



3.3 Agricultural output and productivity

	Crop production index		Food production index		Livestock production index		Cereal yield		Agricultural productivity	
	1989-91 = 100		1989-91 = 100		1989-91 = 100		kilograms per hectare		Agriculture value added per worker 1995 \$	
	1979-81	1996-98	1979-81	1996-98	1979-81	1996-98	1979-81	1996-98	1979-81	1996-98
Albania	..	..	..	..	..	..	2,500	2,597	1,223	1,847
Algeria	77.5	128.9	67.6	129.4	55.0	119.0	656	988	1,411	1,943
Angola	102.0	141.1	91.9	130.0	87.8	113.8	526	642	..	123
Argentina	83.9	143.8	92.0	125.9	100.8	103.4	2,183	3,284	10,539	13,715
Armenia	..	110.8	..	76.8	..	58.3	..	1,772	..	4,828
Australia	79.9	150.7	91.3	130.4	85.5	106.5	1,321	1,993	20,880	30,904
Austria	92.8	98.5	92.2	102.3	94.5	104.7	4,131	5,673	9,761	16,070
Azerbaijan	..	45.8	..	60.6	..	66.3	..	1,647	..	776
Bangladesh	80.0	106.9	79.2	110.8	81.3	135.9	1,938	2,716	175	227
Belarus	..	98.2	..	65.9	..	63.8	..	2,204	..	3,509
Belgium ^a	84.9	131.2	88.5	113.0	88.8	113.7	4,861	7,728	..	..
Benin	54.2	167.5	63.5	140.6	68.9	118.1	698	1,096	311	534
Bolivia	71.2	145.7	70.9	134.1	75.5	122.3	1,183	1,603	..	..
Bosnia and Herzegovina	..	..	..	..	..	..	..	2,348	..	..
Botswana	86.3	87.5	87.2	98.7	87.5	100.2	203	255	639	676
Brazil	75.3	116.3	69.5	125.7	67.9	133.9	1,496	2,480	2,047	4,081
Bulgaria	107.7	64.4	105.5	67.8	96.3	61.0	3,853	2,657	2,754	5,135
Burkina Faso	58.6	132.0	62.1	127.8	59.9	136.4	575	820	134	161
Burundi	79.9	93.6	80.3	95.8	86.6	93.9	1,081	1,337	177	141
Cambodia	55.2	128.9	48.9	130.6	27.3	136.7	1,025	1,784	..	408
Cameroon	91.0	119.2	83.0	120.2	61.1	115.2	849	1,172	834	1,015
Canada	77.7	118.9	79.8	117.7	88.4	121.6	2,173	2,738	..	..
Central African Republic	102.8	128.2	79.7	127.9	48.9	126.3	529	927	396	462
Chad	67.1	154.6	90.8	139.1	120.4	111.4	587	647	155	217
Chile	70.7	121.6	71.5	129.6	75.8	140.3	2,124	4,608	3,174	5,039
China	67.1	135.8	60.9	153.5	45.3	185.6	3,027	4,821	161	307
Hong Kong, China	133.6	74.6	97.4	25.9	188.7	19.7	1,712	..	..	..
Colombia	84.3	96.0	76.0	109.7	72.6	116.0	2,452	2,798	2,370	2,693
Congo, Dem. Rep.	72.5	93.9	71.7	95.9	77.3	104.0	807	781	270	285
Congo, Rep.	83.1	109.9	81.1	112.1	80.7	118.3	838	707	385	492
Costa Rica	70.6	128.7	73.0	128.6	77.2	119.5	2,498	3,387	3,160	4,409
Côte d'Ivoire	73.8	124.7	70.8	128.5	74.7	120.0	867	1,102	1,074	1,028
Croatia	..	86.3	..	59.4	..	42.5	..	4,733	..	8,521
Cuba	84.3	62.1	89.9	63.8	96.0	62.1	2,458	1,973	..	..
Czech Republic	..	86.4	..	79.7	..	75.3	..	4,141	..	..
Denmark	65.2	94.4	83.2	103.0	95.0	112.6	4,040	6,130	21,321	..
Dominican Republic	96.5	97.0	85.2	105.4	68.8	123.4	3,024	3,841	1,839	2,599
Ecuador	78.2	134.1	77.4	143.6	73.0	151.3	1,633	1,743	1,206	1,795
Egypt, Arab Rep.	75.5	132.6	68.0	139.7	65.8	150.3	4,053	6,595	721	1,189
El Salvador	120.4	103.3	90.8	111.3	88.8	120.4	1,702	1,930	1,925	1,679
Eritrea	..	141.3	..	114.6	..	96.3	..	580	..	..
Estonia	..	69.1	..	47.0	..	41.8	..	1,931	..	3,519
Ethiopia	..	130.9	..	123.7	..	110.4	..	1,206	..	..
Finland	76.3	89.6	93.5	90.7	107.1	92.5	2,511	3,103	16,995	28,231
France	87.4	109.2	93.8	105.4	97.8	105.6	4,700	7,126	14,956	36,889
Gabon	76.3	111.7	79.0	108.7	86.4	112.0	1,718	1,742	1,814	1,839
Gambia, The	79.5	79.4	82.8	84.9	94.4	111.4	1,284	1,048	325	203
Georgia	..	61.7	..	85.2	..	91.9	..	1,692	..	2,120
Germany	89.4	108.6	91.2	92.3	98.7	85.2	4,166	6,366	..	22,452
Ghana	67.0	151.7	68.7	144.1	79.7	104.5	807	1,342	354	286
Greece	86.8	103.6	91.2	99.0	99.9	98.2	3,090	3,535	8,804	..
Guatemala	89.6	115.2	69.7	124.1	76.0	124.5	1,578	1,882	2,143	2,075
Guinea	89.7	135.6	96.3	137.4	116.4	134.9	958	1,294	..	271
Guinea-Bissau	64.8	116.6	68.3	117.1	78.4	117.4	711	1,410	221	315
Haiti	103.4	87.5	101.3	94.4	100.2	121.2	1,009	969	578	396
Honduras	90.4	120.0	88.2	113.0	80.8	121.7	1,170	1,528	694	1,018



