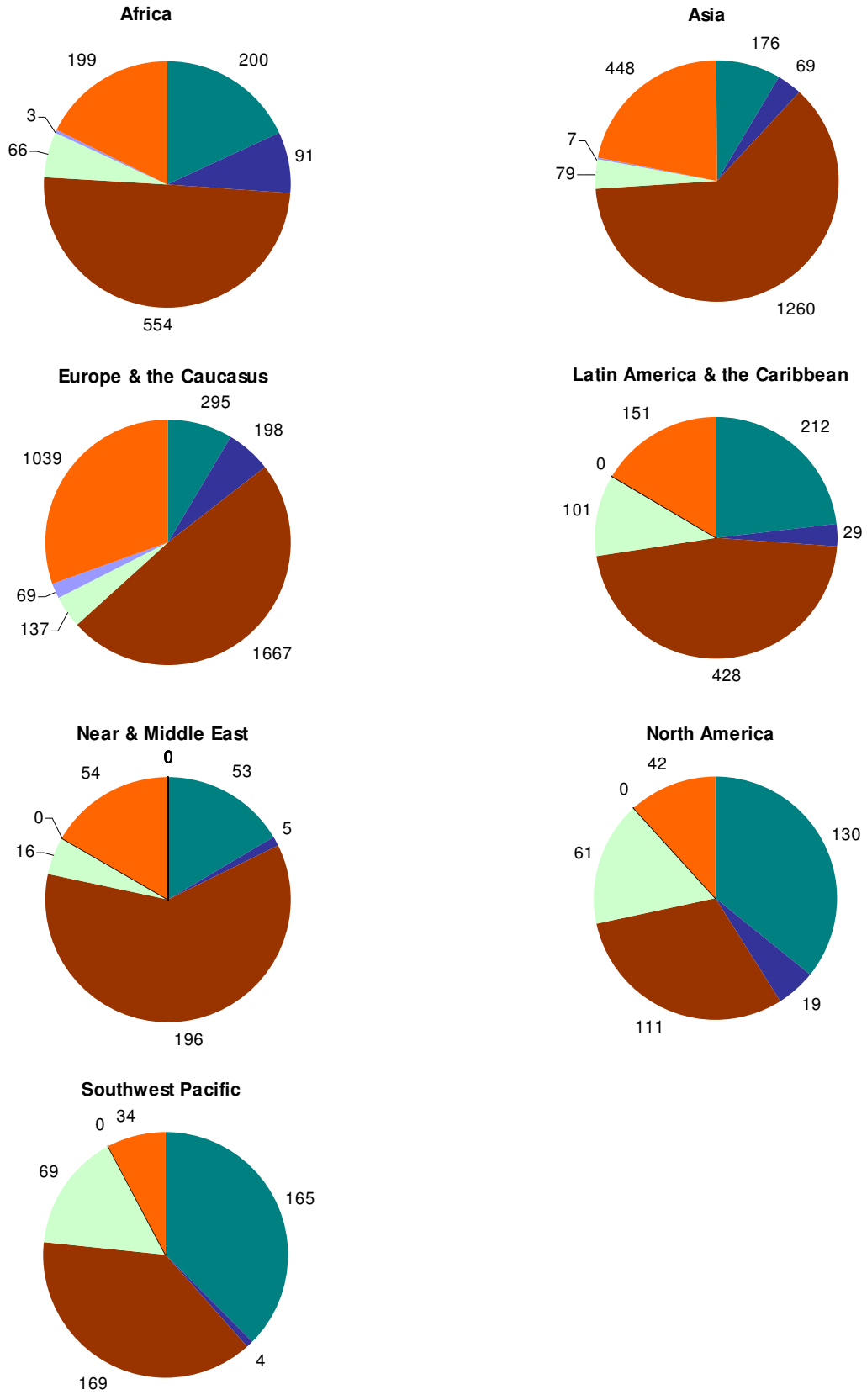


FIGURE 3

Number of local and transboundary breeds at regional level



Note that for these figures international transboundary breeds are counted once in each region, where they occur. Thus, international transboundary breeds are counted more than once. The figures show the number of breeds belonging to each group present in the respective region.

15. Tables 2 and 3, respectively, show the number of local breeds of mammalian and avian species for each region of the world. For most livestock species, Europe and the Caucasus or Asia are the regions that have the highest number of local breeds. The dromedary, with most breeds located in Africa and the Near and Middle East, is an exception to this pattern.

TABLE 2

Mammalian species – number of reported local breeds

Species	Africa	Asia	Europe & the Caucasus	Latin America & the Caribbean	Near & Middle East	North America	South west Pacific	World
Ass	19	39	45	22	16	5	3	149
Bactrian camel	0	8	2	0	0	0	0	10
Buffalo	2	88	12	11	8	0	2	123
Cattle	168	240	313	132	43	29	27	952
Dromedary	46	13	1	0	23	0	2	85
Goat	91	183	176	28	34	4	11	527
Guinea Pig	4	0	0	12	0	0	0	16
Horse	38	141	275	75	14	22	22	587
Pig	51	230	181	67	1	18	63	611
Rabbit	11	16	123	17	5	0	0	172
Sheep	117	265	508	50	52	32	38	1062
Yak	0	26	2	0	0	0	0	28
Total	547	1249	1638	414	196	109	169	4322

Excludes extinct breeds. Not shown: alpaca, deer, dog, dromedary × Bactrian camel, guanaco, guinea pig, llama, vicuña.

TABLE 3

Avian species – number of reported local breeds

Species	Africa	Asia	Europe & the Caucasus	Latin America & the Caribbean	Near & Middle East	North America	South west Pacific	World
Chicken	107	253	745	87	35	15	16	1258
Duck	14	80	87	22	4	1	7	215
Goose	10	40	104	5	2	0	2	163
Muscovy duck	5	9	6	1	1	0	2	24
Ostrich	6	2	4	0	0	0	1	13
Partridge	2	8	3	0	0	0	0	13
Pheasant	0	7	5	6	0	0	0	18
Pigeon	7	12	30	7	8	1	2	67
Turkey	11	11	32	11	3	11	3	82
Total	162	422	1016	139	53	28	33	1853

Excludes extinct breeds. Not shown: cassowary, Chilean tinamou, duck × Muscovy duck, emu, guinea fowl, ñandu, peacock, quail, swallow.

16. For several mammalian species, including sheep, horses and pigs, Europe and the Caucasus, has the highest number of regional transboundary breeds. As Table 4 shows, Africa has a relatively large share of regional transboundary breeds in most of these species. Moreover, Africa is dominant in terms of the numbers of regional transboundary breeds of cattle, goats and asses. Europe and the Caucasus, however, has by far the highest number of regional transboundary breeds among avian species (Table 5). The existence of significant numbers of regional transboundary breeds clearly has implications for management and conservation of AnGR, and highlights the need for cooperation at regional or subregional levels.

TABLE 4

Mammalian species – number of reported regional transboundary breeds

Species	Africa	Asia	Europe & the Caucasus	Latin America & the Caribbean	Near & Middle East	North America	South west Pacific	World
Ass	3	3	1	1	0	0	0	8
Buffalo	0	8	1	1	0	0	0	10
Cattle	35	20	24	7	1	3	0	90
Deer	0	1	1	0	0	0	0	2
Dromedary	1	1	0	0	0	0	0	2
Goat	15	11	12	2	0	5	1	46
Guinea Pig	0	0	0	1	0	0	0	1
Horse	7	10	36	4	0	4	0	61
Pig	2	2	17	4	0	1	0	26
Rabbit	3	0	32	1	0	0	0	36
Sheep	25	13	74	3	4	6	3	128
South American camelids	0	0	0	5	0	0	0	5
Total	91	69	198	29	5	19	4	415

Excluding extinct breeds.

TABLE 5

Avian species – number of reported regional transboundary breeds

Species	Africa	Asia	Europe & the Caucasus	Latin America & the Caribbean	Near & Middle East	North America	South west Pacific	World
Chicken	3	3	43	0	0	0	0	49
Duck	0	2	12	0	0	0	0	14
Goose	0	1	7	0	0	0	0	8
Quail	0	1	0	0	0	0	0	1
Turkey	0	0	7	0	0	0	0	7
Total	3	7	69	0	0	0	0	79

Excluding extinct breeds.

17. Cattle, sheep, horses and chickens are the species that have the highest numbers of international transboundary breeds (Tables 6 and 7).

TABLE 6

Mammalian species – number of reported international transboundary breeds

Species	Number of breeds
Ass	5
Bactrian Camel	2
Buffalo	5
Cattle	110
Deer	10
Dromedary	2
Goat	38
Horse	63
Pig	32
Rabbit	23
Sheep	99
Total	389

Excluding extinct breeds.

TABLE 7

Avian species – number of reported international transboundary breeds

Species	Number of breeds
Cassowary	1
Chicken	106
Duck	12
Emu	1
Goose	15
Guinea fowl	5
Muscovy duck	1
Ostrich	3
Pigeon	1
Turkey	16
Total	161

Excluding extinct breeds.

IV. RISK STATUS OF ANIMAL GENETIC RESOURCES

18. A total of 1 649 breeds (20 percent) are classified as being at risk (compared to 1 491 in 2006). Figure 4 shows that for mammalian species, the proportion of breeds classified as at risk is lower overall (16 percent) than for avian species (31 percent). However, in absolute terms, the number of breeds at risk is higher for mammalian species (931 breeds) than for avian species (718 breeds). Figure 5 presents risk status data for mammalian species. It can be seen that cattle are the mammalian species with the highest number of breeds at risk. However, horses (22 percent) followed by rabbits (21 percent) and pigs (17 percent) are the species that have the highest proportions of at-risk breeds. Figure 6 also indicates the large number of breeds for which no risk status data are available. The problem is particularly significant in some species – 67 percent for deer breeds, 66 percent for rabbits, 59 percent for asses and 58 percent for dromedaries. This lack of data is a serious constraint to effective prioritization and planning of breed conservation measures. Cattle are the species with the highest number of breeds (199) reported as extinct. Large numbers of extinct pig, sheep and horse breeds are also reported. There is, however, clearly a possibility that there were breeds that became extinct before they were documented, and which are therefore missing from the analysis.

19. Among avian species, chickens have by far the highest number of breeds at risk on a world scale (Figure 7). In the majority of avian species more than 24 percent of breeds are classified as at risk (guinea fowl and partridge are the only exceptions). In the case of chickens, geese, turkeys, quail, pigeons and ostrich, the proportion is close to one-third. As in the case of mammalian species, there are a large number of breeds for which population figures are unavailable. Extinct breeds have mainly been reported among chickens. There are also a few cases among ducks, guinea fowl and turkeys. Figures 7 and 8 show the distribution of breeds at risk by region for mammalian and avian species, respectively.

20. The regions with the highest proportion of their breeds classified as at risk are Europe and the Caucasus (29 percent of mammalian breeds and 50 percent of avian breeds) and North America (19 percent of mammalian breeds and 81 percent of avian breeds). Europe and the Caucasus, and North America are the regions that have the most highly specialized livestock industries, in which production is dominated by a small number of breeds. In absolute terms, Europe and the Caucasus has by far the highest number of at-risk breeds. Despite the apparent dominance of these two regions, problems in other regions may be obscured by the large number of breeds with unknown risk status. In Latin America and the Caribbean 68 percent and 84 percent of mammalian and avian breeds, respectively, are classified as being of unknown risk status; the respective figures for the Southwest Pacific region are 76 percent for mammals and 68 percent for birds, and for Africa 59 percent for mammals and 60 percent for birds.

