

Regional Report on
Animal Genetic Resources:
the Near and Middle East



Acknowledgements

The Regional Factsheet was prepared by Salah Galal. Regional Priorities were compiled by Milan Zjalic.

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Introduction

This document is one of a set of subregional and regional reports prepared as part of the Annex to *The State of the World's Animal Genetic Resources for Food and Agriculture*. It consists of two sections:

- a factsheet; and
- a synthesis of priorities.

The factsheet is a compilation of background material on the significance of livestock to the region's economy and food security; the characteristics, distribution, and relative significance of the various livestock production systems; and the characteristics of animal genetic resources.

The priorities presented in this report are based on the outcome of consultations held at the regional level to review a draft report on strategic priorities for action, which had been prepared by FAO as a global-level synthesis of priorities identified in the Country Reports submitted as part of State of the World process. The consultations, which were held during the final quarter of 2005, took the form of e-mail conferences and/or physical meetings, and provided an opportunity for country representatives, from both technical and policy backgrounds, to identify priorities and to further strategies for cooperation.



Regional factsheet: the Near and Middle East

For the purposes of this factsheet, the Near and Middle East region comprises Bahrain, Egypt, Gaza Strip, Jordan, Iraq, Kuwait, Lebanon, the Libyan Arab Jamahiriya, Oman, Qatar, Saudi Arabia, the Sudan, the Syrian Arab Republic, the United Arab Emirates, West Bank and Yemen. The most common feature among these countries is that a great part of their area is desert, and with few exceptions water is scarce. Water availability dictates land use. Although wide variation exists among the countries of the region, e.g. Egypt and the Sudan vs. the Gulf States, Table 1 shows that the proportion of land under mixed rainfed agriculture is quite low, at 5 percent, as compared to 25 percent for the world as a whole. Another important factor that contributes to shaping the supply and demand for animals and animal products is that some of the region's countries (Bahrain, Kuwait, the Libyan Arab Jamahiriya, Oman, Qatar, Saudi Arabia and the United Arab Emirates) are major oil/natural gas producers. Energy resources are by far the greatest economic asset in these countries, and dwarf any other resource or activity.

TABLE 1
Distribution of land by livestock production system

	Near and Middle East (%)		World (%)	
LGA: Livestock only, rangeland-based arid/semi-arid	19		15	
LGH: Livestock only, rangeland-based humid/subhumid	5		6	
LGT: Livestock only, rangeland-based temperate/tropical highland	0		8	
Subtotal		24		29
MIA: Mixed irrigated arid/semi-arid	4		3	
MIH: Mixed irrigated humid/subhumid	0		1	
MIT: Mixed irrigated temperate/tropical highland	0		2	
Subtotal		4		6
MRA: Mixed rainfed arid/semi-arid	4		9	
MRH: Mixed rainfed humid/subhumid	1		9	
MRT: Mixed rainfed temperate/tropical highland	1		7	
Subtotal		5		25
Other	67	67	40	40
Total	100	99	100	100

Derived from Thornton *et al.* (2002).

See Annex for description of the production system classification.

1 Importance of livestock in the region's economy and food security

Table 2 shows that the contribution of agriculture to the national economy ranges from nearly nil or less than 1 percent in oil/gas-rich countries to 39 percent in the Sudan. Even for the oil/gas-rich countries livestock is proportionally important when measured relative to agriculture in general – 61 percent of the contribution of agriculture to GDP in Saudi Arabia is from livestock while for Kuwait the figure is 52 percent.

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The region harboured 27 percent of the world's camel breeds (Table 3) and 23 percent of the world's total camel population in 2005 (FAOSTAT). Another specificity of the region is that it is traditionally a mutton consumer, while pork consumption is negligible.

1.1 Production

According to FAOSTAT stock numbers of cattle, sheep, goats and chickens in the region increased by 28 percent, 17 percent, 13 percent and 41 percent, respectively from 1995 to 2003 (Figure 1). This increase, and the concomitant increase in animal products, was not, however, enough to meet demand.

TABLE 2

Economic indicators and contribution of livestock production to the economy and to agriculture in the countries of the region

Country	GDP 2001 (US\$1000)	Contribution of agriculture to GDP 2001	Contribution of livestock to GDP 2001	Human Population (1000)	GDP per capita (US\$)	Contribution of livestock to Ag. GDP %
Bahrain	11 534 490	< 1%*	...	724	15 932	
Egypt	239 241 900	17%	5%	71 931	3 326	28
Jordan	19 999 690	2%	1%	5 473	3 654	52
Kuwait	35 969 180	0.47*	0.2%*	2 521	1 4268	
Lebanon	19 088 550	12%	4%	3 653	5 225	31
Libyan Arab Jamahiriya	...	...	...	5 551		
Oman	33 625 800	...	...	2 851	11 794	
Palestine, Occupied Tr.	...	7%	3%			40
Qatar	...	...	...	610		
Saudi Arabia	272 382 400	5%	3%	24 217	11 248	61
Sudan	57 032 810	39%	21%	33 610	1 697	53
Syrian Arab Republic	56 854 110	24%	7%	17 800	3 194	27
United Arab Emirates	...	...	...	2 995		
Yemen	14 814 120	15%	7%	20 010	740	44

Source: FAOSTAT.

*Estimates obtained directly from the countries involved through missions by the author

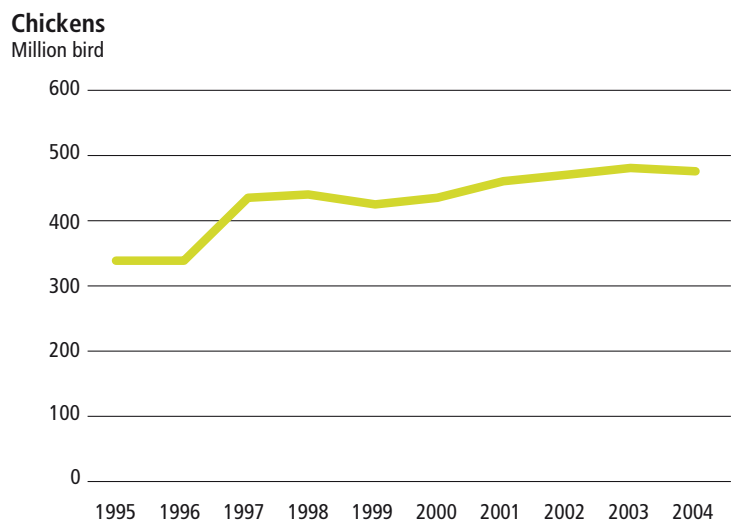
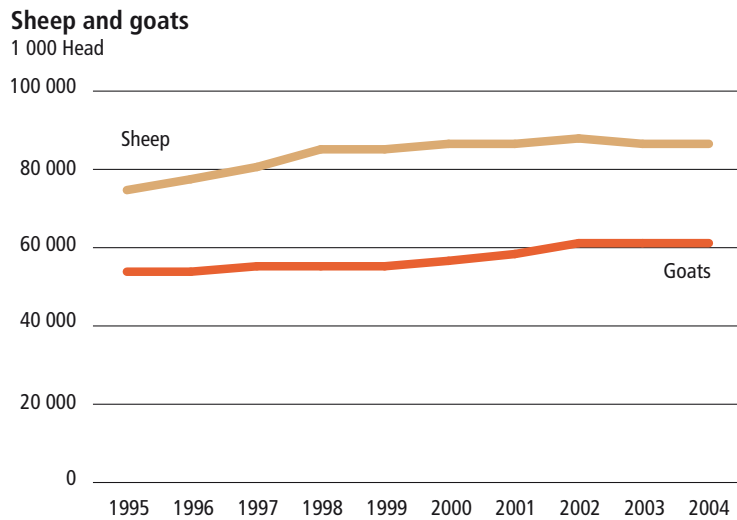
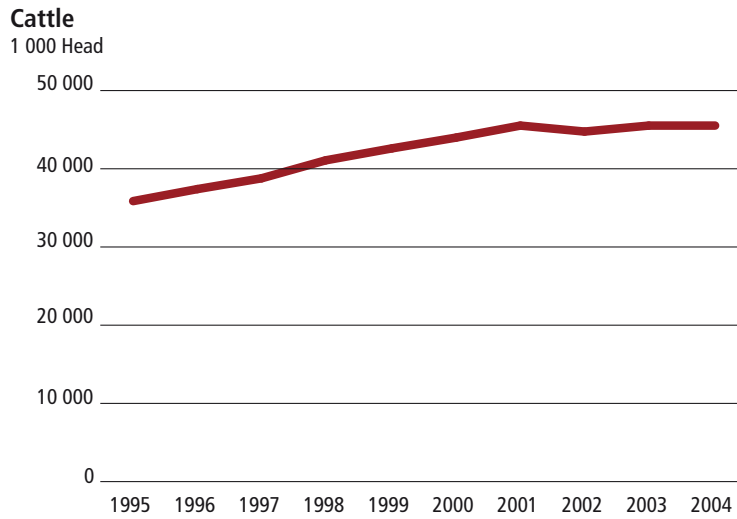
TABLE 3

