

Subregional Report on
Animal Genetic Resources:
the Caribbean



Acknowledgements

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Contents

Introduction	5
Part 1 Subregional factsheet: the Caribbean	7
1 Importance of livestock to subregion's economy and food security	7
1.1 Climate and natural resources	7
1.2 Agriculture	9
1.3 Production and consumption	10
1.4 Imports and exports	11
1.5 Projected demand for livestock products	13
2 Livestock production systems	14
2.1 Overview	14
2.2 Production system trends	15
2.3 Impact of production trends on animal genetic resources	17
3 Animal Genetic Resources	17
3.1 Status	17
3.2 Threats to animal genetic resources in the Caribbean	24
3.3 Unique resources highlighted	24
References	25
Annex	27
Part 2 Subregional priorities: the Caribbean	29

TABLES

1. Land area and population	8
2. GDP and the contribution of agriculture	8
3. Land use	9
4. Annual growth rates for the Caribbean	14
5. Resource base, production and productivity figures of the different production systems found in the Caribbean	16
6. Total population size and number of breeds of the major livestock species in the Caribbean and their share of the world total	17
7. Transboundary mammalian breeds in the Caribbean	18
8. Transboundary avian breeds in the Caribbean	19

FIGURES

1. Total meat, milk and egg production in the Caribbean	10
2. Import of live animals and primary livestock products in the Caribbean	12
3. Export of live animals and primary livestock products in the Caribbean	12
4. Past and projected meat, milk and egg production	13
5. Risk status of mammalian breeds recorded in the Caribbean up to December 2005: absolute (table) and percentage (chart) figures	20
6. Risk status of avian breeds recorded in the Caribbean up to December 2005: absolute (table) and percentage (chart) figures	21
7. Population data status and index for mammalian breeds recorded by countries of the Caribbean subregion up to December 2005	22
8. Population data status and index for avian breeds recorded by countries of the Caribbean subregion up to December 2005	23

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 subregion'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 a workshop held in Kingston Jamaica, 22–24 November 2004. Participants from eight Caribbean countries attended (Antigua and Barbuda, Bahamas, Barbados, Jamaica, Saint Lucia, Saint Vincent and the Grenadines, Suriname, and Trinidad and Tobago).



Subregional factsheet: the Caribbean

1 Importance of livestock to subregion's economy and food security

1.1 Climate and natural resources

The countries of the Caribbean subregion, as defined for the purposes of this report, comprise Antigua and Barbuda, the Bahamas, Barbados, Belize, Dominica, Grenada, Guyana, Jamaica, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Suriname, and Trinidad and Tobago. Except for Belize, Guyana and Suriname, these are all island states. The countries of the subregion are diverse in terms of population, size, income, ethnic composition, and political status. Grenada's 100 000 residents live on an island of 340 km², whereas Jamaica has a population of 2.6 million and a territory of nearly 11 000 km². The per capita gross domestic product (GDP) of the Bahamas is more than four times as large as that of Jamaica. Trinidad and Tobago's population is evenly divided between people of African descent and people of South Asian descent, a pattern quite different from that on the other islands, which have predominantly African-derived populations (Knight, 1989). In 2003 the total human population of the Caribbean subregion was estimated to be 6.5 million, an increase of almost half a million people since 1993.

The topography of the individual islands varies from mostly flat lowlands (a few metres above sea level) to very mountainous highlands. Although in general the Caribbean climate is tropical (typically hot and wet), relatively cool and dry areas are also found within the subregion. Climatic conditions are strongly dependent on elevation. In the coastal lowlands, the surrounding maritime environment has a moderating effect on average temperatures. The geological substrate in most parts of the subregion originated from volcanic activities and where rainfall is not a limiting factor the natural vegetation is very lush and biodiversity abounds. The subregion is prone to severe weather disturbances, such as tropical storms and hurricanes, which can cause severe damage to the agricultural sector.

Although the countries appear disparate, the differences should not obscure the extensive ties that bind the islands of the Commonwealth Caribbean (formerly the Caribbean portion of the British Empire). The islands' populations clearly regard themselves as distinct from their Latin American neighbours (Knight, 1989). A summary of general information for the subregion is shown in Tables 1 to 3.

THE CARIBBEAN

TABLE 1
Land area and population

	Land area (km ²)	Population 2003	Population density (km ²)	Population growth rate (% per annum)	
				1975–2003	2003–2015
Antigua and Barbuda	440	100 000	227	0.9	1.2
Bahamas	10 000	300 000	30	1.8	1.3
Barbados	430	300 000	698	0.3	0.2
Belize	23 000	300 000	13	2.4	1.8
Dominica	750	100 000	133	0.3	0.9
Grenada	340	100 000	294	0.4	1.3
Guyana	197 000	700 000	4	0.1	-0.1
Jamaica	11 000	2 600 000	240	1	0.4
Saint Kitts and Nevis	360	40 000	117	-0.2	1.1
Saint Lucia	610	200 000	328	1.3	0.8
Saint Vincent and the Grenadines	390	100 000	256	0.7	0.4
Suriname	156 000	400 000	3	0.7	0.5
Trinidad and Tobago	5 000	1 300 000	253	0.9	0.3

Data from UN and FAO statistics.

TABLE 2
GDP and the contribution of agriculture

	GDP ¹ 2003 (US\$ billions)	GDP ¹ per capita 2003 (PPP US\$ billions)	Value added in agriculture ² 2003 (% of GDP)	Agricultural population ¹ 2003 (% of total)
Antigua and Barbuda	0.8	10 294	.	16
Bahamas	5.3	17 159	.	3
Barbados	2.7	15 720	5	3
Belize	1.0	6 950		25
Dominica	0.3	5 448	18	18
Grenada	0.4	7 959	10	18
Guyana	0.7	4 230	31	18
Jamaica	8.2	4 104	5	20
Saint Kitts and Nevis	0.4	12 404	3	21
Saint Lucia	0.7	5 709	5	17
Saint Vincent and the Grenadines	0.4	6 123	9	27
Suriname	1.0	.	9	20
Trinidad and Tobago	10.5	10 766	1	8

¹ Data from UN and FAO statistics.

² Data from World Bank statistics.

TABLE 3
Land use

	Arable (%)		Permanent pasture (%)		Forest/woodland (%)	
	1993	2003	1993	2003	1993	2003
Antigua and Barbuda	18	18	9	9	11	.
Bahamas	1	1	0	0	32	.
Barbados	37	37	5	5	12	.
Belize	3	3	2	2	92	.
Dominica	5	7	3	3	67	.
Grenada	6	6	3	3	9	.
Guyana	2	2	6	6	84	.
Jamaica	16	16	21	21	17	.
Saint Kitts and Nevis	22	19	6	6	31	.
Saint Lucia	8	7	5	3	13	.
Saint Vincent and the Grenadines	13	18	5	5	36	.
Suriname	0	0	0	0	96	.
Trinidad and Tobago	15	15	2	2	46	.
Average	2	2	4	4	85	.

¹ Data from UN, FAO and World Bank statistics.