FIGURE 4

Proportion of the world's breeds by risk status category

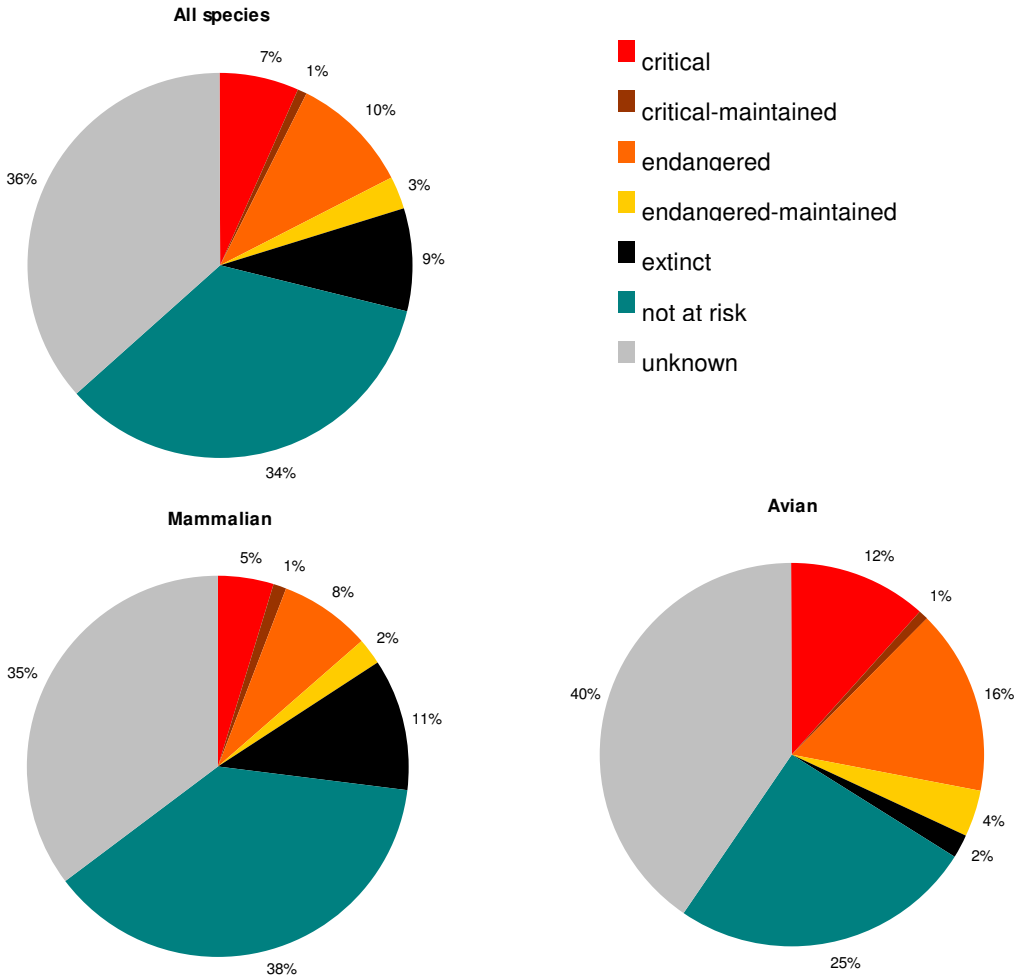
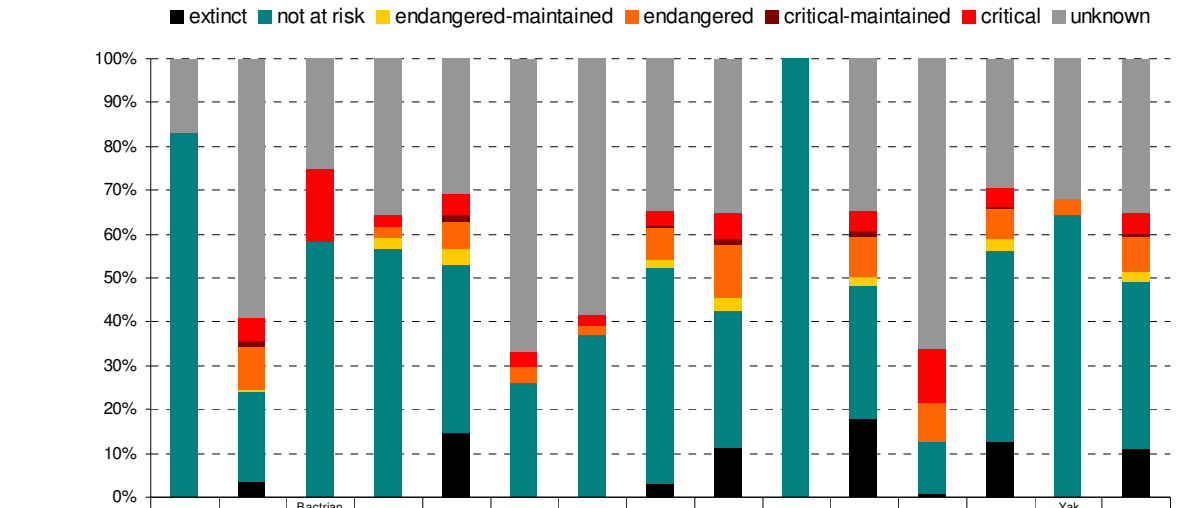


FIGURE 5

Risk status of the world's mammalian breeds in December 2008: absolute (table) and percentage (chart) figures by species

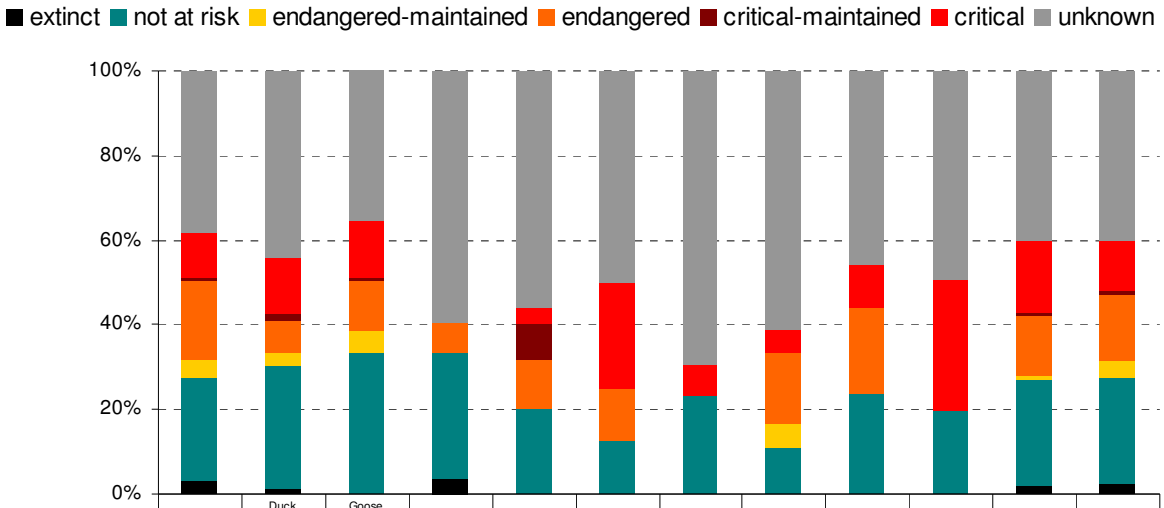


	Alpaca	Ass	Bactrian Camel	Buffalo	Cattle	Deer	Dromedary	Goat	Horse	Llama	Pig	Rabbit	Sheep	Yak (domestic)	Total
unknown	1	99	3	49	418	18	52	218	281	0	284	154	433	9	2019
critical	0	9	2	4	62	1	2	21	49	0	35	29	64	0	278
critical-maintained	0	2	0	0	22	0	0	4	10	0	13	0	5	0	56
endangered	0	17	0	3	85	1	2	45	98	0	72	21	103	1	448
endangered-maintained	0	1	0	4	49	0	0	11	23	0	18	0	37	0	143
not at risk	5	34	7	78	516	7	33	312	250	5	247	27	647	18	2186
extinct	0	6	0	0	199	0	0	18	91	0	146	2	183	0	645
Total	**6**	**168**	**12**	**138**	**1351**	**27**	**89**	**629**	**802**	**5**	**815**	**233**	**1472**	**28**	**5775***

* The total number of breeds is actually higher than the number shown, as Bactrian camel × dromedary crosses, guanacos, vicuñas, guinea pigs and dogs (of which there are a total of 59 reported breeds) are not included.

FIGURE 6

Risk status of the world's avian breeds in December 2008: absolute (table) and percentage (chart) figures by species

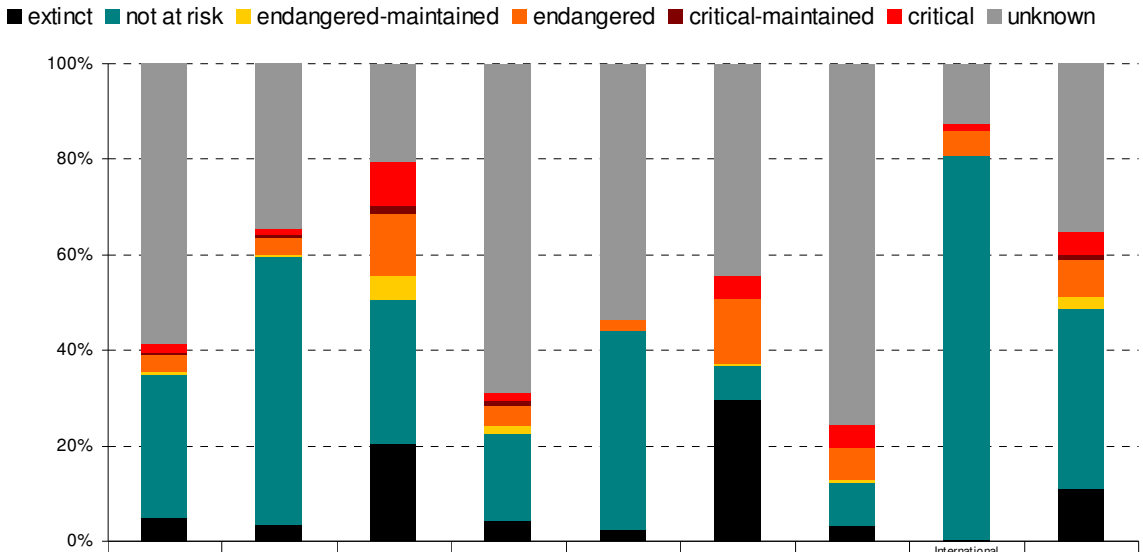


	Chicken	Duck (domestic)	Goose (domestic)	Guinea fowl	Muscovy duck	Ostrich	Partridge	Pheasant	Pigeon	Quail	Turkey	Total
unknown	556	108	66	32	14	8	9	11	31	25	43	903
critical	154	32	25	0	1	4	1	1	7	16	18	259
critical-maintained	13	4	1	0	2	0	0	0	0	0	1	21
endangered	270	18	22	4	3	2	0	3	14	0	15	351
endangered-maintained	63	8	10	0	0	0	0	1	0	0	1	83
not at risk	357	71	62	16	5	2	3	2	16	10	27	571
extinct	43	3	0	2	0	0	0	0	0	0	2	50
Total	**1456**	**244**	**186**	**54**	**25**	**16**	**13**	**18**	**68**	**51**	**107**	**2238***

* The total number of breeds is actually higher than the number shown, as duck × Muscovy duck crossings, Chilean tinamou, cassowaries, emus, ñandus, peacocks and swallows (of which there are a total of 19 reported breeds) are not included.