Total population size of the major livestock species in the Near and Middle East region

Species	Population size* (1000)	Number of surviving breeds	% of world total number of breeds
Buffaloes	4 697	9	6
Dromedaries and camels	4 792	25 (dromedary)	27
Cattle	70 462	58	4
Goats	104 452	46	7
Sheep	185 953	67	5
Asses	8 019	20	12
Rabbits	9 660	8	3
Horses	734	19	2
Pigs	547	1	0.1
Chickens	1 109 646	34	2
Ducks	11 702	6	3
Geese	11 550	2	1
Turkeys	8 233	6	4
Pigeons	Na	8	12

*Source for population figures: FAOSTAT estimates of 2005 live animal populations.

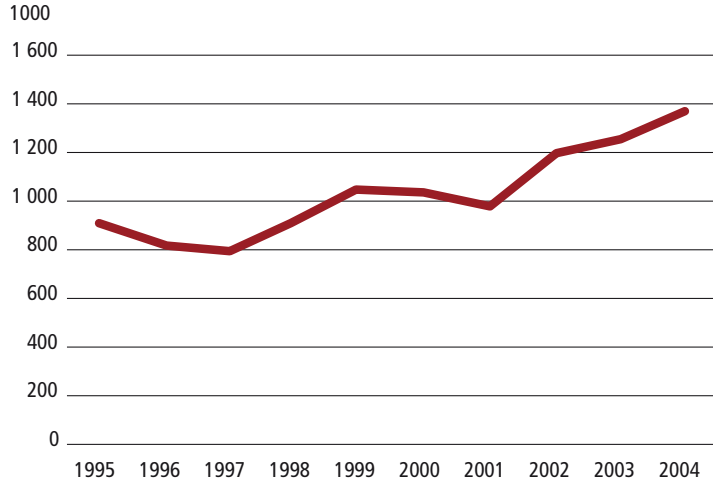
FIGURE 1
Production of ruminants and chickens in the Near and Middle East, 1995–2004



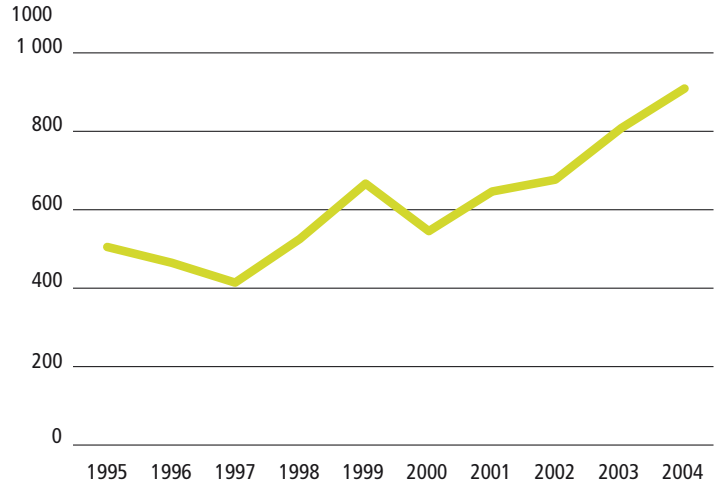
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FIGURE 2
Trade balance (import minus export) for milk and meat, 1995–2004

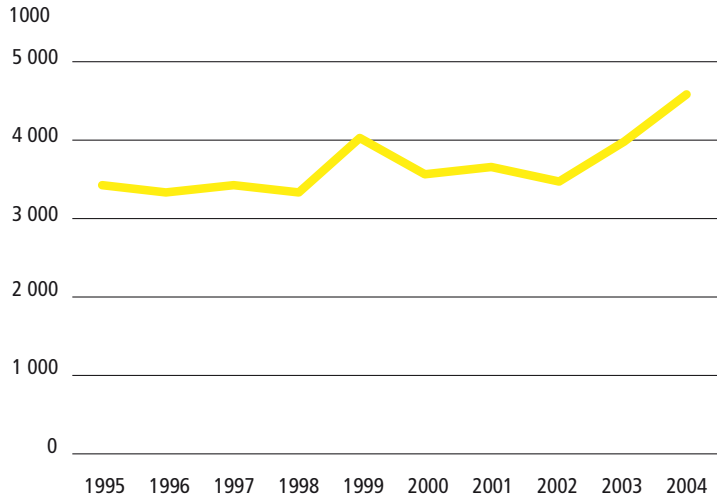
Total meat
metric ton



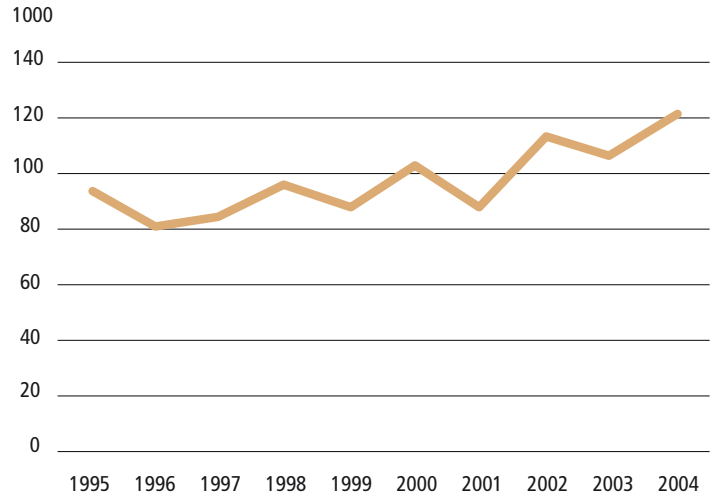
Chicken meat
metric ton



Milk equivalent
metric ton

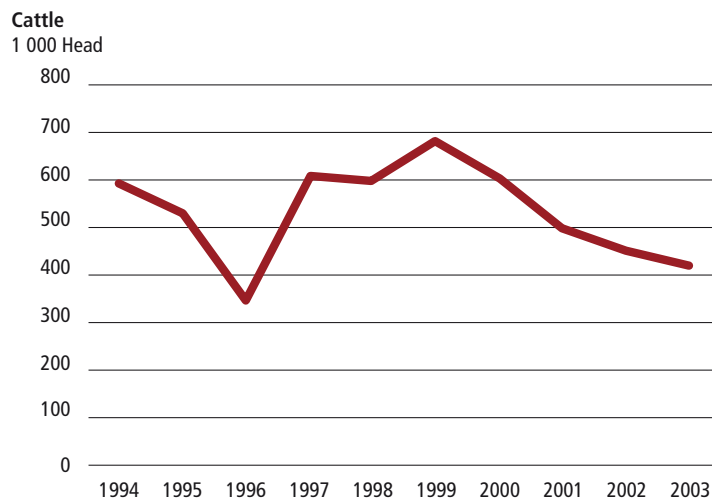
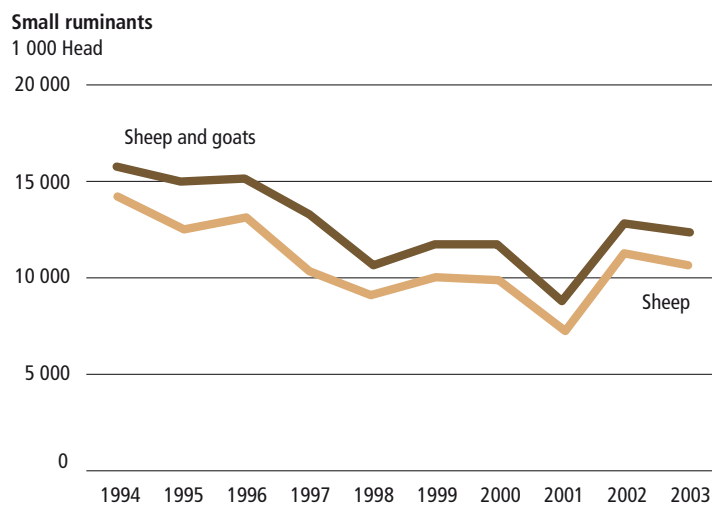
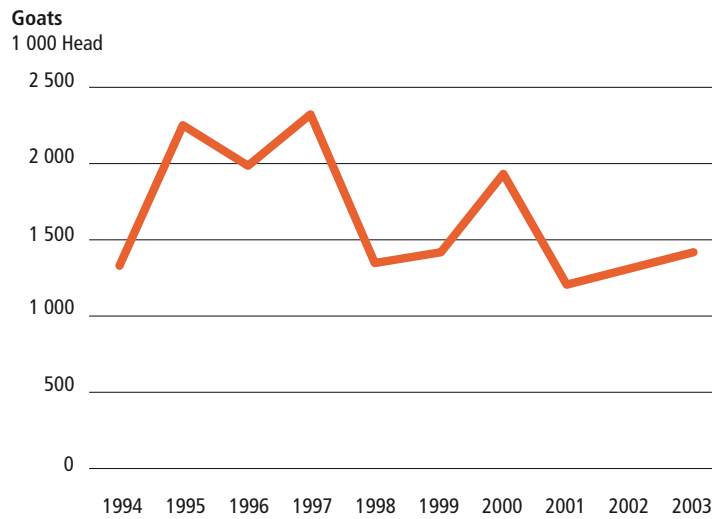