1.2 Agriculture

Historically, agriculture has played a dominant role in the economies of Caribbean countries. Agriculture and forestry occupy most of the land, and in many countries it is an important foreign exchange earner and employer of the labour force. In Guyana for example, agriculture's contribution to GDP was 31 percent in 2003. However, Caribbean agriculture faces a number of challenges, foremost among these being globalization (FAO, 2001). In both agriculture and forestry, only a small number of commodities are produced on a commercial scale and these are generally exported as raw materials. Many countries in the region rely upon a limited number of export crops, and their agriculture-based economies are therefore vulnerable to world price fluctuations (FAO, 1995).

During the sixteenth and seventeenth centuries the economy of the Caribbean was based on tobacco production. During the seventeenth century the economy and life of the islands was transformed as sugar plantation agriculture based on African slave labour replaced the previous society of small landholders. In the 1980s, the sugar industry was beset by inefficient production, falling yields, a steady erosion of world prices, and a substantial reduction in United States import quotas (Knight, 1989). Agriculture produce was quite varied in the 1980s and 1990s, and included bananas, sugarcane, citrus products, coffee, cocoa and coconut. From the 1990s onwards Caribbean countries have been promoting diversification of their food and agricultural production. Vegetables, tropical fruits, root crops, spices, livestock and feed grains are increasingly important (FAO, 1995).

Today, Caribbean agriculture is being threatened by external and internal forces such as trade liberalization, rural migration and competition from other sectors (e.g. tourism). In the Windward Islands, bananas which were once considered "green gold" have come under severe pressure from the so-called "dollar bananas" of Latin America. Likewise, diminishing quotas and low prices for commodities such as sugar, cocoa and coffee have affected exports (FAO, 2001).

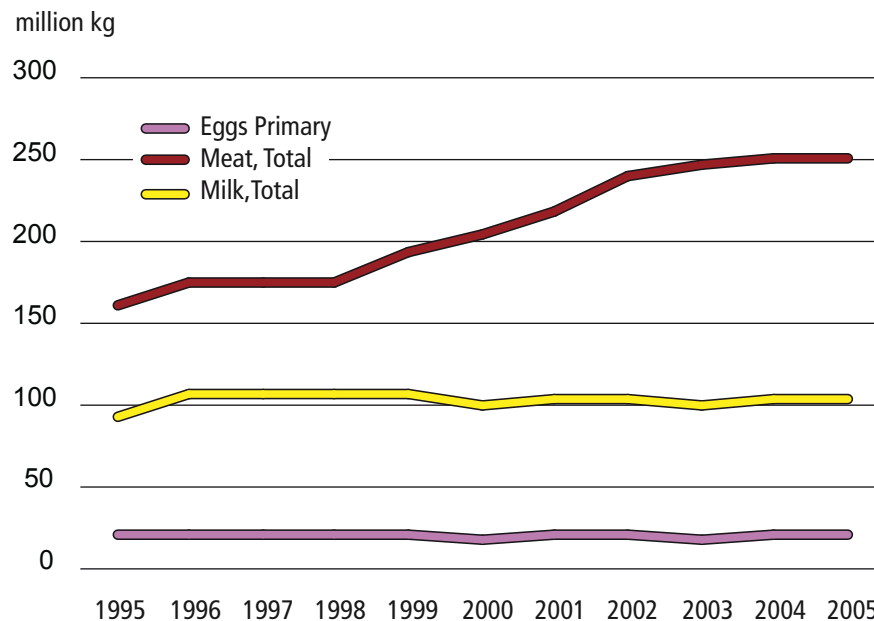
Despite these declining fortunes, agriculture still plays an important role in the region's economy, as a source of foreign exchange, employment and food security. Furthermore, it has the potential to contribute to economic growth through the expansion of exports and import substitution, especially in countries with limited natural resources. Linkages between agriculture and tourism through ecotourism and agritourism are additional options for agricultural development (FAO, 2001).

1.3 Production and consumption

Livestock production varies in importance across the subregion depending on the environment and culture. Production and consumption figures reflect subregion-specific livestock species and products (FAO/UNEP, 2000). Jamaica has the biggest livestock sector in the subregion, and although its livestock sector has failed to show sustained growth over the last three decades, the country has well-developed poultry and other livestock industries. The livestock industry as a whole has been affected by trade liberalization policies, cheaper imports, and the "dumping" of subsidized commodities from other countries onto the local market, leading to serious declines in local production (Lopez *et al.*, 2004). Apart from a few large commercial operations, most livestock owners in Jamaica are smallholder farmers who rear goats, pigs and sheep for the local market and for their own consumption (IAEA, undated).

Due to the high costs of food imports, there is a pressing need to improve livestock production. Present livestock production utilizes low-quality pastures and less than adequate stock and pasture management (IDRC, 1999). Figure 1 shows production figures for meat, milk and eggs in the Caribbean during the 1995 to 2005 period.

FIGURE 1
Total meat, milk and egg production in the Caribbean



Source: FAOSTAT.

Among the livestock products produced in the subregion, meat has the highest production figures. However, the production of the Caribbean accounts for only 0.1 percent of total world meat production. Jamaica produces more than 40 percent of the total meat production of the Caribbean. Meat production increased by 54 percent in the ten-year period 1995 to 2005, an annual growth rate of 4.4 percent. Growth was particularly high in the period from 1998 to 2002, with an annual growth rate of 8.3 percent. Chicken meat makes up more than 80 percent of total meat production (FAOSTAT). The poultry industry in Jamaica – Jamaica produces 40 percent of all Caribbean chicken meat – has become highly competitive, but is still unable to meet local demand (Lopez *et al.*, 2004). Guyana showed a 12 percent annual increase in production of chicken meat during the last decade (FAOSTAT). After poultry, beef and veal are the most important meat products in the Caribbean; Jamaica produces more than 60 percent of the subregion's total beef and veal meat. Pig meat is the third most important meat industry in the subregion. Jamaica produces more than one-third of the total pig meat produced in the Caribbean. The pig meat industry has had its problems, and has also been affected by cheaper imports (Lopez *et al.*, 2004).

In the period 1993 to 2003, meat supply per capita per year in the Caribbean increased at an annual rate of 1.9 percent, which is above the world average of 1.4 percent. Per capita supply of meat in the Caribbean is on average 16 kg higher than the world level. In 2003 poultry meat was the meat with the highest consumption in the region – supply was 39 kg per capita, 27 kg above the average world level. Chicken is the meat with the highest consumption in the subregion, because of its quality and low cost. Since 1993 per capita supply of poultry meat increased by 2.8 percent per year. Supply of pig meat is below the average world level, but the growth rate is significant. Supply of bovine meat is below the average world level, and even decreased by almost 2 percent since 1993. Supply of goat meat and mutton is above the average world level. Caribbean Islanders have a strong preference for goat meat (Schoenian, 1998). In Jamaica, curried goat and manish water (goat head soup) are popular. Most of the lamb is consumed by the tourist trade (*ibid.*).