FIGURE 7

Risk status of the world's mammalian breeds in December 2008: absolute (table) and percentage (chart) figures by region

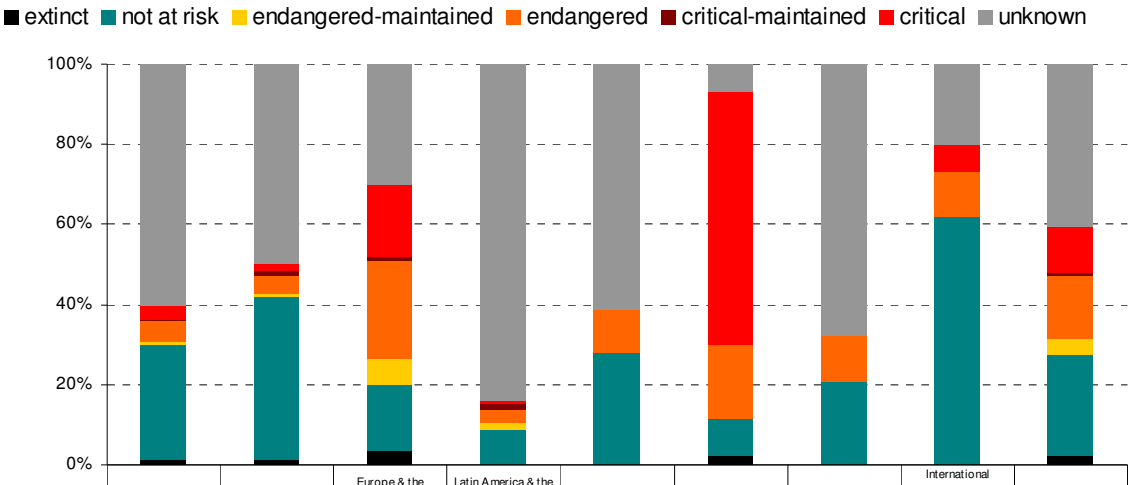


	Africa	Asia	Europe & the Caucasus	Latin America & the Caribbean	Near & Middle East	North America	Southwest Pacific	International transboundary breeds	World
unknown	399	476	480	329	110	82	135	49	2060
critical	13	17	215	9	0	9	9	6	278
critical-maintained	1	8	43	4	0	0	0	0	56
endangered	25	49	298	20	5	25	12	20	454
endangered-maintained	4	4	125	8	0	1	1	0	143
not at risk	203	775	704	87	86	13	16	314	2198
extinct	34	45	478	21	5	55	6	1*	645
Total	**679**	**1374**	**2343**	**478**	**206**	**185**	**179**	**390**	**5834**

*African Aurochs, which once lived in parts of both the Africa and the Near and Middle East regions.

FIGURE 8

Risk status of the world's avian breeds in December 2008: absolute (table) and percentage (chart) figures by region



	Africa	Asia	Europe & the Caucasus	Latin America & the Caribbean	Near & Middle East	North America	Southwest Pacific	International transboundary breeds	World
unknown	123	228	345	127	33	3	23	32	914
critical	7	8	208	1	0	27	0	11	262
critical-maintained	1	7	11	2	0	0	0	0	21
endangered	10	20	281	5	6	8	4	18	352
endangered-maintained	2	4	74	3	0	0	0	0	83
not at risk	59	188	189	13	15	4	7	100	575
extinct	2	5	42	0	0	1	0	0	50
Total	**204**	**460**	**1150**	**151**	**54**	**43**	**34**	**161**	**2257**

21. Tables 8 and 9 present the number of extinct mammalian and avian breeds by species and region. Europe and the Caucasus has by far the largest number of extinct mammalian and avian breeds – 16 percent of all reported breeds are extinct. However, it is the North America region that has the highest proportion of extinct breeds (25 percent) among its recorded breeds. The dominance of North America, and Europe and the Caucasus in terms of the numbers of extinct breeds, may relate to the greater levels of breed recording that have taken place in these two regions. The year of extinction has been reported for only 27 percent (187) of extinct breeds. Fifteen breeds became extinct before the year 1900, 112 between 1900 and 1999, and within the last eight years another 60 breeds became extinct (Table 10).

TABLE 8

Number of extinct mammalian breeds

Species	Africa	Asia	Europe & the Caucasus	Latin America & the Caribbean	Near & Middle East	North America	South west Pacific	International transboundary breeds	World
Ass	1	0	4	0	1	0	0	0	6
Cattle	22	18	131	19	1	5	2	1	199
Goat	0	2	15	0	0	1	0	0	18
Horse	6	1	75	0	0	8	1	0	91
Pig	0	13	102	2	0	28	1	0	146
Rabbit	0	0	0	0	2	0	0	0	2
Sheep	5	11	151	0	1	13	2	0	183
Total	34	45	478	21	5	55	6	1	645

TABLE 9

Number of extinct avian breeds

Species	Africa	Asia	Europe & the Caucasus	Latin America & the Caribbean	Near & Middle East	North America	South west Pacific	World
Chicken	0	5	37	0	0	1	0	43
Duck	0	0	3	0	0	0	0	3
Guinea fowl	2	0	0	0	0	0	0	2
Turkey	0	0	2	0	0	0	0	2
Total	2	5	42	0	0	1	0	50

TABLE 10

Years of extinction

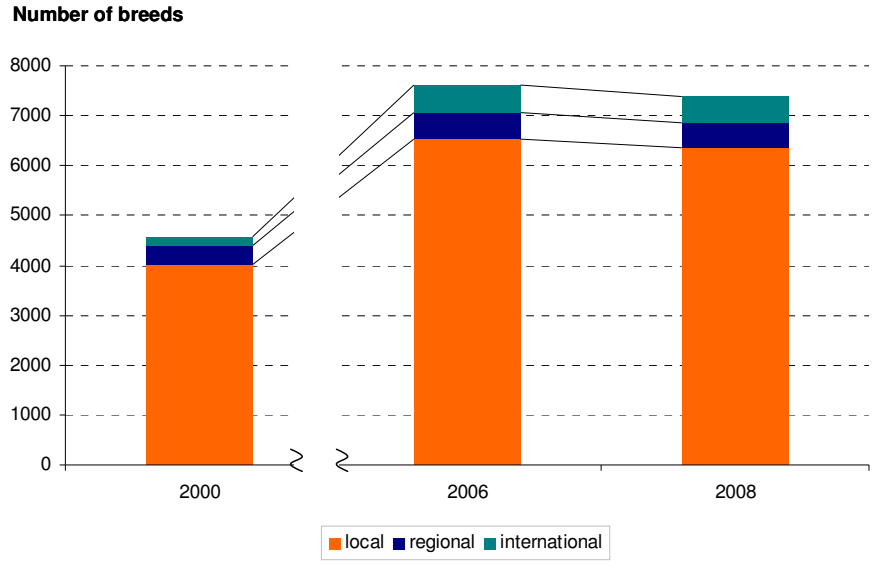
Year	Number of breeds	%
unspecified	508	73
before 1900	15	2
1900-1999	112	16
after 1999	60	9
Total	695	100

V. TRENDS IN BREED STATUS

22. This section describes the changes in the numbers of breeds within each of the breed categories (local, regional transboundary and international transboundary) over the period between January 2006 and December 2008. The share of international transboundary breeds remained at 7 percent during this period, with a slight reduction in the absolute numbers (from 557 to 551 breeds). This was accompanied by a slight decrease in the proportions of regional transboundary – from 7 to 6 percent (absolute figures decreased from 523 to 500 breeds) and local breeds (absolute figures grew from 6 536 to 7040 breeds) (Figure 9). The changes can largely be accounted for by improved reporting.

FIGURE 9

Local, regional and international breeds in 2000 and 2008



VI. TRENDS IN GENETIC EROSION

23. Where trends in genetic erosion are concerned, comparison of the data from 2006 and 2008 shows a slight reduction in the proportion of breeds assigned to the unknown, at risk and extinct risk categories, which implies an increase in the proportion of breeds classified as being not at risk.

24. Over the 1999 to 2006 period, 20 percent of the local breeds previously classified as being of unknown status were assigned to known risk status categories (Figure 11) – an indication of improved reporting. By the end of 2008 the number of breeds in all the risk categories increased. The highest growth was among in breeds classified as at risk (13 percent of the gain relative to the year 2006), then breeds assigned to the unknown risk category (8 percent). The number of extinct local breeds increased by seven but it this may be caused by the simultaneous change in the number of extinct transboundary breeds (reduction from nine to seven).

FIGURE 10

Changes in risk status of transboundary breeds from 2000 to 2008

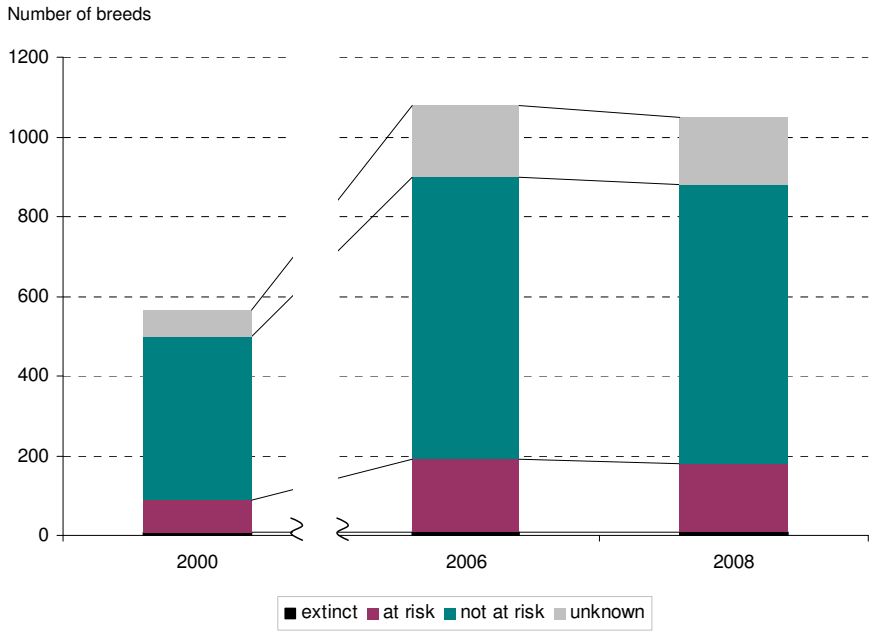


FIGURE 11

Changes in the risk status of local breeds from 2006 to 2008

VII. CONCLUSIONS

25. During the period from 2006 to 2008 the coverage of breed diversity in the Global Databank was further improved. However, breed-related information remains far from complete. For more than one-third of all reported breeds, risk status is not known because of missing population data. In Africa and the Southwest Pacific, for example, population size has not been reported for over two-thirds of breed populations. The completeness of data by country is shown in Annex 2.

26. The slight changes in the number of local and transboundary breeds are caused mainly by correction of the assignment of national populations to transboundary breeds. The transboundary breed can be shifted from international to regional or vice versa simply by removal or insertion of a national population in one or more regions. The same can occur because of the establishment of a link between one or more national populations and a transboundary breed. It should be noted that any change in one national population can also affect the risk classification of a given transboundary or local breed. All above have impact on counting breeds in terms of risk statuses by species, regions, etc.

27. In summary, there is a need for National Coordinators for the Management of Animal Genetic Resources to check, edit, correct and update their data, particularly complete the breed descriptions and update population data regularly. Historic data should also be entered, as this enables the calculation of trends in breed population size and structure. Reviewing the linkages of national breed populations to transboundary breeds is particularly important, as this affects the analysis of risk status at national, regional and global levels.