Sheep meat
metric ton



Source: FAOSTAT.

FIGURE 3
Imports of ruminants during the period 1994–2003



Source: FAOSTAT.

1.2 Self-sufficiency in animals and animal products

Figure 2 shows that the region was a net importer of animal products in the 1995 to 2004 period. However, some individual countries were net exporters of some products in some years.

Egypt and Lebanon were net exporters of table eggs and chicken meat during 2002, 2003 and 2004, while Egypt and Saudi Arabia showed a favourable average trade balance in milk over the same years. The latter country also showed a positive balance in table eggs in 2004 (FAOSTAT). The region is a net importer of ruminants. However, there is a lot of bilateral exchange between the countries of the region. For example, during the years 2001, 2002 and 2003, Sudan had an average annual export of 1.2 million head of sheep, while the figure for the Syrian Arab Republic was nearly 1 million.

The region imports a lot of sheep and goats, especially the former, ranging from 8.8 to 15.4 million head annually from 1994 to 2003 (Figure 3). This represents the regular needs of consumers, plus the extra animals needed for the hajj seasons in Saudi Arabia.

With the fast growing human population, rising standards of living, and the limited agricultural resources of many countries, the region is expected to remain a net importer of red meat and live sheep and cattle, with an even wider gap between production and consumption. In view of the great effort and investments being made in dairy cattle and poultry projects, some countries could, however, become self sufficient in these animal products. The greater availability of chicken meat and its lower price as compared to red meat are affecting consumer choice and leading to a movement towards chicken consumption. This can be seen as a drastic change from the region's traditional mutton-oriented diet.

The "livestock revolution" (Delgado *et al.*, 1999), i.e. an increase in demand for animal products in developing countries, is certainly affecting the Near and Middle East. During the period 1993 to 2003, where data is available from FAOSTAT, human population increased in the region at an annual rate of 2.3 percent, while per capita consumption of animal products increased at the rate of 1.6 percent, leading to an annual increase in total regional consumption of these products of 3.0 percent.

2 Livestock production systems

From a population perspective, the largest numbers of people are supported by mixed irrigated livestock production systems in the arid and semi-arid tropics and subtropics. Almost two-thirds of the regional total figure of 206 million people live in this system (Table 4). This system has only about 0.3 ha of agricultural land per person compared to a regional average of 1.5 ha of land per person. Large areas of grazing land and smaller population numbers lead to higher availability of agricultural land per person for the livestock production systems found in grassland-based arid/semi-arid systems (5 ha of land per person) and grassland-based production systems in the humid and subhumid tropics and subtropics (8 ha of land per person).

The figures show that the majority of cattle are kept in two systems, namely the grassland-based arid and semi-arid system (18 million animals) and in the mixed irrigated systems in the arid and semi-arid tropics and subtropics (11 million animals). In this latter production system, about 45 percent of animals are dairy cows and they show the highest average milk production level for the subregion, 970 kg of milk per dairy cow per year, compared to the subregional average of 820 kg per year. A fair number of buffaloes (3.6 million) are kept in Egypt, and these animals also contribute significantly to total milk production in the mixed irrigated production systems of the arid and semi-arid tropics and subtropics.

Overall, in this region more than one-third of milk production is not derived from dairy cows, showing the importance of small ruminants, buffaloes and camels as contributors to total milk production. The largest number of sheep and goats is kept in grassland-based systems of the arid and semi-arid tropics and subtropics (58 million animals), followed by the mixed irrigated production systems of the arid and semi-arid tropics and subtropics (46 million animals). Some of the region's sheep are fed in intensive feedlots – about 2 million animals each year.

The average availability of ruminant meat per inhabitant is 9 kg per year. About half comes from large ruminants, the other half from sheep and goats. Monogastric production is comprised almost exclusively of poultry production, and it contributes on average 9 kg of meat (about 7 kg from intensive landless production systems) and 4 kg of eggs (about 3 kg from intensive production) per person per year to the diets of the region's inhabitants.

TABLE 4
Resource base, production and productivity data for livestock production systems in the Near and Middle East region

	Grassland-based			Mixed rainfed		Mixed irrigated	Landless	TOTAL
	Temperate/ Highland	Humid/ Sub-humid	Arid/ Semi-arid	Humid/ Sub-humid	Arid/ Semi-arid	Arid/ Semi-arid		
Parameters								
Human population (thousands)	14 237	2 758	50 214	919	4 379	134 372		206 879
a. Resource base								
a1. Grazing land (1 000 ha)	14 382	20 613	244 842	6 871	20 827	23 603		331 138
a2. Arable land (1 000 ha)	1 357	2 432	12 549	811	2 457	17 231		36 837
a3. Irrigated land (1 000 ha)	406		2 258	98	98	10 165		13 025
a4. Livestock numbers (1 000 head)								
Cattle	1 223	6 864	18 340	2 288	6 783	11 360		46 858
Dairy cows	286	575	2 910	192	912	4 998		9 873
Buffalo						3 617		3 617
Sheep and goats	9 905	14 816	58 043	4 939	14 284	46 063	2 033	150 083
b) Major outputs (1 000 tonnes)								
Beef and veal meat	52	58	183	19	57	373		742
Buffalo meat						298		298
Sheep and goat meat	47	47	230	16	46	381	15	782
Pig meat	-	-	-	-	-	2	1	3
Poultry meat	9	2	32	1	3	309	1 442	1 798
Eggs	4	3	25	1	4	167	582	786
Dairy milk	172	276	2 245	92	438	4 854		8 077
Other milk	45	157	1 130	52	249	3 855		5 488
Milk production total	217	433	3 375	144	687	8 709		13 565
c) Productivity indicators								
Beef and buffalo meat (kg/head)	43	8	10	8	8	45		21
Sheep and goat meat (kg/head)	5	3	4	3	3	8	7	5
Milk yield kg/cow	601	480	771	479	480	971		818
d) Self-sufficiency of systems								
Ruminant meat (kg/inhabitant)	7	38	8	38	24	8		9
Monogastric meat (kg/inhabitant)	0.6	0.7	0.6	1.1	0.7	2.3		8.7
Milk (kg/inhabitant)	15.2	157.0	67.2	156.7	156.9	64.8		65.6
Eggs (kg/inhabitant)	0.3	1.1	0.5	1.1	0.9	1.2		3.8

Source: FAO (2004).

Generally, it can be safely concluded that during the last two decades or so the livestock production systems in the region have consistently been moving towards intensification. The pure nomadic system has nearly vanished, while the transhumant system, especially in small ruminants, which used to be important in the region, is decreasing. The pastoral system is still important in the Sudan. Some of the reasons for this trend towards intensification are:

- Recurrent drought and overgrazing have degraded the pasture to a great extent. Very little success has been realized in pasture rehabilitation.