The dairy sector is the livestock industry that has suffered the most serious setbacks in recent years. Supply of milk per capita in the subregion decreased by 13 percent from 1993 to 2003 and was lower than the average world level in 2003 (FAOSTAT). Only Belize and Guyana showed a strong growth in milk production in the last decade; Belize had 11 percent annual growth, albeit from a small base. Guyana is now the biggest milk producer in the Caribbean. In Suriname, milk production fell after 1996, with a decrease of more than 7 percent per annum.

In Jamaica – the second biggest dairy producer in the Caribbean – fresh milk production for local consumption has rarely exceeded 15 percent of local demand over the years. A significant proportion is processed into condensed milk because of the demand for a milk product that does not require refrigeration. Cheaper imported milk powder has affected farmgate prices, causing many dairy farms to go out of production. In 1993, 53 million litres of milk were produced in Jamaica. One year later this dropped to 26 million litres. Despite projections of recovery and an increase in taxes on imports, neither bank financing nor income tax relief to farmers has succeeded in promoting new investment in dairy farming (Lopez *et al.*, 2004). There is concern as to whether there will be sufficient milking animals and heifers to meet projected targets. Nevertheless, the dairy sector remains a potentially profitable industry (*ibid.*).

Egg production has shown only a slight increase – 0.1 percent per annum, during the last decade. About half of the countries in the subregion even decreased their egg production. Barbados and Belize, however, had a strong increase of more than 6 percent per annum (FAOSTAT).

1.4 Imports and exports

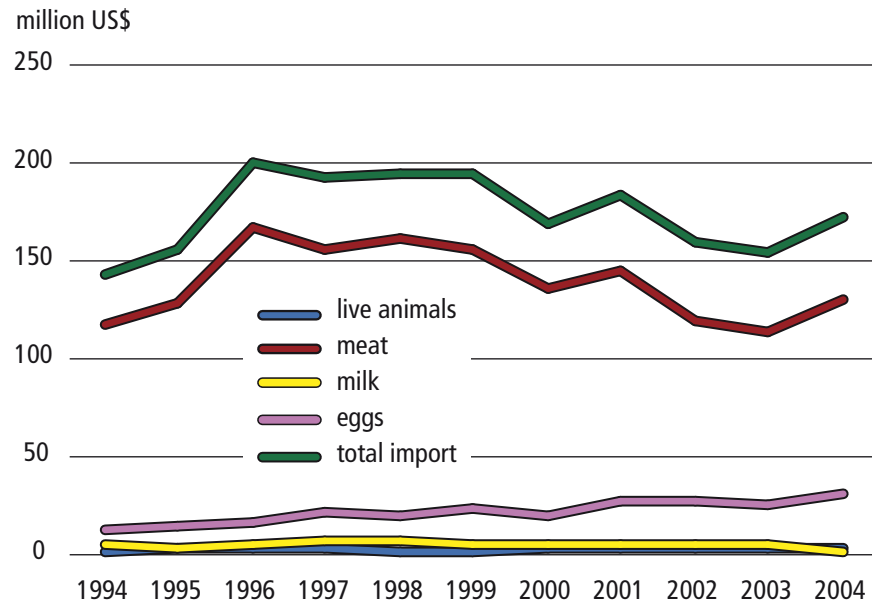
Figure 2 shows total imports of live animals and primary livestock products in the Caribbean. The countries of the Caribbean import far more live animals and primary livestock products than they export. The Caribbean subregion produces only about 15 percent of its demand for small ruminant products. Import figures indicate that the bulk of small ruminant products are from the United States of America, Australia and New Zealand (Fearon, 2002). The food import bill amounts to billions of US dollars (Jean, 2005).

In Grenada, the livestock industry remains relatively undeveloped despite being considered a “high-priority” by successive governments, and its potential, especially for import substitution, has not been realised. The country imports most of its livestock products, mainly from the United States of America. It is self-sufficient in egg production, but imports 94 percent of the poultry meat consumed. Near self-sufficiency has been achieved for pig meat (FAO, 2006).

Imports increased up to 1996, but from 1996 onwards mainly decreased, with the exception of 2001. After 2003 there was again an increasing trend. The animal product imported in the largest quantities during the last decade was meat, of which poultry meat made up the largest part. Mutton and goat meat is another important import commodity. Imports of beef and buffalo meat decreased by 54 percent in the last decade, while imports of mutton and goat meat increased by 55 percent. Imports of pig and poultry also increased, both at 2 percent per annum during the last decade. Eggs are the second most important import commodity; imports increased 9 percent annually over the last decade. The import of live animals also increased at a rate of 5 percent per year. Conversely, imports of milk decreased significantly.

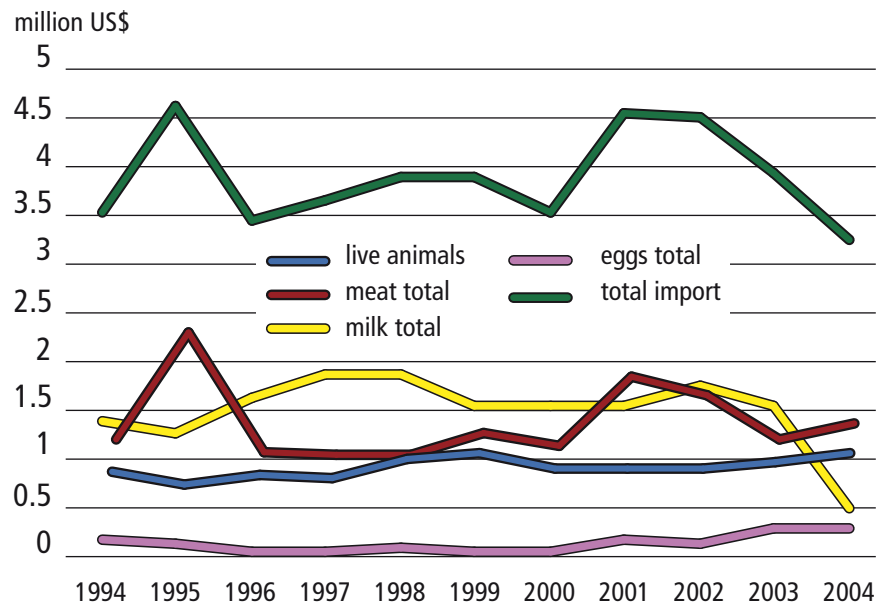
THE CARIBBEAN

FIGURE 2
Import of live animals and primary livestock products in the Caribbean



Source: FAOSTAT.