Annex 1: Status of population data reported by each country and region

1.1. Africa

1.2. Asia

1.3. Europe and the Caucasus

1.4. Latin America and the Caribbean

1.5. Near and Middle East

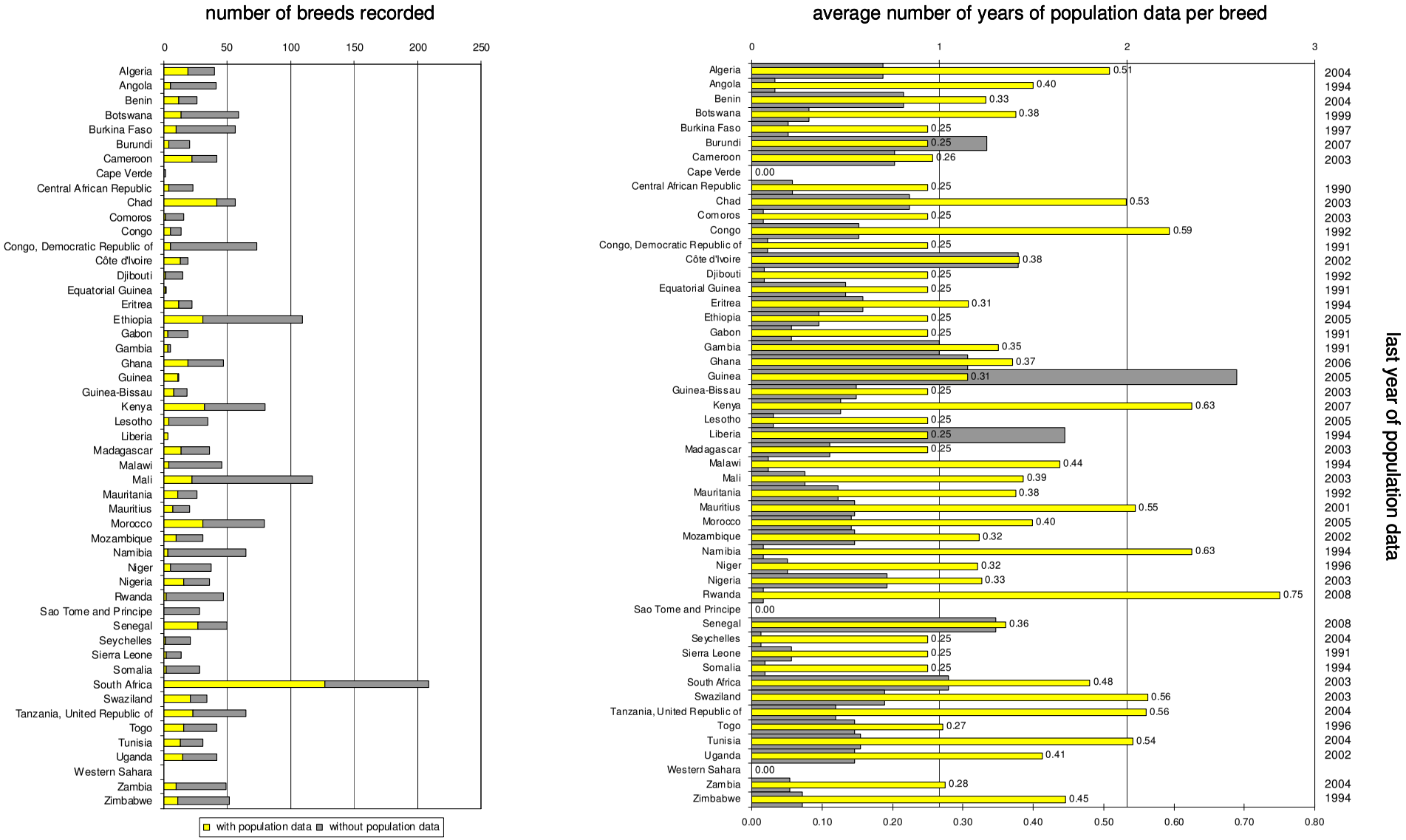
1.6. North America

1.7. Southwest Pacific

This annex allows countries to view the state of completeness of their breed population data in DAD-IS. They can also see how their progress in entering population data compares to that of other countries in their respective regions.

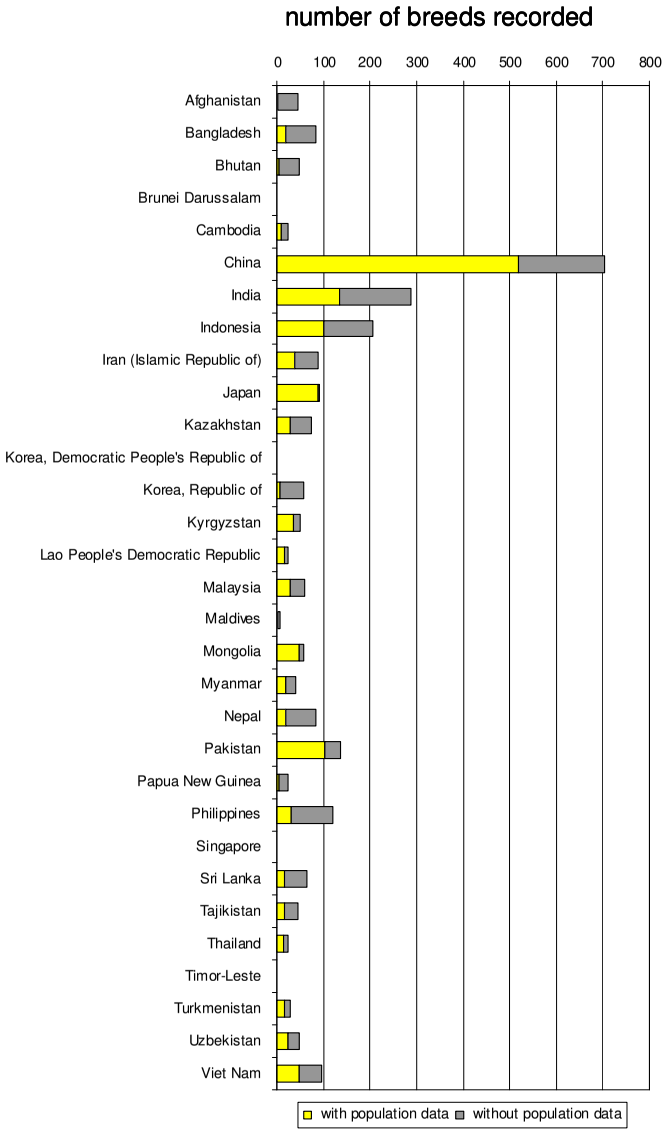
Two graphics are presented for each region. The first shows the number of breeds for which population data have been recorded and the number of breeds that have been entered into the system but for which no population data have yet been recorded. The second graphic presents two further measures of data completeness: the average number of years for which population has been reported per breed and the "population data index". The latter relates only to breeds for which some population data have been entered – it represents the fraction of selected population data fields (population, size, number of breeding females, number of breeding males, and the percentage of females bred to males of the same breed) that contain data, averaged across breeds and years. The figures also show the most recent year for which population data are available from a given country. Dependent territories are listed under the respective country.

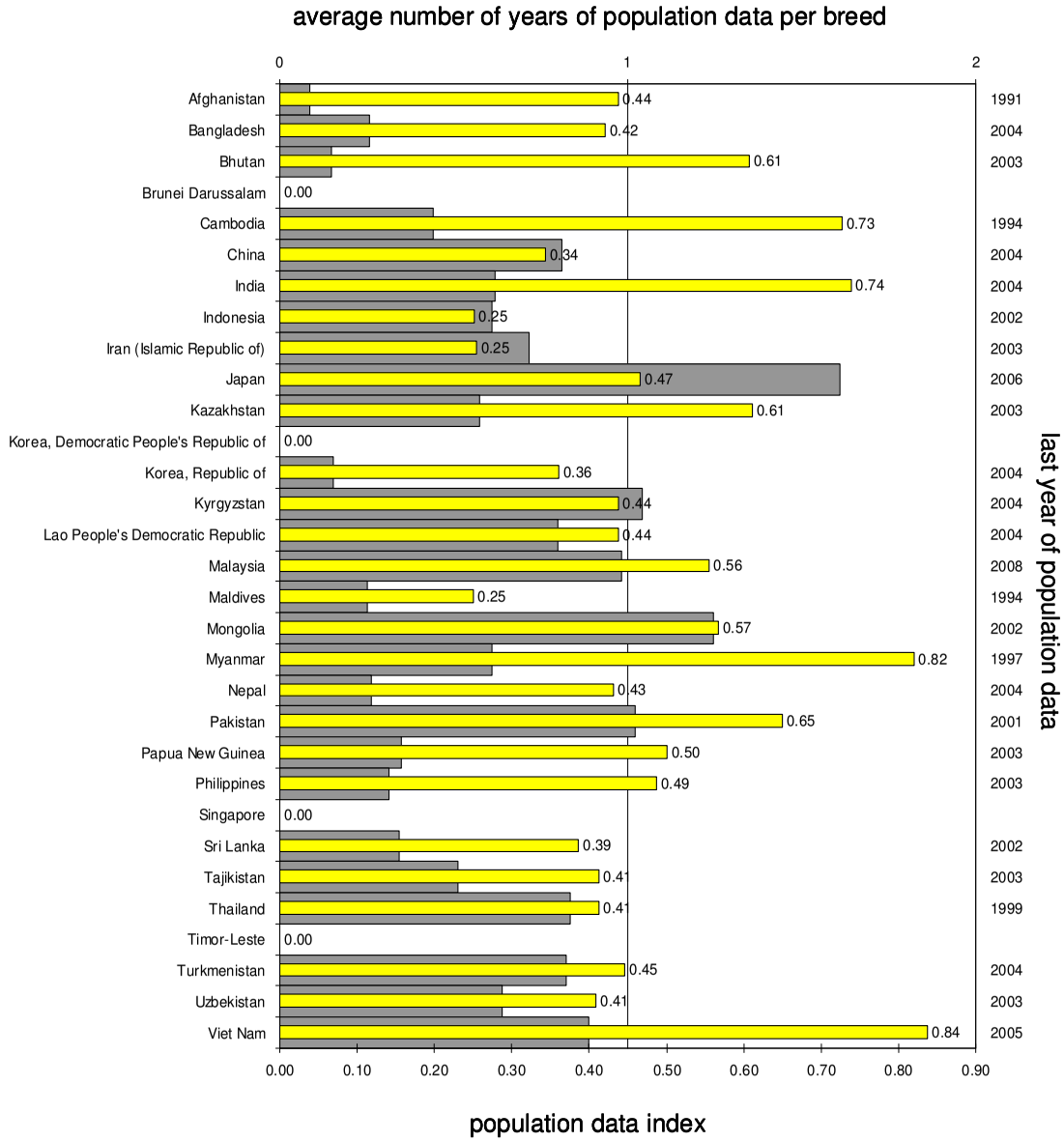
1.1. Africa



Population Data Index (PDI) – For each country the PDI was calculated only for those breeds recorded as having population data. The PDI is the fraction of selected population data fields (population size, number of breeding females, number of breeding males and the percentage of females bred to males of the same breed) that contain information, averaged across breeds.