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- Urbanization and changing lifestyles have meant that shepherding/herding is no longer an attractive occupation, especially in view of the availability of jobs in the oil sector in oil-rich countries.
- The fast growing population in most countries of the region, and the rising standard of living and income, forced governments to look for a “quick fix” solution to the shortage of animal protein. With a lack of long-term vision for the role of local breeds and plans for their development, meeting the rising demand for animal products has been achieved through direct import of animals and animal products for consumption, as well as through the introduction of dairy breeds and commercial poultry production. These actions had repercussions for local animal genetic resources (AnGR) especially for cattle and chickens.
- Subsidies for feed grains and concentrate, and also sometimes for hay, which prevailed in 1990s in most of the region's countries, and which are still offered in some countries encouraged producers to intensify production.

Other trends in animal production include the sedentarization of sheep and goat production and commercialization of dairy and poultry production. The impact of this on breed structure in sheep and goats is not large, but impact is great in the case of poultry and cattle, where local breeds are declining in importance. Landless peri-urban livestock production systems are spreading in countries like Egypt and the Sudan where medium-sized cattle and poultry units are springing up around major cities.

3 Animal genetic resources¹

3.1 Populations

Table 5 shows the regional population and number of breeds of mammalian and avian species with and their respective contribution to total world figures.

TABLE 5

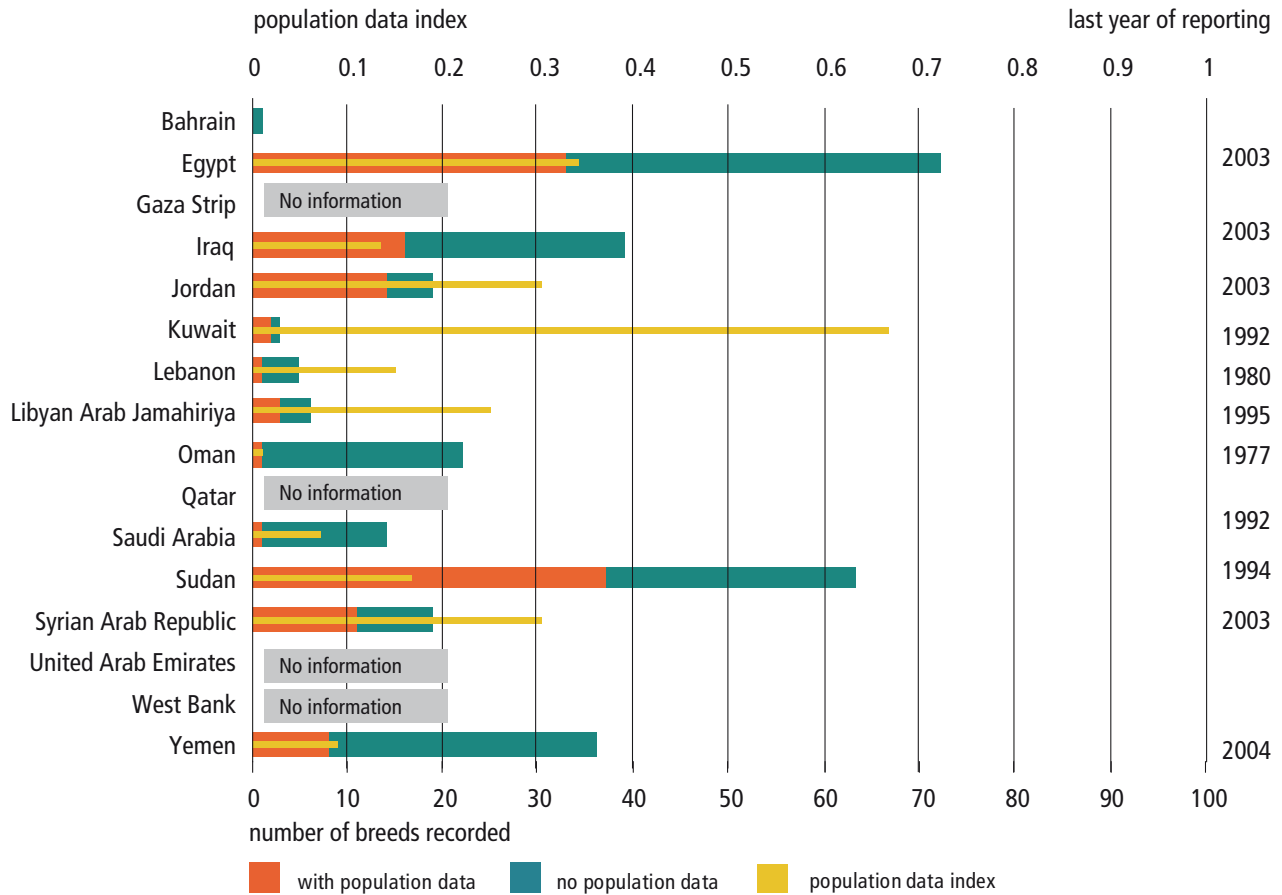
Total population size of the major livestock species in the Near and Middle East region

Species	Population size (1 000)	Number of surviving breeds within the species	% of world population	% of world breeds
Asses	8 019	20	11.4	12
Buffaloes	4 697	9	2.2	6
Cattle	70 462	58	3.4	4
Chickens	1 109 646	34	2.9	2
Ducks	11 702	6	1	3
Geese	11 550	2	3	1
Goats	104 452	46	7.6	7
Horses	734	19	0.3	2
Pigs	547	1		0.10
Pigeons	N/A	8		12
Rabbits	9 660	8		3
Sheep	185 953	67	8.4	5
Turkeys	8 233	6	0.7	4

Source for population size: FAOSTAT estimates of 2005 live animal populations.

¹ Throughout this section “Region” is defined according to the FAO official definition, which contains more countries than those considered elsewhere in this report.

FIGURE 4
Population data status and index for mammalian breeds recorded by the countries of the Near and Middle East region up to December 2005



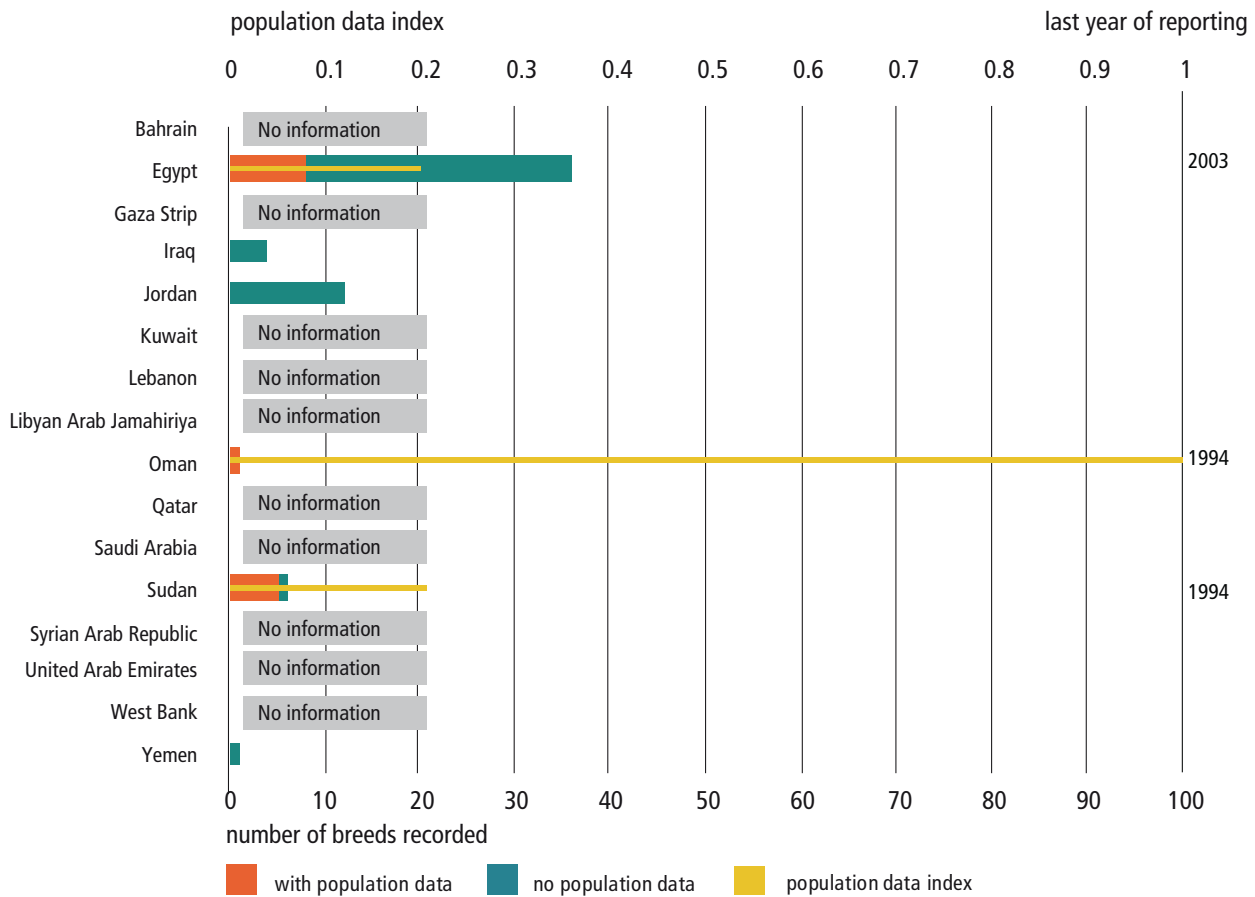
With population data: Those breeds with information recorded in one or more of the 16 population data fields.