FIGURE 3
Export of live animals and primary livestock products in the Caribbean



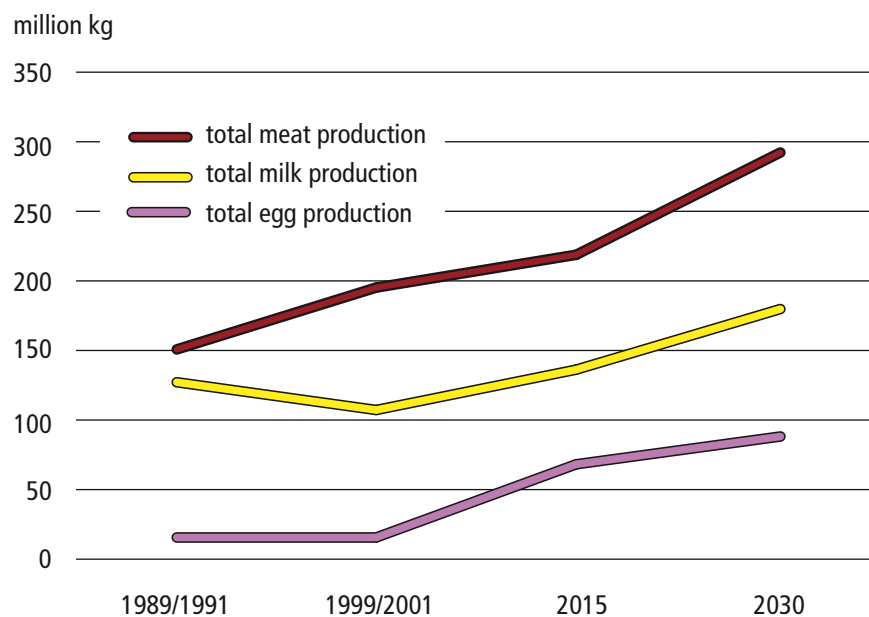
Source: FAOSTAT.

Figure 3 shows total exports of live animals and primary livestock products in the Caribbean. During the last decade, the total value of exports of live animals and primary animal products in the Caribbean showed a variable trend, but was very low overall. The decrease after 2001 was a result of the slowdown in world trade in 2001, further aggravated by the events of 11 September 2001 in the United States of America (IFAD, 2002). In view of the region's economic openness and its close economic links with the United States of America, the economic repercussions these events were felt much more in Latin America and the Caribbean than in any other part of the world (ibid.). Among livestock products, meat, milk and live animals are the most important export commodities of the Caribbean.

1.5 Projected demand for livestock products

Figure 4 shows that total milk, meat and egg production for the Caribbean are predicted to increase up to 2030.

FIGURE 4
Past and projected meat, milk and egg production



Source: FAO (2003b).

Annual growth rates for livestock numbers and meat, milk and egg production are shown in Table 4. It is predicted that annual growth rates for total livestock numbers and meat production will decrease over the period 2000 to 2015, and even become negative in the case of livestock numbers. Annual growth rates of milk and egg production will be higher in the period 2000 to 2015 than they were in the past, and egg production will show significant growth. However, only a few countries in the Caribbean – Guyana, Jamaica, Suriname and Trinidad and Tobago – will have egg production in the future.

TABLE 4
Annual growth rates for the Caribbean

	Annual percentage growth rate	
	1990–2000	2000–2015
Total livestock numbers	3.5	-1.0
Total meat production (kg)	2.7	0.7
Total milk production (kg)	-2.0	1.8
Total egg production (kg)	1.8	9.3

Source: FAO (2003b)

In Latin America overall, consumption of meat has historically been higher than in other parts of the developing world and is predicted to increase further (FAO, 2003a). The per capita demand for meat products is projected to rise to 64.3 kg in 2020. Over the next 20 years the intake of calories per capita is predicted to grow (van der Zijpp, 2003).

2 Livestock production systems

2.1 Overview

In this factsheet, livestock systems are described according to the classification developed by Seré and Steinfeld (FAO, 1996a) based on updated data from 2004. The classification distinguishes grassland-based systems, mixed rainfed systems, mixed irrigated systems and landless systems. A description of the classification system can be found in the Annex to this factsheet. According to this classification, three production systems can be found in the Caribbean, namely the mixed rainfed and mixed irrigated systems of humid/subhumid zones, and the land-less system.

By tradition, most Caribbean cattle owners are small-scale farmers who keep a limited number of cattle for their own needs. An exception is Antigua, where half the total cattle population of the Caribbean is found and farms tend to be larger (FAO, 2003c). Livestock production in Antigua is a low-input and low-output system in which growth of the herd represents the main priority. As a result, livestock numbers have increased significantly. Many of the cattle, along with small ruminants, graze on rough pasture that is communal land, often on former sugar estates. All livestock production is consumed locally (UNDP, 2001). Jamaica, Guyana, Trinidad and Tobago and Suriname are the other most important livestock producing countries of the Caribbean.

On most of the islands, cattle, sheep and goat herds and flocks are mostly small (Caribvet, undated). The livestock sector is dominated by part-time, landless livestock farmers who own small numbers of animals. Livestock production is often limited by health problems (e.g. the tropical bont tick *Amblyomma variegatum*), inadequate access to lands, absence of a livestock extension service and absence of organized, efficient livestock production and marketing systems (*ibid.*).

Jamaica has rather favourable conditions for livestock production and particularly for dairying. There is ample pastureland, no water shortage, and a well-adapted cattle breed, the Jamaica Hope. While there are two very large farms each with over 1 000 head of cattle, some 3 000 small and medium-sized dairy farms supply the bulk of domestic milk production. Small-scale producers, owning up to ten dairy cows, make up about 80 percent of the dairy farmers. In addition there are several thousands of beef cattle farmers (most of them with only a few animals) who also produce milk (Eurostep, 1999).

The mixed rainfed system is the most important system in terms of total population and production figures, although most poultry meat and eggs output comes from landless systems. In this system small ruminant production is more important; sheep and goat numbers are higher than cattle numbers. These are mostly owned by small landless farmers. Buffaloes are kept. Goats are tethered by women on roadsides or wastelands or fed on cut grass and crop residues (Osuji *et al.*, 1983).

Prior to the widespread use of inorganic fertilizers, inter-planted crops of cocoa, nutmeg, citrus and bananas were fertilised mainly with manure from pens of zero-grazed cattle. Animals were tied to

stakes in the fields and fed legumes, grasses, guinea grass, and crop or agroprocessing wastes. The organic matter, after a period of curing, was used on the crops (FAO, 1996b). Sugarcane cultivation was carried out on both estates and small farms with animals – water buffalo, Zebu or Creole cattle – providing traction and also, manure, meat and milk. Animals were fed on molasses, cane tops, grasses and legumes (ibid.). Coconut plantations had estate-owned or worker/peasant-owned cattle, small ruminants and pigs tethered between the trees. These animals controlled the under-storey vegetation at low cost, allowing a more complete harvest of fallen nuts. On larger estates, herds of cattle were (and are still) kept (ibid.). The small landholder, squatter or landless peasant practised mixed farming, growing mixtures of fruit trees, annual plants, vegetables, etc., and rearing free-range poultry for eggs and meat, and tethered pigs, sheep, goats or cattle on roadsides or open lands. Pigs were fed mainly on household wastes, sometimes collected from neighbours or institutions (ibid.).

Barbuda differs from the other islands in that it was not historically devoted to plantation agriculture. Cattle keeping is central to its economy and society. It reinforces the traditional form of land tenure essential to village integration. The social organization of cattle keeping promotes cooperative ties between members of different households and provides livelihoods for inhabitants who would otherwise have to emigrate. Cattle keeping provides resources during drought, strengthens external economic ties, and helps to sustain the corporation of a landholding village community (Berleant-Schiller, 1977).