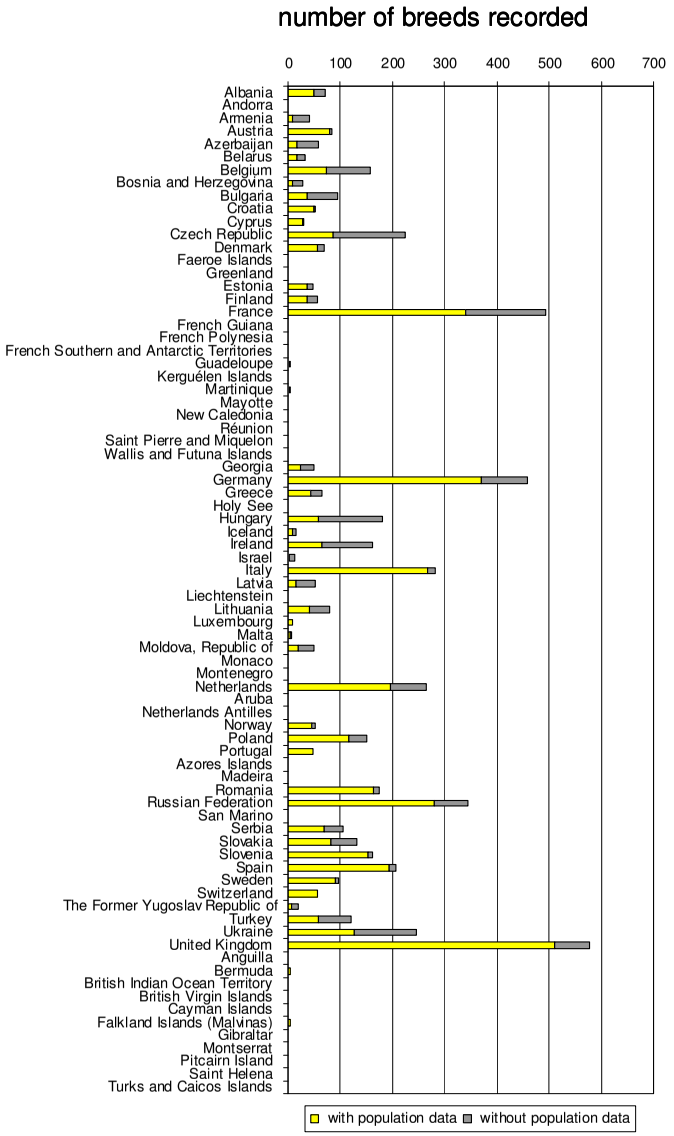
1.2. Asia

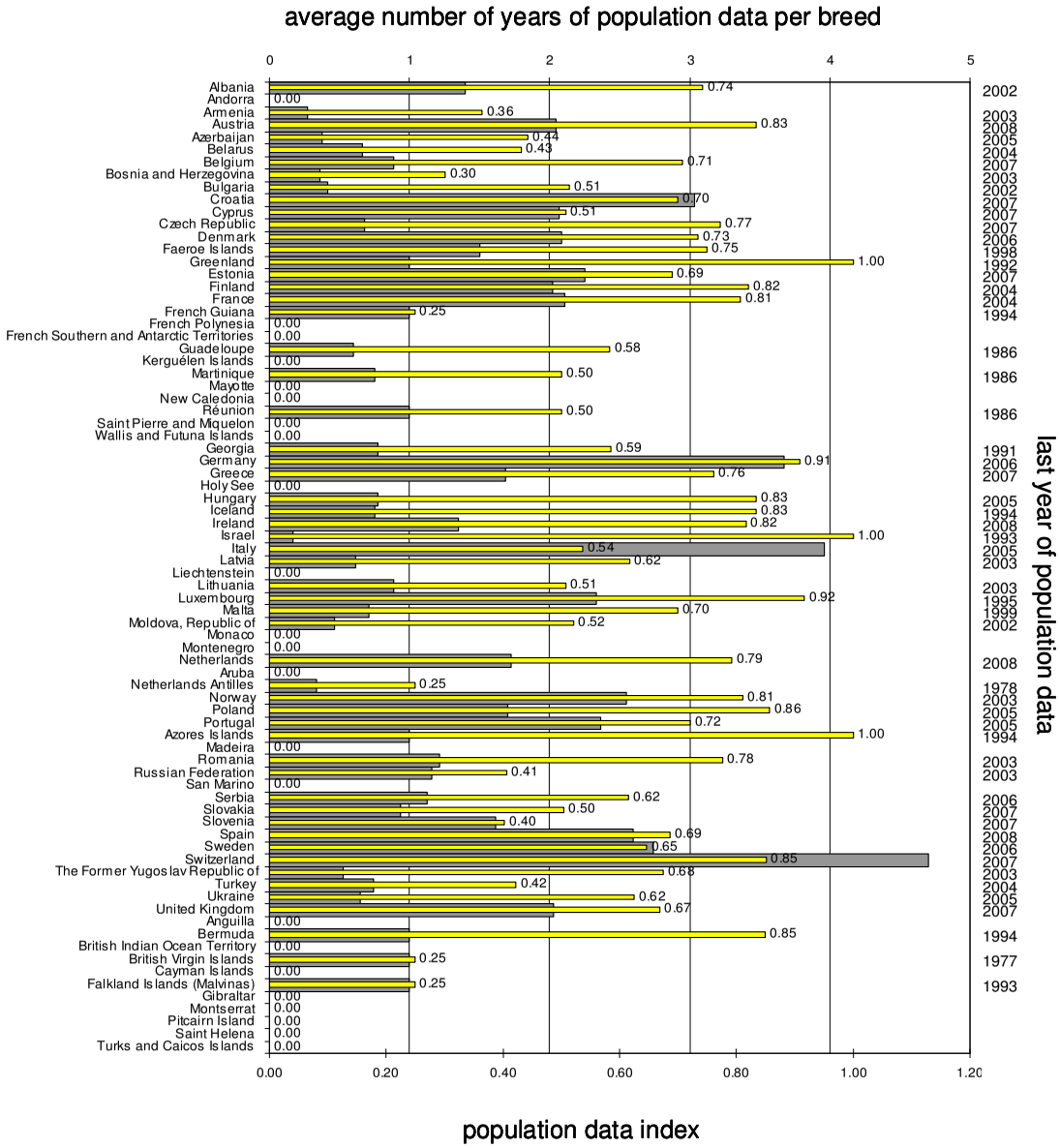




Population Data Index (PDI) – For each country the PDI was calculated only for those breeds recorded as having population data. The PDI is the fraction of selected population data fields (population size, number of breeding females, number of breeding males and the percentage of females bred to males of the same breed) that contain information, averaged across breeds.

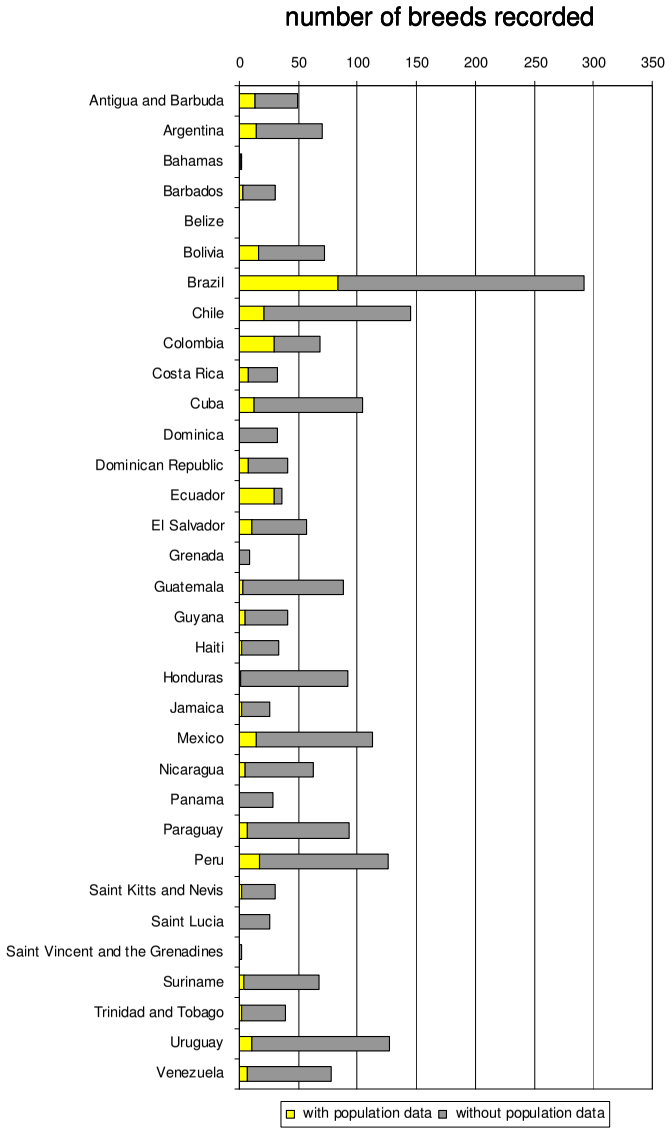
1.3. Europe and the Caucasus

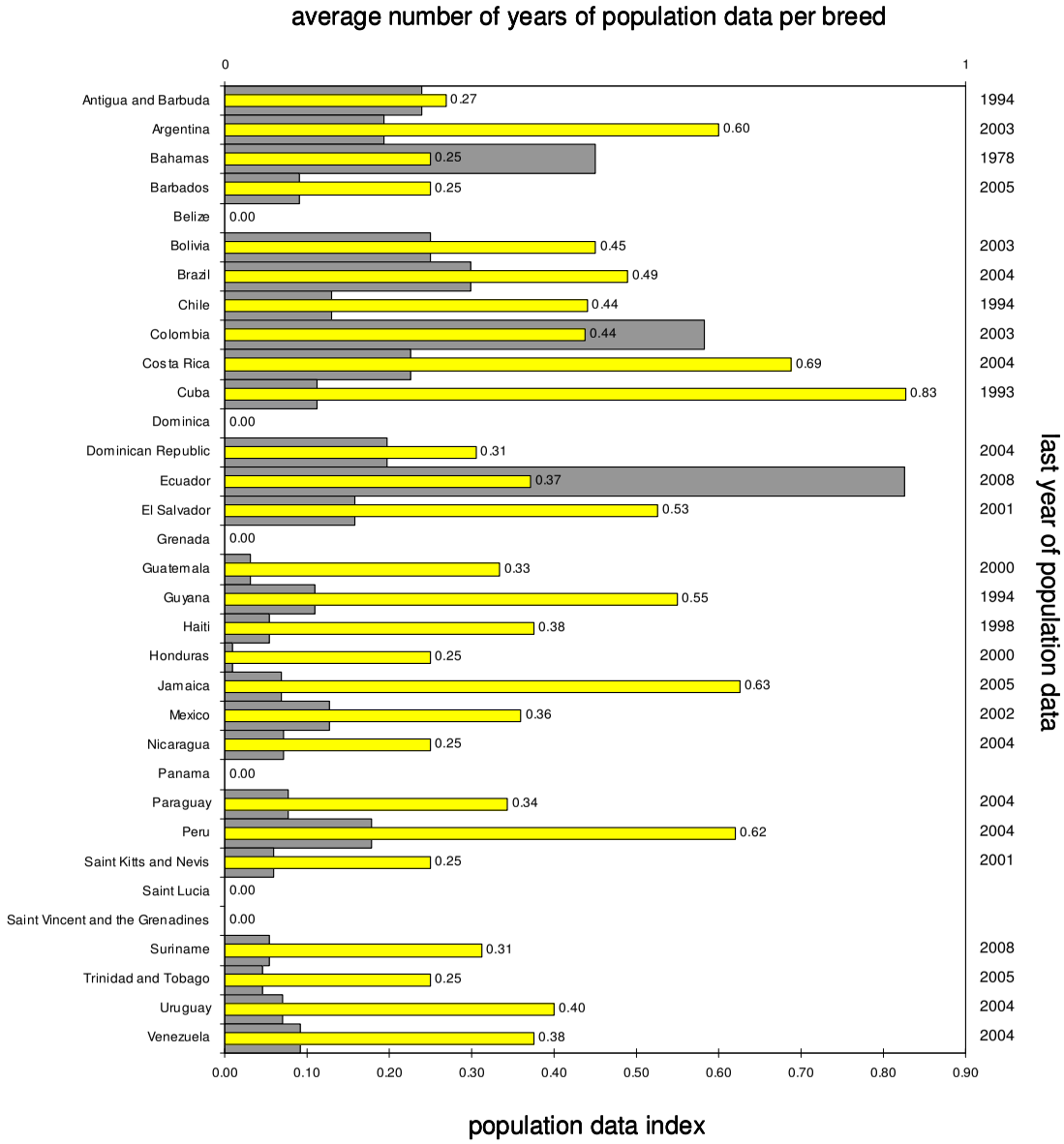




Population Data Index (PDI) – For each country the PDI was calculated only for those breeds recorded as having population data. The PDI is the fraction of selected population data fields (population size, number of breeding females, number of breeding males and the percentage of females bred to males of the same breed) that contain information, averaged across breeds.