No population data: Those breeds with no information recorded in any of the 16 population data fields.

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.

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FIGURE 5
Population data status and index for avian breeds recorded by the countries of the Near and Middle East region up to December 2005



With population data: Those breeds with information recorded in one or more of the 16 population data fields.

No population data: Those breeds with no information recorded in any of the 16 population data fields.

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.

In the whole Near and Middle East region, 14 avian breeds have recorded population data, while 46 breeds lack data (Table 6). For mammalian breeds, population data are available for 127 breeds, while for 172 they are not available. To date, animal censuses in the region have recorded animals by species and gender, and sometime by age-class, but not by breed.

TABLE 6
Population data index

Class	Population data index	Breeds with population data	Breeds without population data
Birds	0.16	14	46
Mammals	0.20	127	172

Table 7 shows, for all major species, a considerable increase during the period 2000 to 2005 in the number of breeds reported in the region. This is not a genuine increase; rather, countries have become increasingly aware of the importance of providing data on their AnGR and have reported more of the existing breeds.

TABLE 7
Changes in the number of reported breeds from 2000 to 2005

Species	Number of breeds (2000)	Number of breeds (2005)	Change (%)
Asses	16	21	31
Buffaloes	7	9	29
Cattle	38	60	58
Chickens	22	34	55
Dromedaries	10	25	150
Ducks	0	6	-
Goats	33	46	39
Geese	0	2	-
Guinea fowl	1	1	No change
Horses	13	19	46
Pigs	0	1	-
Pigeons	1	8	700
Rabbits	5	10	100
Sheep	51	68	33
Turkeys	0	6	-

Among recorded national breed populations in the Near and Middle East region, 89.3 percent are domesticated, 3.5 percent are feral and 3.1 percent are wild; in 10.1 percent of the breed populations, status has not been specified.

3.2 Origins of the region's animal genetic resources

The origin of a breed can be broadly classified as either "local" or "imported", or in cases where the origin is not known, as "undefined". Table 8 shows that there are many breeds that have been imported but could not adapt to the local production environments. These are mainly sheep breeds and to some extent cattle. Starting in the middle of the last century many sheep breeds were imported for experimentation as well as for flock establishment. The great majority of these introductions failed. The number of imported but not locally-adapted breeds as a percentage of the total number of imported breeds in the region is much less than the equivalent percentage globally – 14 percent vs. 35 percent, respectively. The data in Table 8 should be treated with caution as there is possible double counting; for example, Chios introduced to the Libyan Arab Jamahiriya and to Egypt would count as two introductions. The most prominent among the imported but locally-adapted breeds are Holstein-Friesian and Jersey cattle and some poultry breeds. Imported breeds include intra-region importations of Awassi sheep and Damascus goats.

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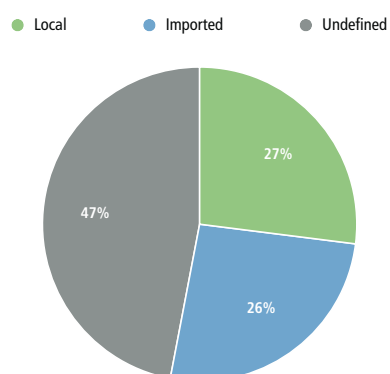
TABLE 8
Origin of the breeds found in the Near and Middle East

	Local*	Imported but locally adapted	Total local breeds	Imported	Imported and not locally adapted	Total imported	Undefined**	Total
Near and Middle East	79	19	98	43	50	93	166	357
World	2 355	456	2 811	2 058	2 370	4 428	5 342	12 581

* Including native, indigenous and autochthonous breeds.

** including composites and cross-breeds.

FIGURE 6
Share of local and imported breeds among the breeds of the Near and Middle East



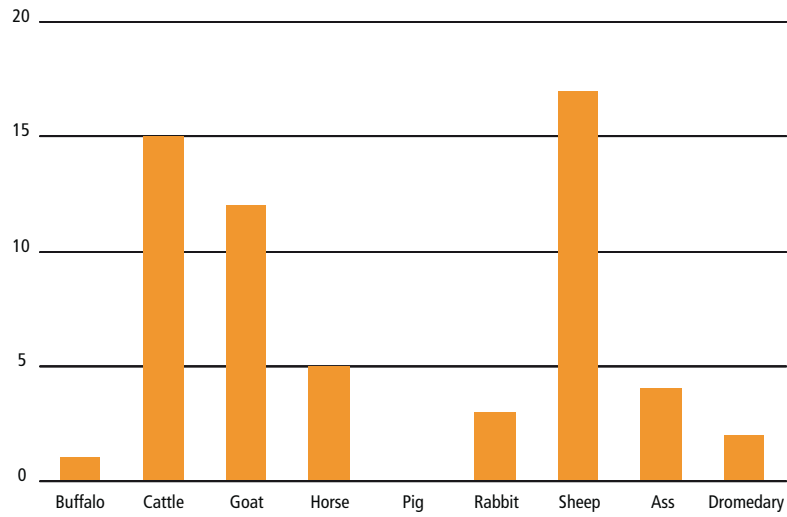
For comparison, 22 percent of all the world's breeds are local, 35 per cent are imported and 43 per cent are undefined.

3.3 International transboundary breeds in the region

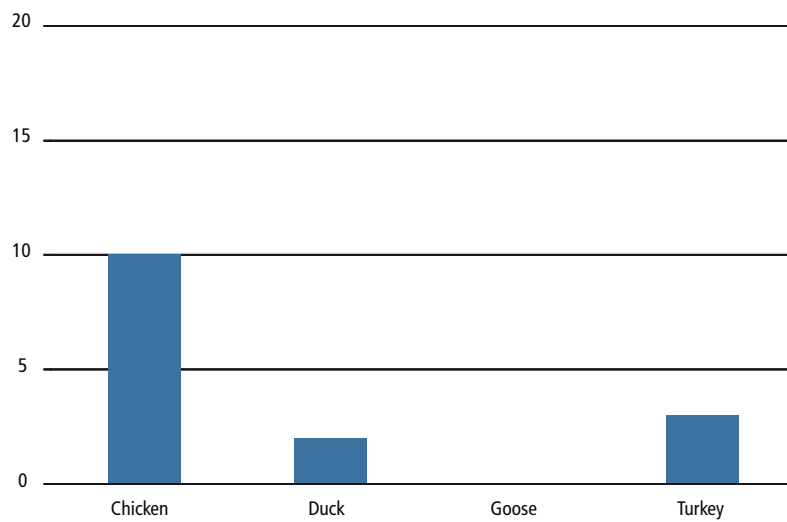
Breeds are not necessarily confined to one region but can sometimes be found in more than one region. These breeds are referred to as "international transboundary breeds". Figures 7 and 8 show the number of international transboundary breeds in the Near and Middle East region.