Mules, donkeys, and horses are widely used for transport. In Trinidad and Tobago the water buffalo is an important draught animal (CR Trinidad and Tobago, 2005).

2.2 Production system trends

Future developments in Latin America overall will be influenced by environmental, farming and nature conservation policies (Van der Zijpp, 2003). Key factors affecting farming systems in the Caribbean are population increase, natural resources and climate. There may be moves to promote organic farming. Much will depend on the development of markets for more expensive organic products and the rigidity of enforcing environmental policies in Latin America itself and in the potential export markets. It is predicted that the Latin American continent should during the next 20 years achieve an improved nutritional status, less poverty, and more intensive agriculture (ibid.).

The livestock sector in Antigua, one of the most important of the Caribbean, is under threat because of climate change. Poultry and small livestock are often victims of high winds and intense rainfall. Livestock numbers have also increased to the point where overgrazing has become a problem (UNDP, 2001). A reduction in the number of animals per hectare can be considered a possible adaptation to long-term climate change (ibid.).

The dairy farming system in Jamaica has severe problems because imports, mainly from the European Union, increasingly push Jamaican dairy farmers out of their own market. Imported milk powder is much cheaper than locally produced milk (Eurostep, 1999).

Mixed farming systems

Integrated farming practices have declined as a result of several factors, including: efforts to modernize agriculture; pressures of the wider economy on agriculture and resource use; and the failure to recognize the importance of agriculture for local consumption (FAO, 1996b). Single-product poultry, pig, milk and, to a lesser extent, beef operations have been promoted (ibid.). This trend is projected to continue, with landless systems becoming more and more important. The replacement of animals with mechanized power started in the 1950s and has spread to even the smaller farmers. Today, livestock production by the sugar companies is separated almost entirely from the cultivation of the crop (ibid.).

Landless systems

Landless poultry and pig production systems account for the majority of the output in developed countries and their share is rapidly increasing in developing countries given their high supply elasticity in the short term (Steinfeld and Mäki-Hokkonen, 1995). The human population in the Caribbean will increase from today's 6.5 million to more than 6.8 million by 2015 – an increase of 5 percent. With increasing incomes, urbanization and ageing populations, the demand for livestock products is increasing. Neither the grazing system nor the mixed farming system, as we know it, will be able to satisfy this increase in demand. The greatest part of the additional demand will have to be supplied by the industrial type of production (FAO, 1996c).

THE CARIBBEAN

TABLE 5
Resource base, production and productivity figures of the different production systems found in the Caribbean

	Grassland-based			Mixed rainfed			Mixed irrigated			Landless	TOTAL
	Temperate / Highlands	Humid / Sub-humid	Arid / Semi-arid	Temperate / Highlands	Humid / Sub-humid	Arid / Semi-arid	Temperate / Highlands	Humid / Sub-humid	Arid / Semi-arid		
Parameters:											
Human population (millions)					4.9			1.3			6.3
a) Resource base											
a1. Permanent pasture (million ha)					0.3			1.3			1.6
a2. Arable land (million ha)					0.4			0.5			0.9
a3. Irrigated land (million ha)					0.03			0.2			0.2
a4. Livestock numbers (million head)											
cattle					0.5			0.3			0.8
dairy cows					0.06			0.04			0.1
buffalo					0.01						0.01
sheep and goats					0.6			0.2			0.9
b) Major outputs (1 million kg)											
beef and veal meat					18			4			22
buffalo meat											
sheep and goat meat					2			1			3
pig meat					9			2	5		16
poultry meat					42			13	138		193
eggs					5			2	14		21
dairy milk					61			40			101
other milk					1						1
milk production total					62			40			102
c) Productivity and density indicators											
beef and buffalo meat kg/head					33			16			27
sheep and goat meat kg/head					3			4			4
milk yield kg/cow					968			1 143			1 031
d) Self-sufficiency of systems											
ruminant meat kg/inhabitant					4			4			4
monogastric meat kg/inhabitant					2			2			3
eggs kg/inhabitant					1			1			3
milk kg/inhabitant					13			30			16

Sources: FAO (1996a); FAO (2004).

2.3 Impact of production trends on animal genetic resources

The future of livestock populations in mixed farming systems is closely linked to crop integration. As human pressures increase, livestock's role as providers of draught power and users of crop wastes, and the importance of dung for fuel and manure will be affected. Landless systems will further increase in importance in the subregion. The external inputs used in these systems allow them to control the production environment, so that an animals' full genetic potential can be expressed. Therefore, especially in the case of monogastrics, there is a significant reduction in the range of genotypes used. Nonetheless, prudent management of genetic resources for current and potential future use within these systems remains important.

3 Animal Genetic Resources

3.1 Status

Table 6 illustrates the number of animals of each major species in the Caribbean region and also gives an estimate of the number of breeds.

TABLE 6
Total population size and number of breeds of the major livestock species in the Caribbean and their share of the world total

	Population size (1 000)	Number of national breed populations	Share of world total	
			Population (%)	Number of breed populations (%)
Buffalo	6	4	0.0	2
Cattle	829	78	0.1	3
Goat	691	50	0.1	4
Sheep	243	48	0.0	2
Pig	242	58	0.0	5
Ass	32	4	0.1	2
Horse	156	10	0.0	1
Chicken	73 528	39	0.4	2
Duck ¹	79	14	0.0	3
Turkey	90	5	0.0	3
Goose (domestic)	-	6	-	2

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

¹ Domestic duck and Muscovy duck.

Tables 7 and 8 show the transboundary mammalian and avian breeds in the Caribbean.

THE CARIBBEAN

TABLE 7
Transboundary mammalian breeds in the Caribbean

Cattle (1)	Cattle (2)	Goat	Horse
Brown Swiss	Creole	Alpine	Mangalarga
Argentine Criollo	Nelore	Anglo-Nubian	Quarter Horse
Australian Milking Zebu	Normande	Boer	Tennessee Walking Horse
Brahman	Puerto Rican	Creole	Thoroughbred
Brangus	Red Poll	Criollo	Creole
Charbray	Red Sindhi	Saanen	American Paint
Charolais	Sahiwal	Toggenburg	Dutch Warmblood
Gir	Salers	British Alpine	
Guernsey	Santa Gertrudis	Spanish	
Hereford	Simmental		
Holstein (black and white)	Indo-Brasilian		
Holstein (red and white)	South Devon		
Jersey	Jamaica Hope		
Limousin			
Pig	Rabbit	Sheep	Buffalo
American Landrace	Angora	Barbado	Buffalypso
Berkshire	California	Barbados Black Belly	
Duroc	Chinchilla	Blackhead Persian	
Dutch Landrace	Dutch	Criollo	
Hampshire	Flemish Giant	Dorper	
Lacombe	New Zealand	Dorset Horn	
Large Black	New Zealand White	Katahdin	
Large White	New Zealand Red	Rambouillet	
Pietrain	Géant des Flandres	St. Croix	
Landrace	French Silver	Suffolk	
PIC HY		West African Dwarf	
Saddleback		Wiltshire Horn	
Sus scrofa		Martinique	