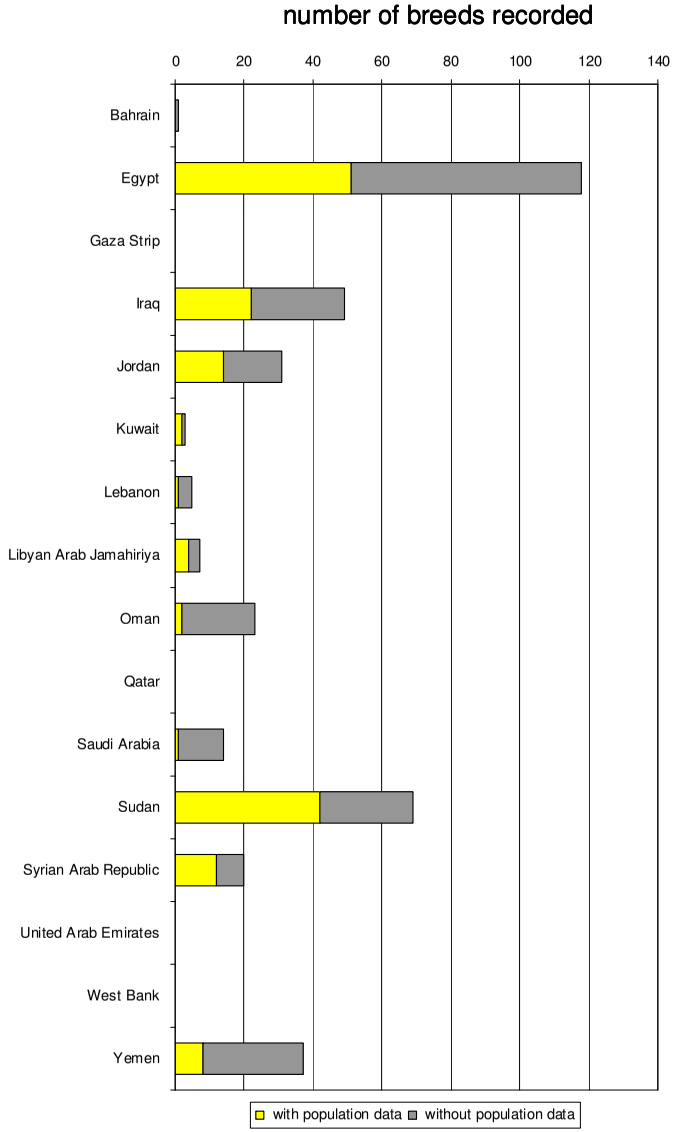
1.4. Latin America and the Caribbean

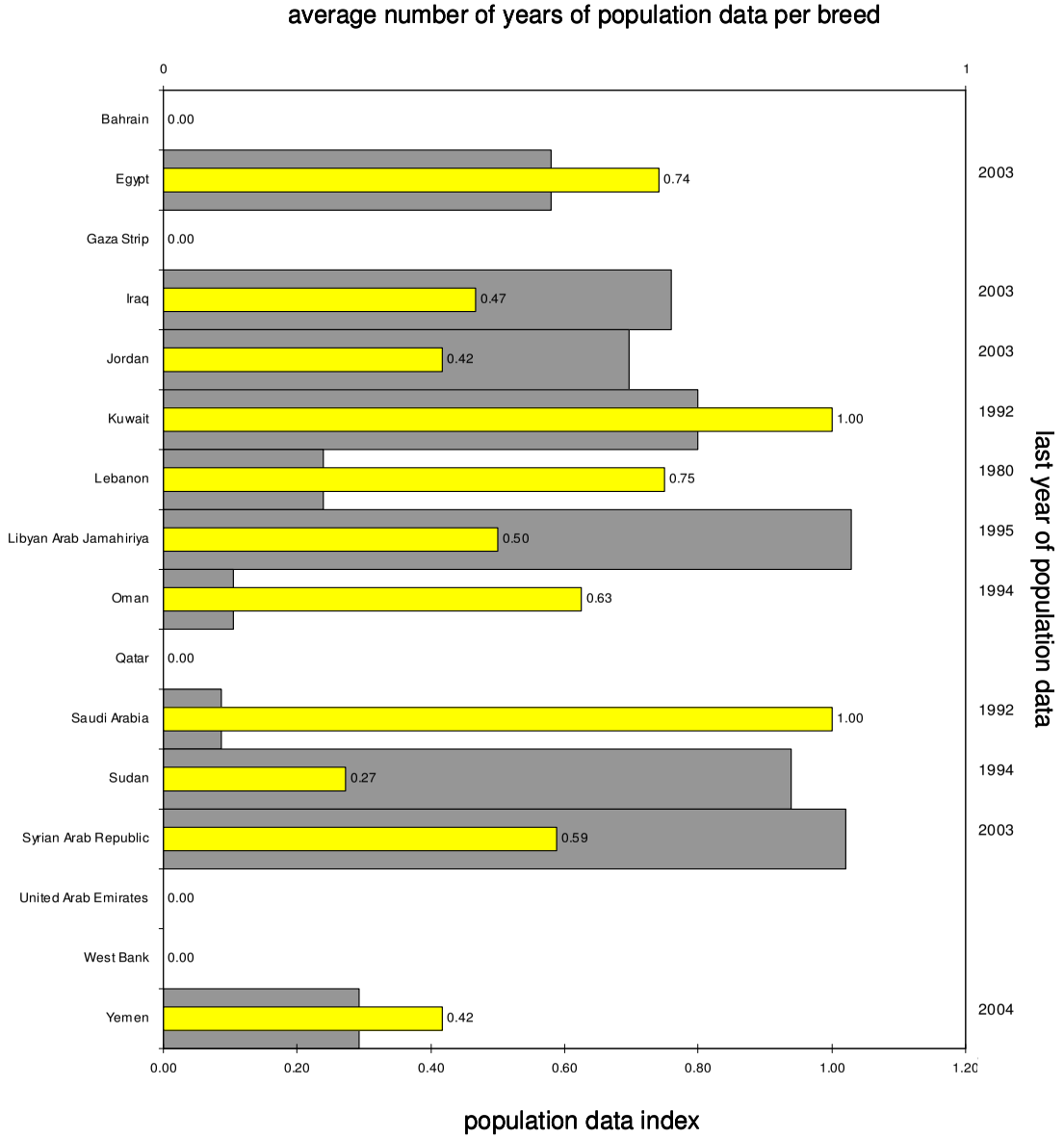




Population Data Index (PDI) – For each country the PDI was calculated only for those breeds recorded as having population data. The PDI is the fraction of selected population data fields (population size, number of breeding females, number of breeding males and the percentage of females bred to males of the same breed) that contain information, averaged across breeds.

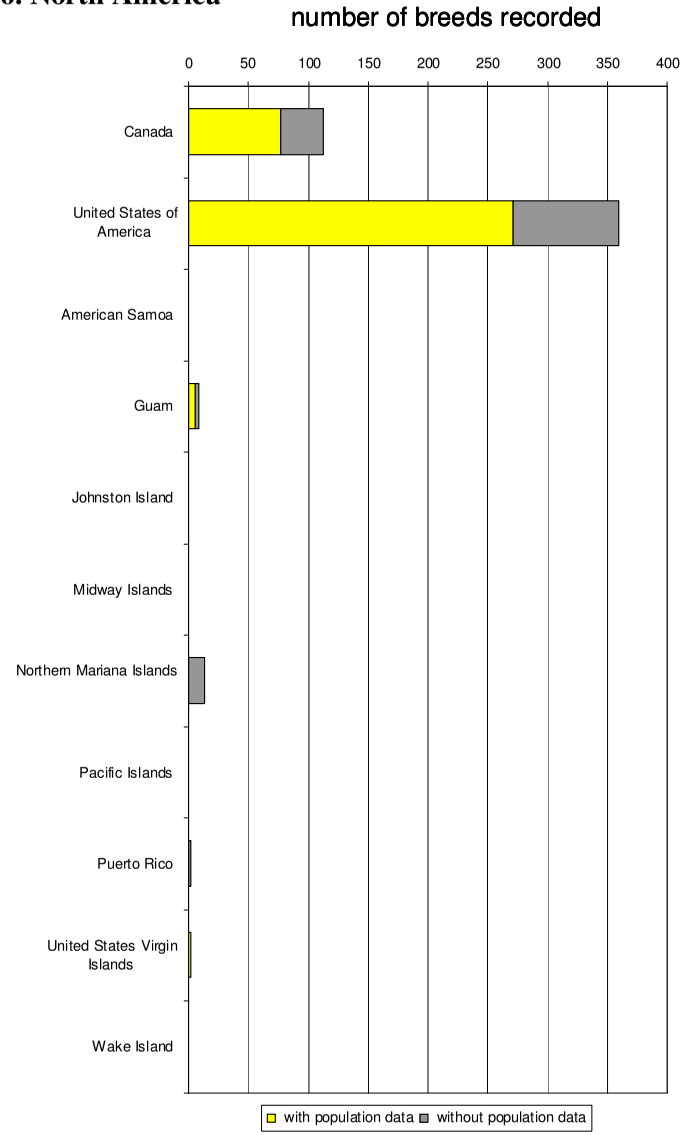
1.5. Near and Middle East

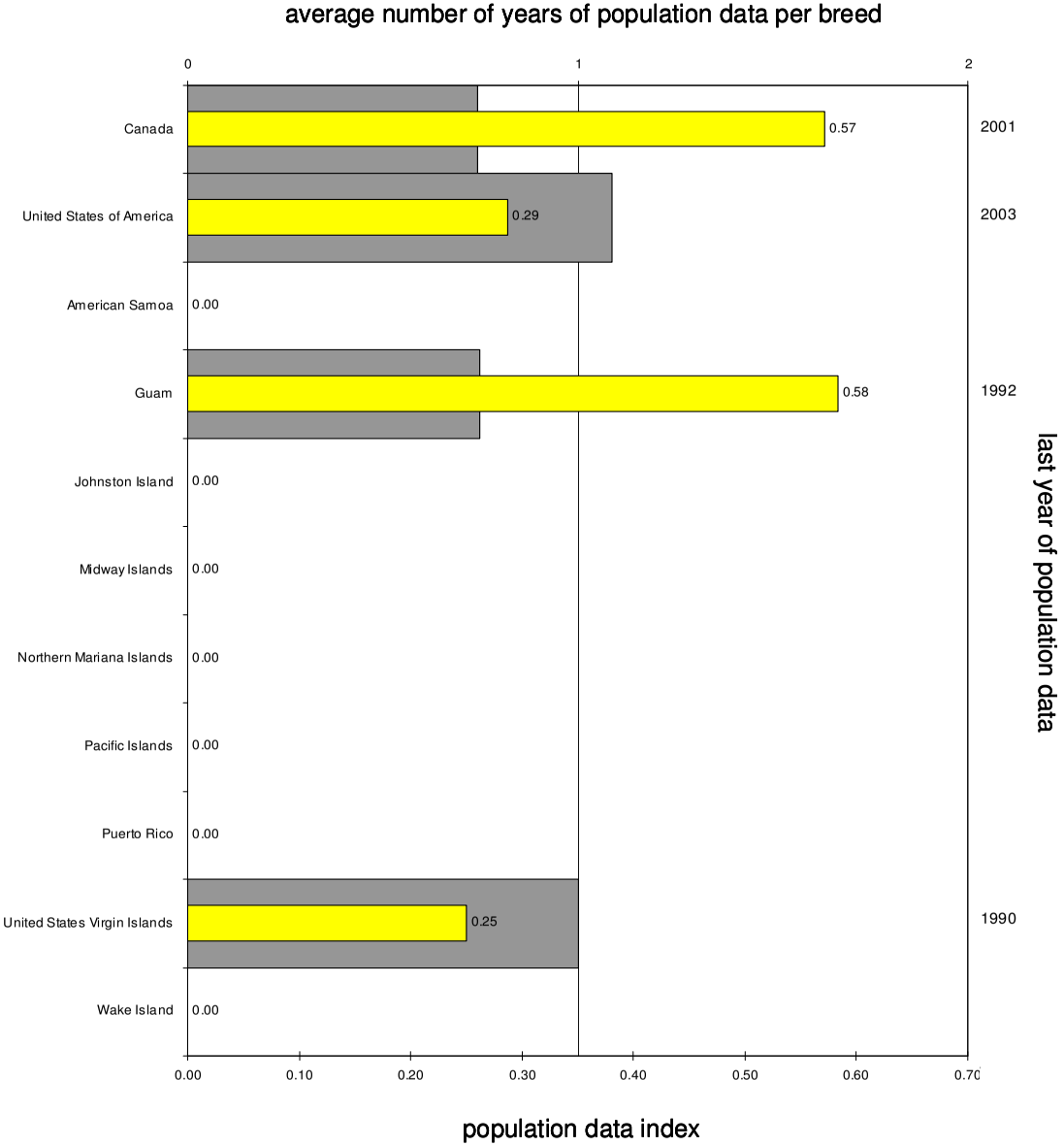




Population Data Index (PDI) – For each country the PDI was calculated only for those breeds recorded as having population data. The PDI is the fraction of selected population data fields (population size, number of breeding females, number of breeding males and the percentage of females bred to males of the same breed) that contain information, averaged across breeds.