FIGURE 7

Number of international transboundary mammalian breeds in the Near and Middle East

**FIGURE 8**

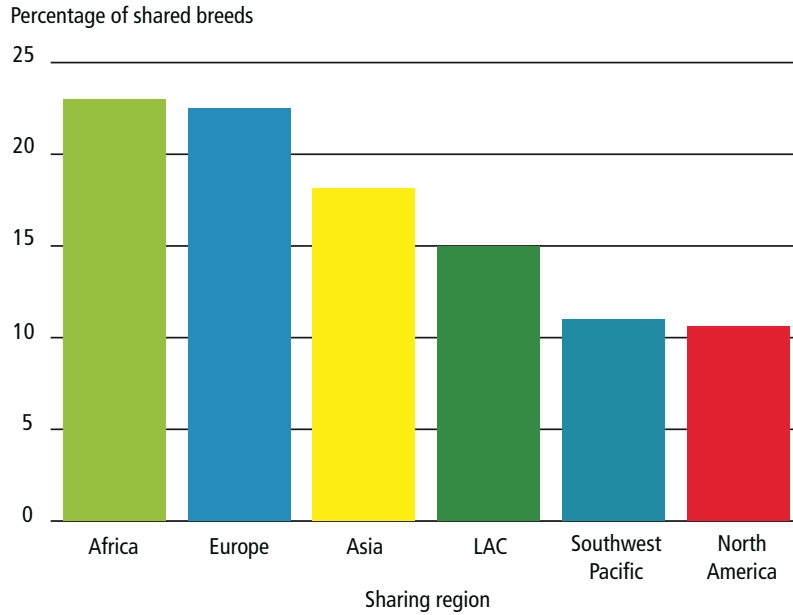
Number of international transboundary avian breeds in the Near and Middle East



The Near and Middle East shares these international transboundary breeds with the other six regions at the percentages given in Figure 9.

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FIGURE 9
Regions sharing international transboundary breeds with the Near and Middle East



LAC = Latin America and the Caribbean.

3.4 Breed risk status

Most of the breeds in the Near and Middle East region are classified as “not at risk” (48 percent) and “unknown risk status” (48 percent). Only 2 percent of breeds are classified as at risk while 2 percent are already extinct (Figure 3.7). Many countries do not have the breed population data necessary to adequately monitor the risk status of their breeds (Figures 3.1 and 3.2). Countries that have a high population data index (see above for definition), such as Kuwait for mammalian species and Oman for avian species, have very small numbers of the respective breeds, which are therefore easy to track. Otherwise, countries that have population data have a population data index of around 30 percent for mammalian species and 20 percent for avian species. Examples of extinct breeds are the Totom sheep of Bahrain and the Giza White and Egypt Baladi White rabbits of Egypt.

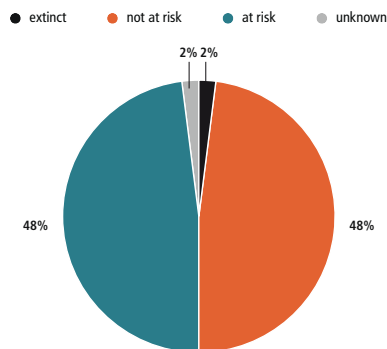


FIGURE 10
Percentage of breeds by risk-status category

Figures 11 and 12 show the risk status – absolute numbers (table) and percentage (chart) – of mammalian and avian breeds respectively, as recorded up to December 2005.

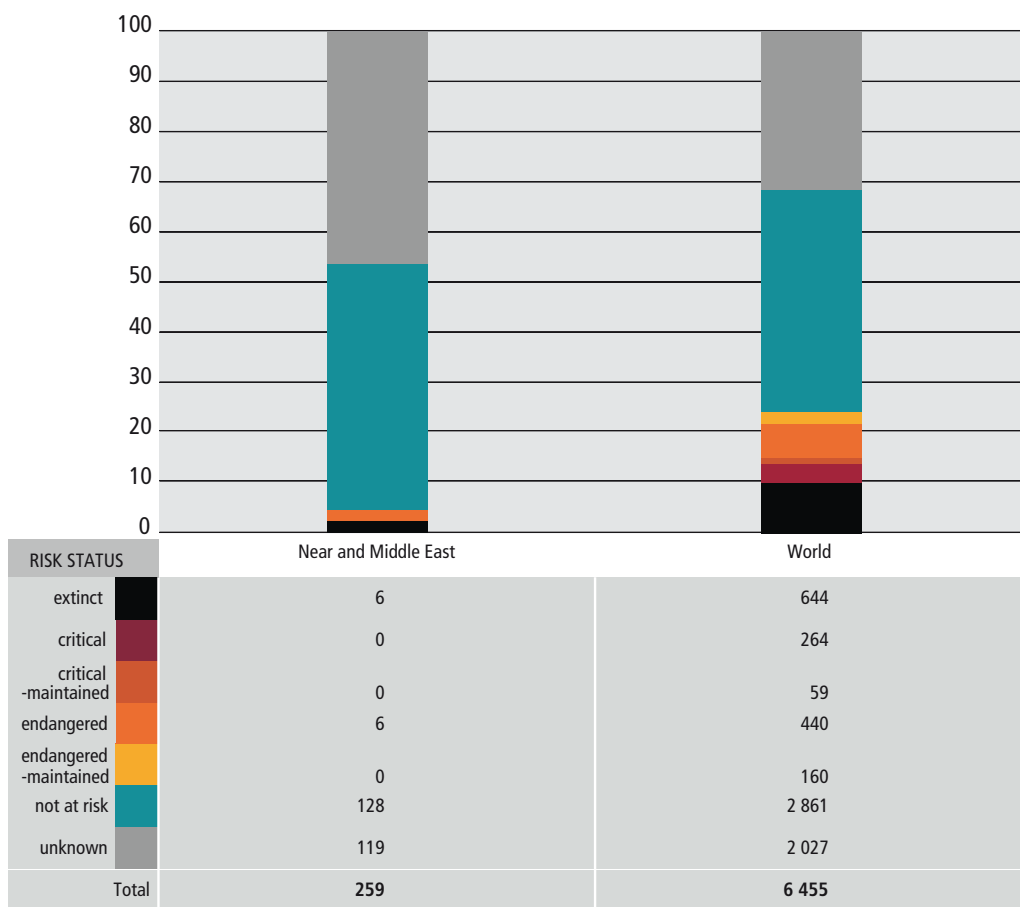
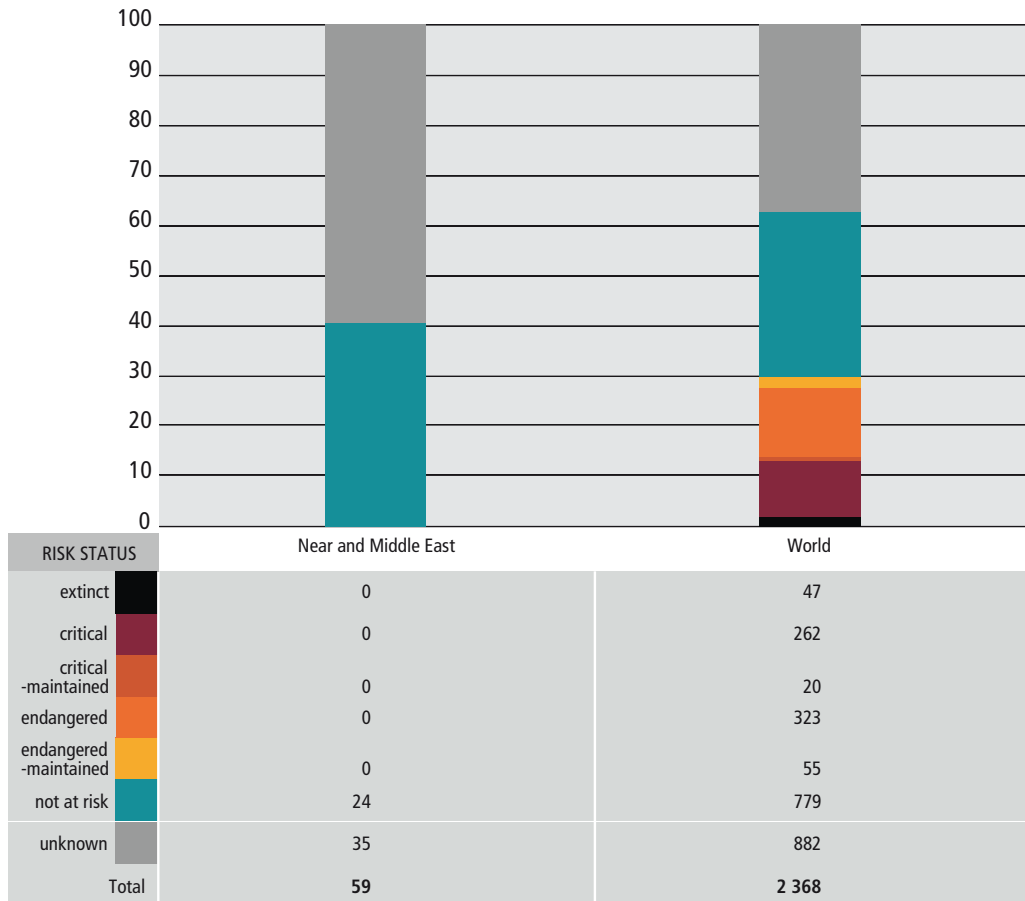