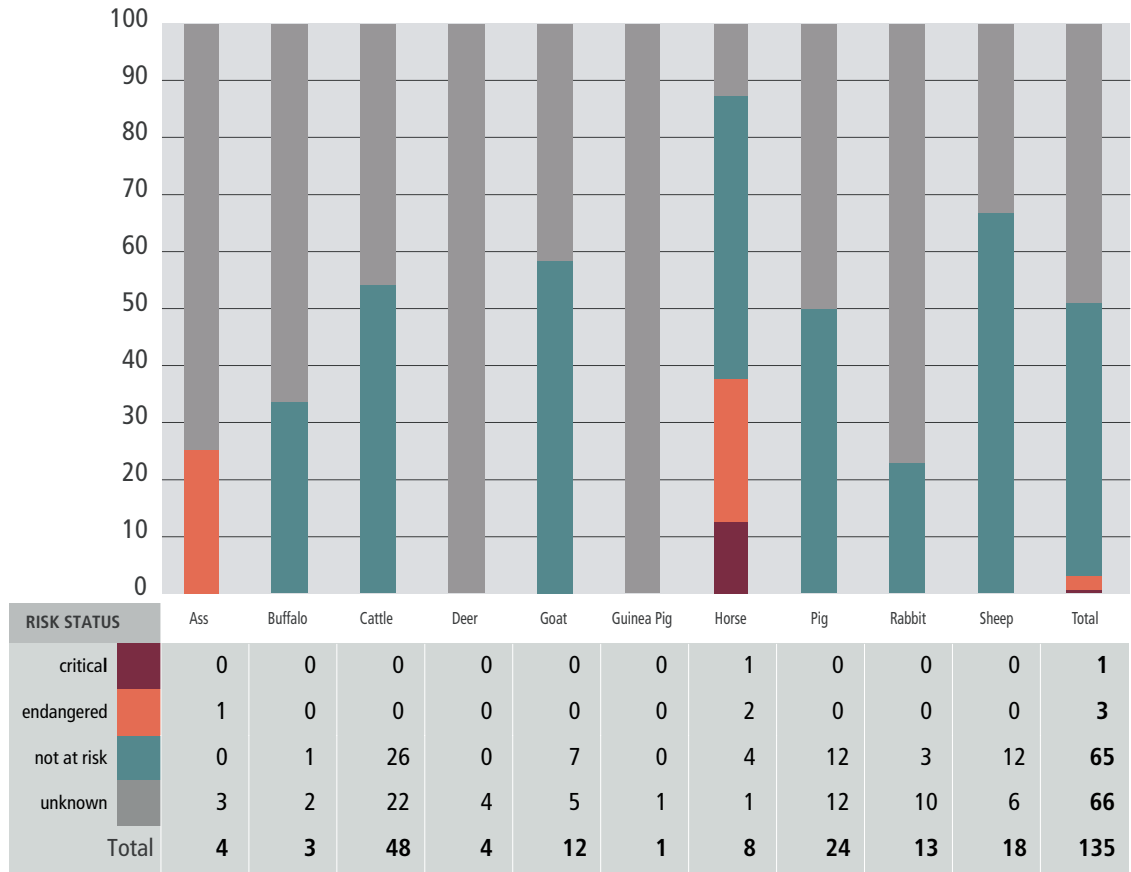
TABLE 8
Transboundary avian breeds in the Caribbean

Chicken (1), commercial strains		Chicken (2)		
Commercial strain, broiler, Arbor Acres AA broiler breeders		Japanese Bantam		
Commercial strain, layer, Cobb 500		Rhode Island Red		
Commercial strain, layer, Euribrid Hisex Brown		Barnevelder		
Commercial strain, Hubbard		Frizzle		
Commercial strain, layer, Hy-Line Brown		Plymouth Rock		
Commercial strain, layer, ISA Brown		Transylvanian Naked Neck		
Commercial strain, layer, Leghorn		Wyandotte		
Commercial strain, broiler, Ross				
Commercial strain, layer, Hendrix Bovan Brown				
Commercial strain, layer, Hubbard Golden Comet				
Commercial strain, broiler, Kabir Chicks Ltd.				
Commercial strain, Peterson				
Duck	Goose	Guinea fowl	Muscovy duck	Turkey
Pekin	African Goose	Purple Guineafowl	Muscovy	American Bronze
	White Chinese	Pearl Guineafowl		White
	White Emden			
	Chinese			

Figures 5 and 6 illustrate the structure of the data recorded in the Global Databank for Farm Animal Genetic Resources, showing the risk status of the mammalian and avian breeds recorded for each species in the Caribbean subregion up to 2005. Only 3 percent (4 of 135) of extant mammalian breeds in the Caribbean are categorized as at risk. However, this is probably an underestimate of the actual situation. Population data is available for only 9 percent of mammalian breeds, and those that are most at risk of extinction are usually those for which it is most difficult to obtain accurate census information (FAO/UNEP, 2000). For avian breeds in the Caribbean information regarding population size and risk status is even more inadequate.

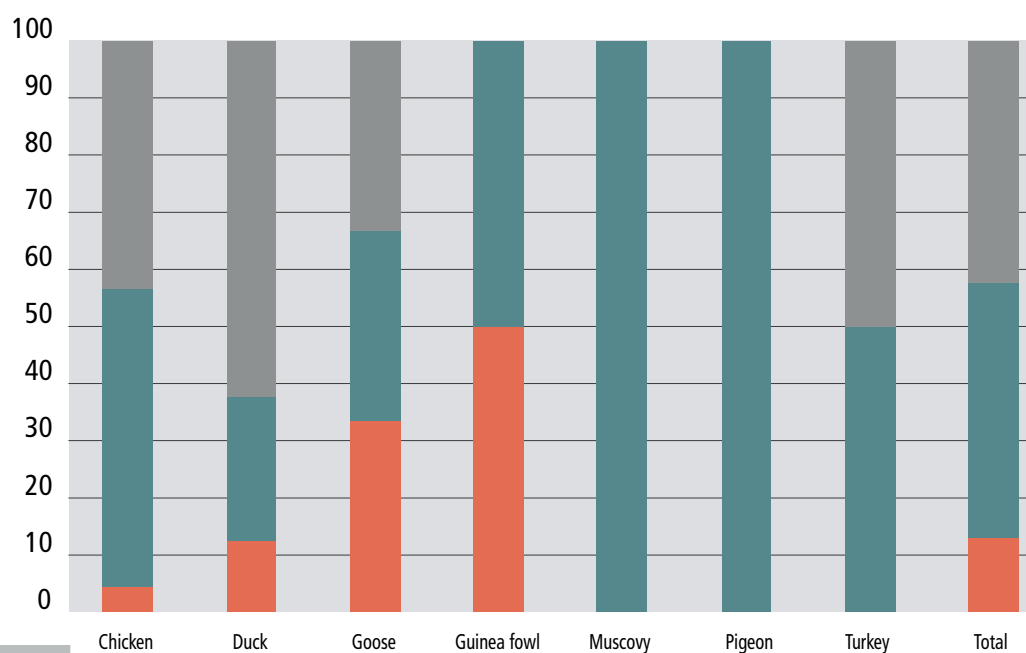
THE CARIBBEAN

FIGURE 5
Risk status of mammalian breeds recorded in the Caribbean* up to December 2005: absolute (table) and percentage (chart) figures



* Breeds that are also recorded in countries outside Latin America and the Caribbean are excluded from the analysis.