1.6. North America





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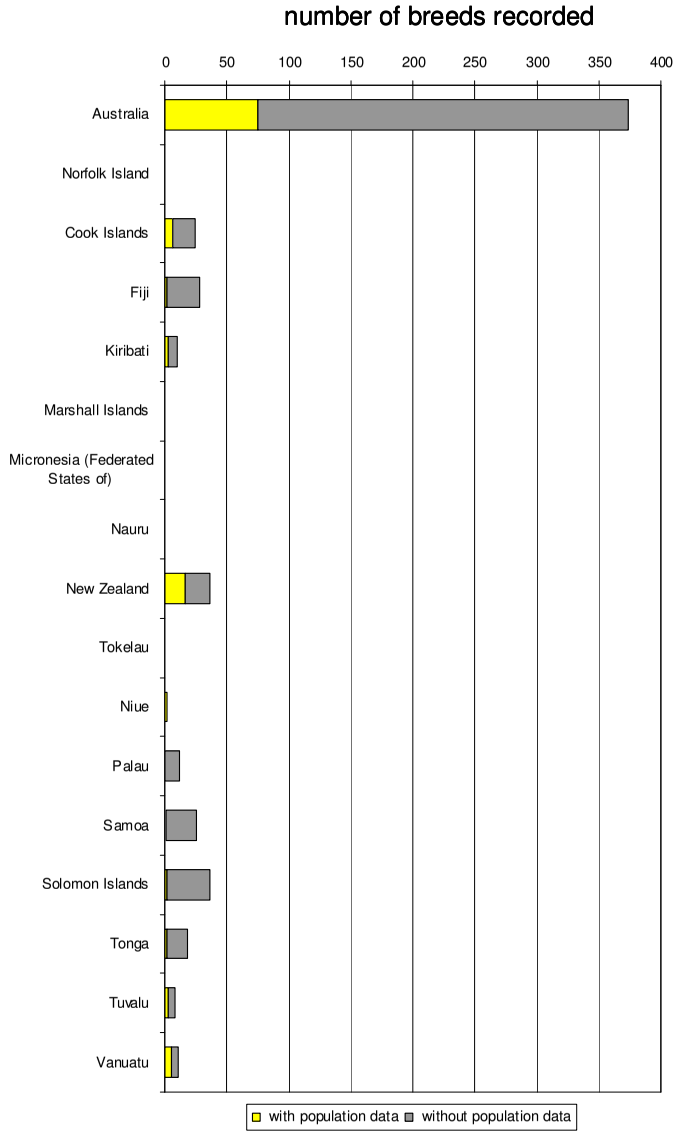
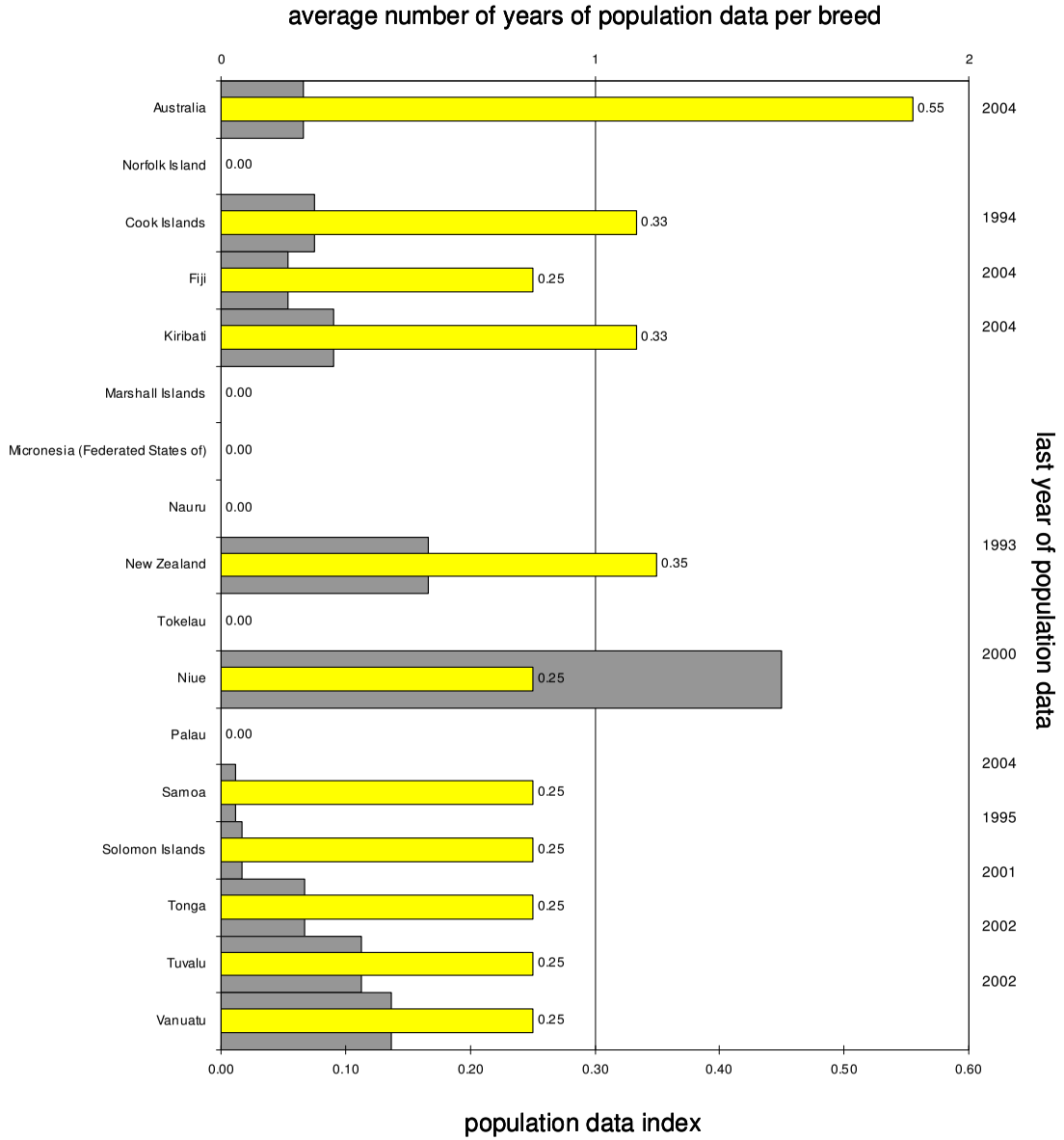
1.7. Southwest Pacific





Population Data Index (PDI) – For each country the PDI was calculated only for those breeds recorded as having population data. The PDI is the fraction of selected population data fields (population size, number of breeding females, number of breeding males and the percentage of females bred to males of the same breed) that contain information, averaged across breeds.

Annex 2: Number of local and transboundary breeds by risk status category reported by each country and region

2.0. Regional overview

2.1. Africa

2.2. Asia

2.3. Europe and the Caucasus

2.4. Latin America and the Caribbean

2.5. Near and Middle East

2.6. North America

2.7. Southwest Pacific

The tables in this annex show the number of local, regional transboundary and international transboundary breeds and their respective risk status by region and by country. Dependent territories are listed under the respective country. The tables will help countries to identify need for action in surveying and conservation.

2.0. Regional overview	local			regional			international			
Region	at risk	not at risk	unknown	at risk	not at risk	unknown	at risk	not at risk	unknown	Total
Africa	59	199	495	4	63	27	9	253	48	1157
Asia	113	908	687	4	55	17	16	306	47	2153
Europe & the Caucasus	1161	751	794	94	142	31	51	344	51	3419
Latin America & the Caribbean	50	83	446	2	17	10	19	266	47	940
Near & Middle East	11	98	141	0	3	2	0	64	12	331
North America	59	12	81	11	5	3	21	168	5	365
Southwest Pacific	24	22	158	2	1	1	26	258	22	514
World	1477	2073	2802	117	286	91	55	414	81	7396

2.1. Africa	local			regional			international			Total
country	at risk	not at risk	unknown	at risk	not at risk	unknown	at risk	not at risk	unknown	
Algeria	0	4	12	0	7	1	0	9	0	33
Angola	0	4	14	1	2	0	0	19	0	40
Benin	0	3	7	0	6	1	0	7	1	25
Botswana	1	2	6	1	4	1	0	40	3	58
Burkina Faso	1	4	17	0	8	2	0	20	3	55
Burundi	0	3	4	0	0	0	0	11	2	20
Cameroon	0	11	10	0	8	1	0	8	0	38
Cape Verde	0	0	0	0	0	0	0	1	0	1
Central African Republic	0	0	9	0	4	2	0	7	1	23
Chad	13	18	4	0	7	4	0	8	1	55
Comoros	0	1	6	0	0	1	0	8	0	16
Congo	0	0	3	0	2	1	1	6	1	14
Congo, Democratic Republic of	0	2	22	0	3	2	0	39	5	73
Côte d'Ivoire	0	4	6	0	6	0	0	3	0	19
Djibouti	0	0	9	0	3	0	0	1	1	14
Equatorial Guinea	0	0	0	0	1	0	0	1	0	2
Eritrea	0	2	4	1	9	2	0	3	1	22
Ethiopia	0	17	50	1	13	3	0	20	3	107
Gabon	0	0	4	0	3	1	1	8	2	19
Gambia	0	0	0	0	1	0	0	3	0	4
Ghana	2	8	10	0	7	0	0	15	4	46
Guinea	0	5	1	0	2	0	0	3	0	11
Guinea-Bissau	0	3	1	0	2	0	0	12	0	18
Kenya	0	14	12	0	7	3	1	40	3	80
Lesotho	0	2	7	0	1	0	0	23	1	34
Liberia	0	0	0	0	2	0	0	1	0	3
Madagascar	4	8	5	0	0	0	0	14	3	34
Malawi	0	2	11	0	2	0	0	24	4	43
Mali	0	7	50	0	14	5	0	32	4	112
Mauritania	0	3	3	0	7	4	0	9	0	26
Mauritius	0	1	4	0	0	1	0	14	0	20
Morocco	0	14	27	0	3	1	0	30	3	78
Mozambique	1	5	6	0	4	0	0	13	1	30
Namibia	1	0	17	1	4	0	0	41	1	65
Niger	0	1	22	0	7	2	0	5	0	37
Nigeria	0	1	12	0	14	3	0	4	0	34
Rwanda	1	0	11	0	0	1	1	28	3	45
Sao Tome and Principe	0	0	6	0	0	0	0	20	2	28

2.2. Africa	local			regional			international			Total
country	at risk	not at risk	unknown	at risk	not at risk	unknown	at risk	not at risk	unknown	
Senegal	0	8	5	0	7	1	0	23	5	49
Seychelles	0	0	1	0	0	2	0	15	2	20
Sierra Leone	0	0	0	0	1	0	0	11	2	14
Somalia	1	0	17	1	3	1	0	4	1	28
South Africa	25	5	36	2	6	1	3	102	8	188
Swaziland	1	11	3	0	4	0	0	14	1	34
Tanzania, United Republic of	5	4	15	0	5	5	0	26	2	62
Togo	0	6	1	0	8	3	0	13	10	41
Tunisia	0	3	5	0	1	0	0	16	3	28
Uganda	2	4	8	0	5	5	1	16	1	42
Western Sahara	0	0	0	0	0	0	0	0	0	0
Zambia	0	6	9	0	2	0	1	28	2	48
Zimbabwe	1	3	3	1	4	1	0	34	2	49

2.3. Asia	local			regional			international			Total
country	at risk	not at risk	unknown	at risk	not at risk	unknown	at risk	not at risk	unknown	
Afghanistan	0	0	37	1	3	3	0	2	0	46
Bangladesh	3	7	38	0	6	0	1	21	5	81
Bhutan	0	1	28	0	4	2	0	11	1	47
Brunei Darussalam	0	0	0	0	0	0	0	0	0	0
Cambodia	2	7	7	1	2	2	0	4	0	25
China	31	437	125	0	12	2	2	54	10	673
India	9	91	113	0	27	6	0	41	1	288
Indonesia	4	52	73	0	5	1	2	48	13	198
Iran (Islamic Republic of)	5	23	31	0	3	1	1	17	4	85
Japan	19	22	7	1	0	0	4	34	2	89
Kazakhstan	3	12	30	0	10	0	0	19	0	74
Korea, Democratic People's Republic of	0	0	1	0	0	0	0	0	0	1
Korea, Republic of	1	6	9	1	0	0	2	31	7	57
Kyrgyzstan	1	15	10	1	7	1	1	13	0	49
Lao People's Democratic Republic	2	13	1	1	1	1	1	5	0	25
Malaysia	1	12	10	1	4	1	1	23	6	59
Maldives	0	1	3	0	0	0	0	3	1	8
Mongolia	0	36	4	0	6	0	1	10	0	57
Myanmar	2	16	1	0	1	0	0	21	0	41
Nepal	0	11	22	0	12	3	0	31	3	82
Pakistan	13	69	22	1	11	1	0	18	0	135
Papua New Guinea	1	4	4	0	1	0	0	13	0	23
Philippines	2	13	29	0	2	1	0	65	6	118
Singapore	0	0	0	0	0	0	0	0	0	0
Sri Lanka	2	9	10	0	7	1	2	31	2	64
Tajikistan	0	6	15	1	9	2	0	10	0	43
Thailand	4	6	8	2	2	1	0	1	0	24
Timor-Leste	0	0	0	0	0	0	0	0	0	0
Turkmenistan	0	3	7	0	5	3	0	6	0	24
Uzbekistan	0	6	15	0	9	3	0	11	1	45
Viet Nam	8	30	27	1	1	3	0	25	1	96