FIGURE 11
Risk status of mammalian breeds in the Near and Middle East recorded up to December 2005: absolute (table) and percentage (chart) figures

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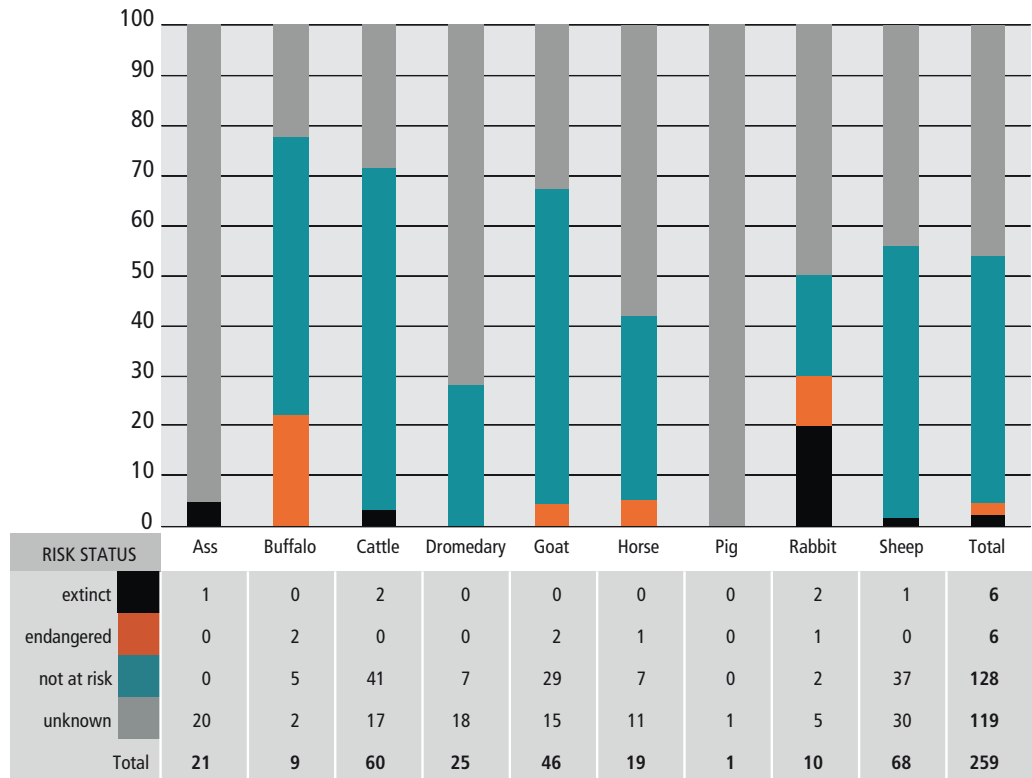
FIGURE 12
Risk status of avian breeds in the Near and Middle East recorded up to December 2005: absolute (table) and percentage (chart) figures



The following two figures and tables show the risk status of breeds by species (mammalian and avian, respectively).

FIGURE 13

Risk status of mammalian breeds in the Near and Middle East recorded up to December 2005: absolute (table) and percentages (chart) figures – by species



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FIGURE 14

Risk status of avian breeds in the Near and Middle East recorded up to December 2005: absolute (table) and percentages (chart) figures – by species

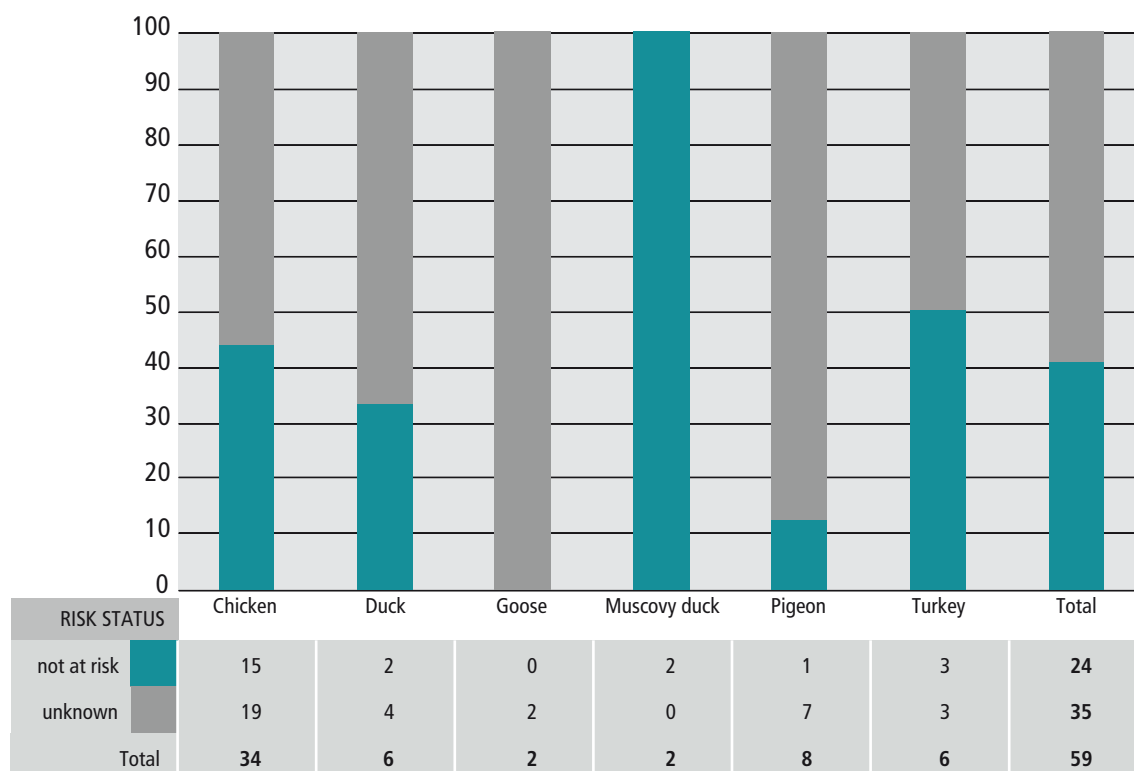


TABLE 9

Percentage change in the number of breeds within risk-status categories between 2000 and 2005

Risk status	Number of breeds in 2000	Number of breeds in 2005	Change (%)
endangered	13	6	-54
extinct	5	6	20
not at risk	116	152	31
unknown	64	154	141

3.5 Prospects for animal genetic resources

Changing functions

With increasing mechanization and the greater use of inorganic fertilizers, the status of work animals has suffered greatly. In many countries, asses have been abandoned to fend for themselves, and native cattle receive much less attention. Horses have sustained their status in some countries for their aesthetic, leisure and sentimental values, an example being the Arabian horse which originated in this region. In other countries, Egypt for example, horses are still significant for transport purposes. The camel has been sustained in many countries for heritage reasons.

Threats to animal genetic resources

The AnGR that is most at risk are local cattle and poultry breeds. These breeds had been under selection, mainly natural, for characteristics that differ from those that are currently required under the dominant production systems. Little effort has been made to define the role of these breeds in a changing situation. As the main driving force of livestock development in the region is the need to provide animal protein to meet the growing demand in the short term, little consideration has been paid to environmental and sustainability issues. In this context, local breeds are sometimes wrongly thought of as things of the past. However, there is rising awareness of their importance, especially in situations where the introduction of exotics has resulted in failure. For example, in many herds in many countries of the region, the average lactation milk yield in Friesian cows is less than one-third of their genetic potential. Exotic breeds have an important role to play in increasing national production, but their use must be rationalized and the proliferation of their genetics must be brought under control. The countries of the region have also benefited from the introduction of breeds native to the region itself, such as the Awassi sheep and Damascus (Shami) goats introduced from the East-of-Mediterranean countries to nearly all other countries in the region.

The most serious factors negatively affecting AnGR are the introduction of exotic breeds and the indiscriminate crossing that accompanies this introduction, and the decline of traditional livestock functions. The introduction of dairy cattle breeds, especially Friesian-Holstein, has greatly impacted local cattle breeds while the introduction of New Zealand and California rabbit breeds in Egypt has led to the disappearance of two local rabbit breeds. The loss of traditional functions has negatively affected cattle, equines, and to some extent camels.