FIGURE 6
Risk status of avian breeds recorded in the Caribbean* up to December 2005: absolute (table) and percentage (chart) figures



RISK STATUS								
	Chicken	Duck	Goose	Guinea fowl	Muscovy duck	Pigeon	Turkey	Total
endangered	1	1	2	1	0	0	0	6
not at risk	12	2	2	1	1	1	2	21
unknown	10	5	2	0	0	0	2	20
Total	23	8	6	2	1	1	4	47

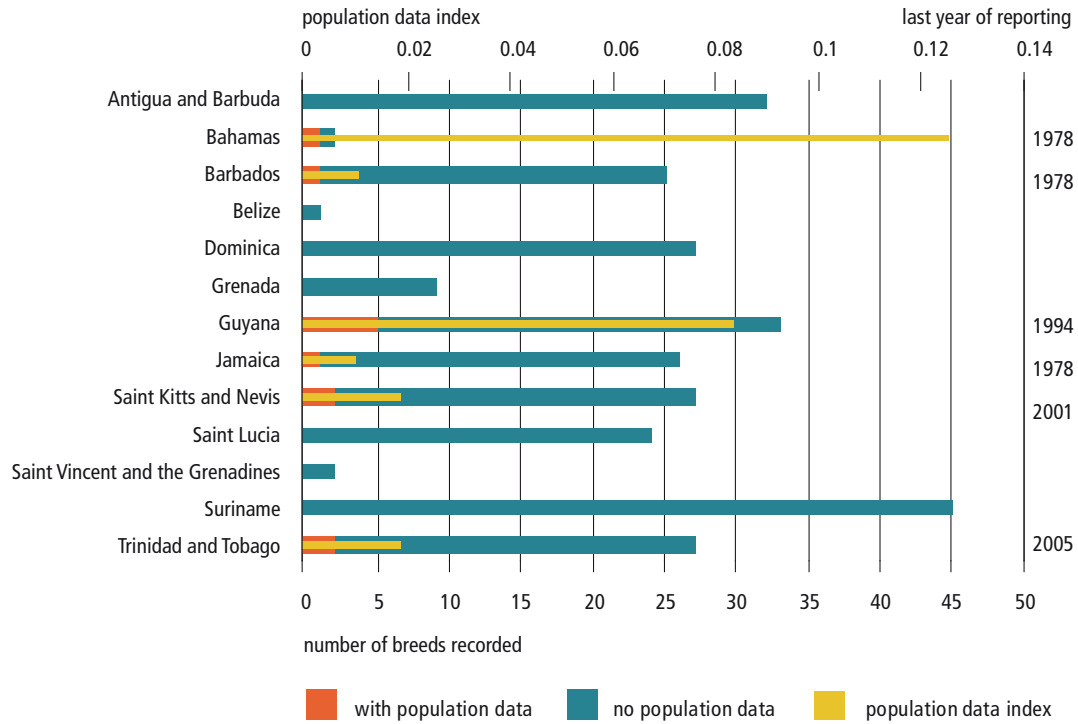
* Breeds that are also recorded in countries outside Latin America and the Caribbean are excluded from the analysis.

Not included: one endangered peacock breed.

Figures 7 and 8 provide general overviews of the quantity and quality of the population data provided by each country for their animal genetic resources. The total number of breeds recorded by each country is shown. **No information** is displayed for those countries for which no breeds are recorded in the Global Databank for Farm Animal Genetic Resources. For all other countries, breeds are split into those **with population data** and those **with no population data** (risk status unknown). When one or more fields in the Global Databank for Farm Animal Genetic Resources are completed then the breed is identified as having population data. For those breeds recorded as having population data, a population data index (PDI) is calculated, which provides an indication of the completeness of the data provided by the country. Selected basic population data fields, regarded as being the most important and used in the calculation of risk status, are considered – population size (absolute or range), number of breeding females, number of breeding males and the percentage of females bred to males of the same breed (FAO/UNEP, 2000).

THE CARIBBEAN

FIGURE 7
Population data status and index for mammalian breeds recorded by countries of the Caribbean subregion up to December 2005