2.4. Europe & the Caucasus	local			regional			international			Total
country	at risk	not at risk	unknown	at risk	not at risk	unknown	at risk	not at risk	unknown	
Albania	7	29	6	0	2	1	0	23	1	69
Andorra	0	0	0	0	0	0	0	0	0	0
Armenia	1	2	10	3	2	3	0	13	4	38
Austria[11]	14	7	1	4	10	0	0	28	0	64
Azerbaijan	3	1	27	3	6	3	1	8	0	52
Belarus	3	7	5	0	4	0	0	10	0	29
Belgium	27	10	28	6	15	1	2	50	2	141
Bosnia and Herzegovina	1	3	15	0	2	0	0	3	0	24
Bulgaria	9	5	25	0	5	2	1	30	0	77
Croatia	8	17	2	3	2	0	0	13	0	45
Cyprus[11]	3	10	4	0	1	0	0	11	0	29
Czech Republic	15	9	41	21	22	9	5	84	7	213
Denmark	16	4	1	0	5	0	0	40	0	66
Faeroe Islands	0	1	0	0	0	0	0	1	0	2
Greenland	0	1	0	0	0	0	0	0	0	1
Estonia[11]	4	6	1	1	4	0	0	29	1	46
Finland	8	8	7	1	4	0	0	28	0	56
France	91	55	132	10	24	0	5	72	6	395
French Guiana	1	0	0	0	0	0	0	0	0	1
French Polynesia	0	0	0	0	0	0	0	0	0	0
French Southern and Antarctic Territories	0	0	0	0	0	0	0	0	0	0
Guadeloupe	0	0	0	0	0	0	0	4	1	5
Kerguélen Islands	0	0	0	0	0	0	0	0	0	0
Martinique	0	0	0	0	0	0	0	3	1	4
Mayotte	0	0	0	0	0	0	0	0	0	0
New Caledonia	0	0	0	0	0	0	0	0	0	0
Réunion	0	0	0	0	0	0	0	1	0	1
Saint Pierre and Miquelon	0	0	0	0	0	0	0	0	0	0
Wallis and Futuna Islands	0	0	0	0	0	0	0	0	0	0
Georgia[11]	2	8	14	6	7	7	0	2	0	46
Germany	133	52	50	24	55	8	6	120	4	452
Greece	13	17	5	0	1	0	0	19	0	55
Holy See	0	0	0	0	0	0	0	0	0	0
Hungary	9	7	64	5	13	2	0	61	5	166
Iceland[11]	2	2	1	0	1	0	0	9	0	15
Ireland[11]	10	7	14	11	10	3	12	87	4	158
Israel	0	0	3	0	0	0	1	6	2	12

[11] The country has established a national information system within the FABISnet network – the number of breeds may in reality be higher than shown in the table due to delays in the translation process from the local language to English or delays in the data synchronization process between the national information system, EFABIS and subsequently DAD-IS.

2.5. Europe & the Caucasus	local			regional			international			Total
country	at risk	not at risk	unknown	at risk	not at risk	unknown	at risk	not at risk	unknown	
Italy[11]	100	67	15	0	6	0	2	25	0	215
Latvia	1	2	7	2	7	2	0	28	1	50
Liechtenstein	0	0	0	0	0	0	0	0	0	0
Lithuania	5	8	7	0	14	1	0	33	4	72
Luxembourg	0	0	0	0	1	0	0	8	0	9
Malta	1	1	0	0	1	0	0	4	0	7
Moldova, Republic of	3	7	7	0	3	1	0	19	5	45
Monaco	0	0	0	0	0	0	0	0	0	0
Montenegro	0	0	0	0	0	0	0	0	0	0
Netherlands[11]	81	29	33	14	27	0	2	73	1	260
Aruba	0	0	0	0	0	0	0	0	0	0
Netherlands Antilles	0	0	0	0	0	0	0	2	1	3
Norway	30	6	4	0	5	0	0	6	0	51
Poland[11]	45	36	14	4	6	3	1	30	0	139
Portugal	4	28	0	2	2	0	0	9	0	45
Azores Islands	0	0	0	1	0	0	0	0	0	1
Madeira	0	0	0	0	0	0	0	0	0	0
Romania	83	7	4	6	13	0	4	36	1	154
Russian Federation	21	103	54	6	18	7	2	60	2	273
San Marino	0	0	0	0	0	0	0	0	0	0
Serbia	19	5	16	4	9	0	2	39	1	95
Slovakia[11]	21	4	13	14	13	3	3	51	5	127
Slovenia[11]	45	10	4	18	11	0	12	53	3	156
Spain	91	62	20	1	2	0	1	10	1	188
Sweden	31	14	0	2	5	0	0	38	0	90
Switzerland[11]	10	12	1	2	6	0	1	11	0	43
The Former Yugoslav Republic of Macedonia	1	4	2	0	2	0	0	10	0	19
Turkey	11	16	45	1	1	2	0	20	4	100
Ukraine	55	28	67	1	17	3	1	42	9	223
United Kingdom[11]	119	33	25	35	42	1	30	187	10	482
Anguilla	0	0	0	0	0	0	0	1	1	2
Bermuda	2	0	0	0	1	0	0	2	0	5
British Indian Ocean Territory	0	0	0	0	0	0	0	0	0	0
British Virgin Islands	0	0	0	0	0	0	0	1	0	1
Cayman Islands	0	0	0	0	0	0	0	0	0	0
Falkland Islands (Malvinas)	2	1	0	0	0	0	0	1	0	4
Gibraltar	0	0	0	0	0	0	0	0	0	0
Montserrat	0	0	0	0	0	0	0	1	1	2
Pitcairn Island	0	0	0	0	0	0	0	0	0	0
Saint Helena	0	0	0	0	0	0	0	0	0	0
Turks and Caicos Islands	0	0	0	0	0	0	0	0	0	0

2.6. Latin America & Caribean	local			regional			international			Total
country	at risk	not at risk	unknown	at risk	not at risk	unknown	at risk	not at risk	unknown	
Antigua and Barbuda	2	2	3	0	0	0	2	37	2	48
Argentina	1	6	15	0	3	0	1	41	2	69
Bahamas	0	0	1	0	0	0	0	1	0	2
Barbados	0	0	6	0	0	0	0	19	4	29
Belize	0	0	1	0	0	0	0	0	0	1
Bolivia	3	3	10	0	8	0	0	43	4	71
Brazil	23	19	76	0	1	2	7	133	13	274
Chile	1	3	43	0	7	0	3	77	6	140
Colombia	2	14	4	1	2	0	0	40	4	67
Costa Rica	0	0	4	1	2	0	0	21	2	30
Cuba	3	5	36	1	1	0	0	47	8	101
Dominica	0	0	3	0	0	0	0	25	3	31
Dominican Republic	3	0	3	1	2	1	0	27	3	40
Ecuador	1	9	0	0	2	0	0	21	0	33
El Salvador	0	2	6	0	3	2	1	39	4	57
Grenada	0	0	0	0	0	0	0	8	1	9
Guatemala	1	1	16	0	5	1	1	57	5	87
Guyana	0	0	10	0	1	1	0	28	0	40
Haiti	0	0	5	0	1	1	0	21	4	32
Honduras	0	1	21	0	2	4	0	60	3	91
Jamaica	1	0	7	0	0	0	0	17	1	26
Mexico	4	5	25	1	3	3	0	69	2	112
Nicaragua	0	1	8	1	2	0	0	43	7	62
Panama	0	0	3	0	2	1	0	21	1	28
Paraguay	1	2	15	0	3	0	0	68	3	92
Peru	0	6	26	0	9	2	0	73	9	125
Saint Kitts and Nevis	2	0	16	0	0	0	0	10	2	30
Saint Lucia	0	0	6	0	0	0	0	18	2	26
Saint Vincent and the Grenadines	0	0	0	0	0	0	0	1	1	2
Suriname	0	0	13	0	2	1	2	44	4	66
Trinidad and Tobago	0	0	4	0	1	0	0	29	5	39
Uruguay	2	2	35	0	1	1	6	69	4	120
Venezuela	0	2	25	1	3	1	0	41	3	76

2.7. Near & Middle East	local			regional			international			Total
country	at risk	not at risk	unknown	at risk	not at risk	unknown	at risk	not at risk	unknown	
Bahrain	0	0	1	0	0	0	0	0	0	1
Egypt	3	33	40	0	1	0	0	29	5	111
Gaza Strip	0	0	0	0	0	0	0	0	0	0
Iraq	7	8	9	0	2	0	0	19	2	47
Jordan	0	5	16	0	1	0	0	9	0	31
Kuwait	0	0	0	0	2	0	0	1	0	3
Lebanon	0	1	0	0	0	1	0	3	0	5
Libyan Arab Jamahiriya	0	1	2	0	1	0	0	2	0	6
Oman	0	2	16	0	0	0	0	5	0	23
Qatar	0	0	0	0	0	0	0	0	0	0
Saudi Arabia	0	0	9	0	1	1	0	3	0	14
Sudan	0	36	20	0	0	0	0	11	2	69
Syrian Arab Republic	1	4	3	0	0	1	0	7	3	19
United Arab Emirates	0	0	0	0	0	0	0	0	0	0
West Bank	0	0	0	0	0	0	0	0	0	0
Yemen	0	8	25	0	0	1	0	2	1	37

2.8. North America	local			regional			international			Total
country	at risk	not at risk	unknown	at risk	not at risk	unknown	at risk	not at risk	unknown	
Canada	26	0	15	11	4	3	3	44	0	106
United States of America	33	9	64	11	5	3	19	155	4	303
American Samoa	0	0	0	0	0	0	0	0	0	0
Guam	0	3	2	0	0	0	0	3	0	8
Johnston Island	0	0	0	0	0	0	0	0	0	0
Midway Islands	0	0	0	0	0	0	0	0	0	0
Northern Mariana Islands	0	0	1	0	0	0	0	12	0	13
Pacific Islands	0	0	0	0	0	0	0	0	0	0
Puerto Rico	0	0	0	0	0	0	0	1	1	2
United States Virgin Islands	0	0	0	0	0	0	0	2	0	2
Wake Island	0	0	0	0	0	0	0	0	0	0

2.9. Southwest Pacific	local			regional			international			Total
country	at risk	not at risk	unknown	at risk	not at risk	unknown	at risk	not at risk	unknown	
Australia	9	10	122	2	0	1	24	181	15	364
Norfolk Island	0	0	0	0	0	0	0	0	0	0
Cook Islands	2	2	2	0	1	0	0	15	2	24
Fiji	0	1	11	0	1	0	0	13	2	28
Kiribati	0	0	2	0	0	0	0	7	1	10
Marshall Islands	0	0	0	0	0	0	0	0	0	0
Micronesia (Federated States of)	0	0	0	0	0	0	0	0	0	0
Nauru	0	0	0	0	0	0	0	0	0	0
New Zealand	9	0	8	2	0	1	2	10	2	34
Tokelau	0	0	0	0	0	0	0	0	0	0
Niue	2	0	0	0	0	0	0	0	0	2
Palau	0	0	0	0	0	0	0	11	1	12
Samoa	0	0	3	0	0	0	1	20	1	25
Solomon Islands	0	1	7	0	0	0	0	27	1	36
Tonga	1	1	1	0	0	0	0	15	0	18
Tuvalu	0	3	0	0	0	0	0	5	0	8
Vanuatu	1	4	1	0	0	0	0	5	0	11