Disease, especially zoonoses, has greatly affected the livestock industry, but only in the short run. Its impact on AnGR is still to be evaluated. During the BSE crisis in Europe and elsewhere, consumption in countries of the region shifted to camel, small ruminant and buffalo meat. In Egypt, the impact of the recent pandemic of avian influenza on avian genetic resources is still to be assessed. The government legislation requiring that all backyard and free-ranging poultry production systems be greatly modified or abandoned could negatively affect local breeds which provide most of the birds for such production systems. The abandonment of such systems also has gender and poverty-alleviation implications, which must be addressed.

Urbanization, rising education levels and changing lifestyles are contributing to changes in livestock production systems. Younger generations are less eager to work as shepherds or animal keepers. Most such jobs in most Gulf States are occupied by expatriates.

4 State of institutional capacity to manage animal genetic resources

The region greatly lacks institutions for the management of AnGR. Institutions exist which cater for livestock production, but do not directly focus in AnGR management. There is a lack of appreciation that while AnGR management is an integral part of animal production, it is a field of a special nature which requires multidisciplinary orientation and networking. Lack of institutional capacity in the region is evident from the following:

- virtually no breed associations exist in the countries of the region except for hobbyist associations, like that of the Shami (Damascus) goat in Kuwait, whose main interest is to emphasize the fancy characteristics of the breed rather than performance;
- the role of NGOs and the participation of different stakeholders, especially farmers, in structures for AnGR management are absent or at best minimal;
- there is a lack of national recording systems – the existing recording takes place in state farms and some isolated herds and flocks;
- no country in the region has established an effective National Focal Point or has a National Coordinator actively involved in the manner detailed in FAO guidelines;
- no Regional Focal Point is in existence; and
- no real or virtual institutional structures exist in any country in the region whose main concern is AnGR management in its entirety, i.e. breed identification, breed characterization, breed development, breed surveying, monitoring and determination of risk status, and breed conservation.

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In nearly all countries in the region, training in all aspects of AnGR management is needed –more specifically:

- systematic characterization, both phenotypic and genetic;
- genetic evaluations – evaluation of crossing experiments, estimation of breeding value;
- molecular genetics techniques;
- embryo transfer and related technologies, e.g. MOET, and artificial insemination;
- networking;
- establishing national recording systems;
- AnGR conservation; and
- establishing gene banks.

National and regional institutions capable of offering a reasonable level of training in many of the above-mentioned fields exist in the region, but achieving this objective would require improved regional networking.

Legislation

There are many laws dealing with livestock in general: hygiene, slaughterhouses, quarantines etc., but there is very little that deals specifically with AnGR management. Some countries have laws to protect specific animals (mainly wild) from extinction, and others have regulations stipulating the genetic level of imported semen from dairy sires.

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Annex

Classification of livestock production systems

FAO (1996)² used the agro-ecological zones (AEZ) described by the Technical Advisory Committee (TAC, 1994)³ and provided a comprehensive description of global livestock production systems using quantitative statistical methods. In this system the distinction is based upon grassland-based systems (LG), mixed-rainfed systems (MR), mixed irrigated systems (MI) and landless systems (LL). The landless livestock production systems are not linked to agro-ecological zones.

- Grassland-based systems (LG) are livestock systems in which more than 90 percent of dry matter fed to animals comes from rangelands, pastures, annual forages and purchased feeds and less than 10 percent of the total value of production comes from non-livestock farming activities. Annual stocking rates are less than 10 livestock units per hectare of agricultural land. A further distinction is made between Temperate Zones and Tropical Highlands (LGT), Humid and Subhumid Tropics and Subtropics (LGH) and Arid and Semi-arid Tropics and Subtropics (LGA).
- Mixed-rainfed systems (MR) are defined as rainfed systems in which more than 10 percent of the dry matter fed to livestock comes from crop by-products and/or stubble or more than 10 percent of the value of production comes from non-livestock farming activities. A further distinction is made between Temperate Zones and Tropical Highlands (MRT), Humid and Subhumid Tropics and Subtropics (MRH) and Arid and Semi-arid Tropics and Subtropics (MRA).
- Mixed-irrigated systems (MI) are defined as irrigated systems in which more than 10 percent of the dry matter fed to livestock comes from crop by-products and/or stubble or more than 10 percent of the value of production comes from non-livestock farming activities. A further distinction is made between Temperate Zones and Tropical Highlands (MIT), Humid and Subhumid Tropics and Subtropics (MIH) and Arid and Semi-arid Tropics and Sub-tropics (MIA).
- Landless systems are defined as those where less than 10 percent of the dry matter consumed is produced on the farm where the livestock are located, and where annual average stocking rates are above 10 livestock units (1 LU = 1 cattle or buffalo or 8 sheep or goats) per hectare of agricultural land. Furthermore, landless monogastric (LLM) and landless ruminant systems (LLR) are distinguished. The former are mainly industrial, intensive and vertically-integrated pig and poultry enterprises whose economic outputs are higher than those of ruminant enterprises. In landless ruminant systems, the value of production of the ruminant enterprises is lower than that of the pig and poultry enterprises.

² FAO. 1996. *World livestock production systems. Current status, issues and trends*, by C. Seré, H. Steinfeld & J. Groenewold. FAO Animal Production and Health Paper No. 127. Rome.

³ TAC. 1994. *Animal agriculture in developing countries: technology dimensions*. Development Studies Paper Series. Morrilton, Arkansas. Winrock International.



Regional priorities: the Near and Middle East

Representatives of governments and academic institutions from Egypt, Iraq, Kuwait, Lebanon, Oman, the Sudan, the Syrian Arab Republic and Yemen, who attended the ICARDA/FAO workshop on animal genetic resources (AnGR), agreed on regional priorities in the fields of inventory, characterization, utilization and conservation of AnGR.

1 Inventory, monitoring and characterization

- Enhance research on breed performance for economic traits, including disease resistance and adaptability under the prevailing production systems.
- Carry out national censuses for each breed (national).
- Provide technical assistance from regional and international organizations to countries in need, to enable priority actions to be undertaken.
- Strengthen the dissemination of the results of AnGR research.
- Monitor changes in the socio-economic framework, traditional knowledge and production systems, and their influences on AnGR.
- Enhance exchange of experiences between stakeholders within the region through networking, technical meetings and the establishment of a Regional Focal Point for AnGR (RFP).

2 Utilization

- Assess the suitability of, and develop plans for, exotic AnGR and their crosses for breeding and production in medium and high-input systems.
- Enhance efforts to evaluate and improve the productivity of local breeds especially in low-input production systems.
- Provide technical assistance for human resource development from regional and international organizations to countries in need, to enable priority actions for AnGR to be implemented.
- Enhance exchange of experiences between stakeholders within the region through networking, technical meetings and the establishment of an RFP.
- Strengthen dissemination of the results of AnGR research.
- Develop joint action on genetic resources management with regard to common breeds, especially Awassi and Barbary sheep, Shami goats, Magrabi camel and Arabian horses.
- Identify opportunities to enhance the use of underutilized species and breeds and develop niche markets for their products.

3 Conservation

- Encourage research institutions to develop *ex situ* cryoconservation systems for materials such as semen, embryos, ova and somatic tissues.
- Establish and enhance regional and subregional genebanks for AnGR.
- Develop research and development funding proposals for the conservation and management of AnGR.

4 Policies, institutions and capacity building

- Enhance awareness among policy-makers and the public of the contribution of livestock to national economies, food security and poverty alleviation.
- Review and analyse current livestock policies and other factors affecting AnGR diversity and improve integration of policies and legislation among various sectors.
- Encourage the formation of NGOs and other networks to help establish breed associations.
- Develop funding proposals for policy research on the conservation and management of AnGR.
- Provide technical assistance from regional and international organizations to countries in need, to enable priority actions for AnGR to be implemented.
- Enhance exchange of experiences between stakeholders within the region through networking, technical meetings and the establishment of an RFP.
- Strengthen dissemination of the results of AnGR research.
- Participating countries agreed that ICARDA would host the RFP for AnGR for the Near and Middle East Region.
- RFP commitment is in accordance with the terms of reference developed by FAO, in association with other regional and subregional organizations and member states and within the structure of the Global Strategy for the Management of Farm Animal Genetic Resources.
- ICARDA will establish a secretariat for the RFP and its allied structure; it is proposed that members of the steering committee will represent regional organizations, and rotating country membership from North Africa, West Asia, the Arab Peninsula, and the Nile Valley and Red Sea.