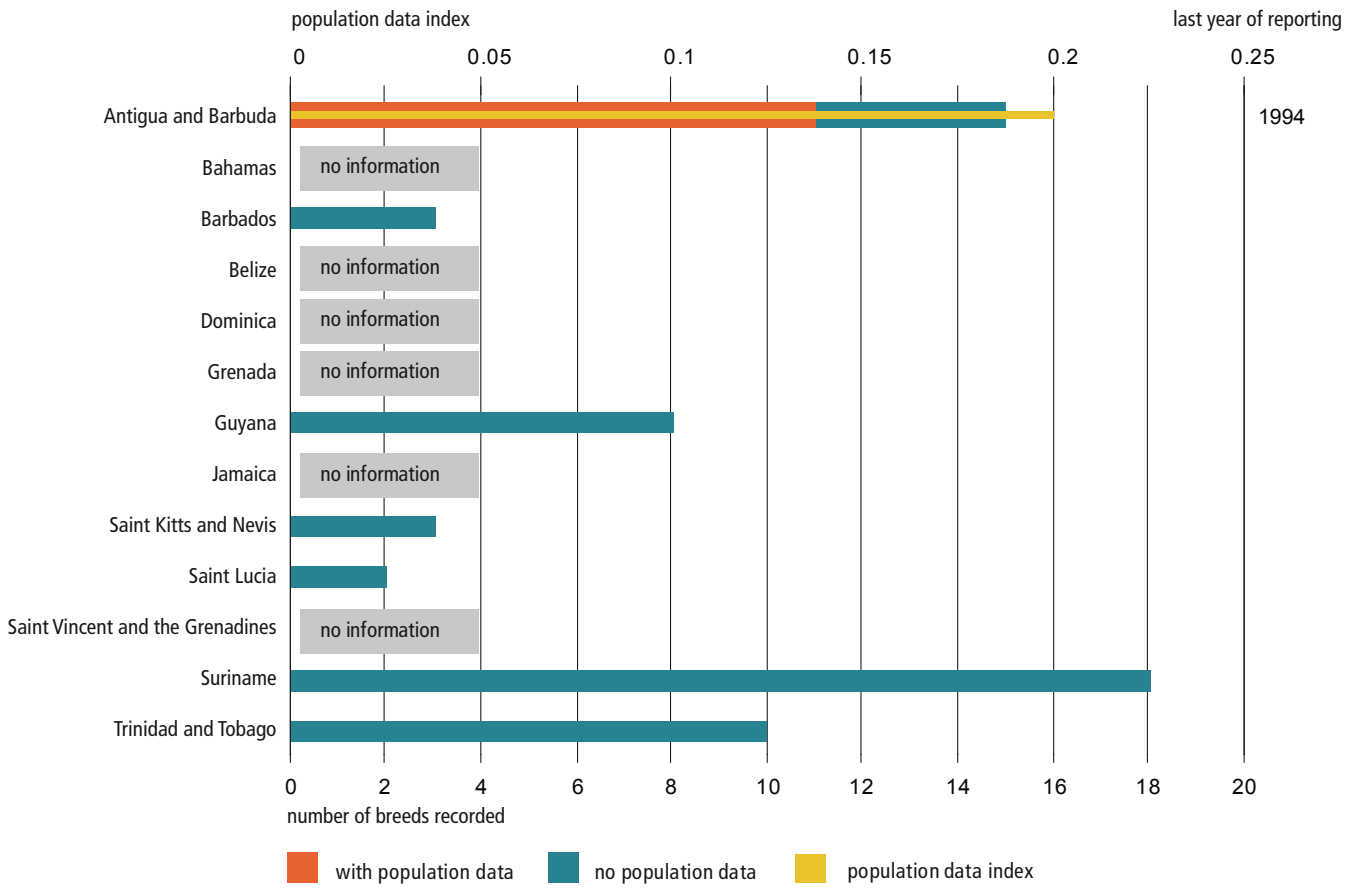


With population data: Those breeds with information recorded in one or more of the sixteen population data fields.

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

Population Data Index (PDI): For each country the PDI is 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.

FIGURE 8
Population data status and index for avian breeds recorded by countries of the Caribbean subregion up to December 2005



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

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

Population Data Index (PDI): For each country the PDI is 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.

3.2 Threats to animal genetic resources in the Caribbean

Important threats to animal genetic resources in the Caribbean include natural disasters, climate change, diseases and lack of appropriate livestock policies.

The Caribbean is affected by the annual Atlantic hurricane season lasting from May to November. After an extended period of relative dormancy, the years since 1995 have seen intensified hurricane activity with many of these systems directly impacting the islands of the subregion (Challenger, 2002). There is general consensus that since 1995 the region has entered a more active period of hurricane formation possibly linked to multi-decadal changes in global weather and climate. Projections for global climate change indicate that the small island countries of the Caribbean can expect to experience a number of adverse effects deriving from changes in climate parameters such as rainfall, temperature, sea-levels, and storm/hurricane frequency and intensity (ibid.). In many cases, these climatic events have a devastating effect on livestock populations (ibid.). Drought is also a problem on many of the islands. It is, for example, a recurrent feature of Antigua and Barbuda's climate, severely affecting livestock. It is also foreseen that temperatures will rise in the near future and more hot days are very likely, which will cause an increased heat stress in livestock.

In addition to a large variety of climatic and agricultural conditions, animals are challenged by many diseases, especially in the warm humid regions. Tick-borne infections such as babesiosis and anaplasmosis are becoming more widespread. The tropical bont tick (*Amblyomma variegatum*), which can spread the diseases dermatophilosis and heartwater, is a particular problem. In Saint Kitts and Nevis, for example, dermatophilosis had a devastating impact on cattle and goat populations during the late 1980s (FAO, 2002). Concerted efforts have been undertaken to eradicate the tick from the Caribbean through the Caribbean *Amblyomma* Programme, and a number of countries have been declared provisionally free (ibid.). A number of serious bacterial and viral diseases which can cause mortality, reproductive disorders or chronic loss of productivity – for example, brucellosis, blackleg, mastitis, tuberculosis and rabies, are present in some of the countries of the subregion.

3.3 Unique resources highlighted

Most domesticated livestock species in Latin America and the Caribbean were introduced to the region by successive waves of exploration and colonization. The West African Dwarf goat, for example, brought from West Africa together with slaves, is thought to have contributed considerably to some local goat breeds. Introduced species soon adapted to one or other of the large range of environments and these early introductions now present recognized, well-adapted breeds (FAO/UNEP, 2000).

The predominant breed of sheep on most Caribbean Islands is the Barbados Blackbelly, developed on the island of Barbados, but brought to the islands from West Africa during the slave era. Blackbellies are "antelope-like" in appearance, brown tan or yellow in colour, with black points and under-parts (Schoenian, 2000). Another popular breed is the Pelibüey, a similar hair-type sheep (Schoenian, 1998). They show patches of wool (ibid.). The Barbados Blackbelly offers many outstanding qualities. They are one of the world's most prolific sheep breeds. They mature early and breed all year round. It is not uncommon for them to produce two lamb crops in a single year, though three crops in two years is more the norm (ibid.). Like other hair sheep, Blackbellies are more resistant to heat, insects and intestinal parasites. They are a hardy sheep that will survive on sparse vegetation (ibid.). Another breed of interest is the White Sheep of the Virgin Islands, which is also known for its prolificacy (FAO/UNEP, 2000). Hairless sheep breeds, besides being adapted to cope with hot humid climates, provide a useful source of meat, milk and a very soft skin, which produces fine leather used for garments (ibid.). In Jamaica, goats are an integral part of the economy and culture (Schoenian, 1998). The sheep in Jamaica are largely of the St. Elizabeth breed, a mixture of hair and wool sheep, the result of various British and American importations. (ibid.).

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Annex

Classification of livestock production systems

FAO (1996)¹ used the agro-ecological zones (AEZ) described by the Technical Advisory Committee (TAC, 1994)² 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.

¹ 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.

² TAC. 1994. *Animal agriculture in developing countries: technology dimensions*. Development Studies Paper Series. Morrilton, Arkansas. Winrock International.



Subregional priorities: the Caribbean

The following list of subregional priorities is the outcome of a workshop held in Kingston, Jamaica, 22–24 November 2004. Participants from eight Caribbean countries attended (Antigua and Barbuda, Bahamas, Barbados, Jamaica, Saint Lucia, Saint Vincent and the Grenadines, Suriname, and Trinidad and Tobago).

The following priorities were identified:

- implementation of a national and regional network for animal genetic resources;
- characterization of animal genetic resources (recording systems, genetic evaluation, genetic distances, etc.);
- development and implementation of breeding and conservation strategies for small populations (Barbados Blackbelly, Trinidad and Tobago Buffalypso, Jamaica Hope, creole populations, etc.);
- training on the management of animal genetic resources (valuation of animal genetic resources);
- establishment of the Caribbean Society of Animal Production;
- establishment of national committees to provide advice to government in the development of national policies regarding the management of animal genetic resources;
- inventory (census) of livestock;
- development of nucleus farms and multiplication units to supply breeding stock, for animal genetic resources that contribute most to food security;
- raising public awareness;
- evaluation of imported breeding stock; and
- use of by-products from animal genetic resources.

Suggestions for international cooperation included:

- development of regional projects to seek financial and technical support;
- implementation of a regional network for animal genetic resources;
- development of software to be used in animal breeding analyses (and provision of relevant training);
- development of links between ecotourism and agriculture;
- enhancing the utilization of animal genetic resources in the context of changing consumer preferences;
- regional branding of unique animal products;
- exchange of learning experiences among countries; and
- enhancing the availability of animal genetic resources for specific studies (Buffalypso, Barbados Blackbelly, etc).