Agricultural output and productivity 3.3

	Crop production index		Food production index		Livestock production index		Cereal yield		Agricultural productivity	
	1989-91 = 100		1989-91 = 100		1989-91 = 100		kilograms per hectare		Agriculture value added per worker 1995 \$	
	1979-81	1996-98	1979-81	1996-98	1979-81	1996-98	1979-81	1996-98	1979-81	1996-98
Hungary	93.4	81.0	90.8	76.3	94.1	70.6	4,519	4,275	3,389	4,770
India	70.9	118.9	68.1	119.9	62.2	126.7	1,324	2,200	275	406
Indonesia	66.2	116.8	62.8	120.4	47.2	139.0	2,837	3,915	610	749
Iran, Islamic Rep.	56.7	144.9	61.1	144.7	68.1	139.5	1,108	1,956	2,570	4,089
Iraq	74.7	110.0	77.9	98.7	81.3	69.0	832	848	..	..
Ireland	93.9	109.0	83.3	106.2	83.3	105.6	4,733	6,721	..	..
Israel	98.2	104.8	85.4	107.0	78.2	118.3	1,840	1,869	..	..
Italy	106.1	100.4	101.4	101.2	93.0	103.6	3,548	4,920	9,993	20,031
Jamaica	98.6	127.3	86.0	120.1	73.9	110.0	1,667	1,228	894	1,291
Japan	107.9	92.6	94.0	95.2	85.1	95.6	5,252	6,017	15,655	30,272
Jordan	54.6	150.3	57.3	152.5	51.2	166.8	521	933	1,176	1,431
Kazakhstan	..	52.7	..	57.2	..	49.5	..	668	..	1,450
Kenya	74.8	110.0	67.7	104.9	60.2	102.9	1,364	1,535	262	228
Korea, Dem. Rep.	..	..	..	..	..	..	3,694	2,280	..	..
Korea, Rep.	87.8	105.9	77.6	122.2	52.6	155.2	4,986	6,450	3,745	11,760
Kuwait	37.1	142.4	93.2	161.2	108.8	168.0	3,124	5,879	..	..
Kyrgyz Republic	..	104.1	..	102.0	..	74.7	..	2,544	..	3,144
Lao PDR	73.7	113.7	70.8	126.7	58.0	164.1	1,402	2,643	..	546
Latvia	..	79.2	..	48.1	..	37.4	..	2,115	..	3,191
Lebanon	52.0	136.7	59.2	138.2	100.5	140.5	1,307	2,456	..	27,409
Lesotho	95.1	122.2	90.0	111.1	87.7	106.0	977	1,011	505	393
Libya	77.9	121.9	81.6	130.1	68.4	128.9	430	820	..	..
Lithuania	..	100.8	..	69.2	..	55.0	..	2,474	..	3,228
Macedonia, FYR	..	103.6	..	97.0	..	89.7	..	2,812	..	1,826
Madagascar	82.9	104.5	84.4	108.7	89.6	106.3	1,664	1,961	197	186
Malawi	84.1	115.7	91.1	109.7	78.2	113.8	1,161	1,224	100	136
Malaysia	74.7	108.9	55.4	125.2	41.4	146.2	2,828	3,065	3,275	6,061
Mali	57.4	128.6	77.9	114.5	94.5	116.9	804	984	224	263
Mauritania	62.1	133.0	86.5	104.7	89.4	100.8	384	810	299	449
Mauritius	92.5	101.3	89.0	111.0	63.8	137.0	2,536	5,030	3,087	5,630
Mexico	82.4	116.8	83.8	120.2	83.5	123.3	2,164	2,610	1,482	1,704
Moldova	..	68.3	..	53.2	..	41.3	..	2,861	..	1,474
Mongolia	44.6	32.1	88.1	88.5	93.2	93.8	573	687	932	1,151
Morocco	54.8	107.8	55.9	107.2	59.8	102.9	811	1,215	1,146	1,836
Mozambique	109.6	141.5	100.1	130.9	85.7	96.8	603	827	..	127
Myanmar	89.0	140.3	87.7	138.1	86.2	129.6	2,521	2,944	..	..
Namibia	80.6	107.8	107.4	123.5	115.9	125.9	377	315	876	1,190
Nepal	62.7	116.6	65.9	117.2	77.3	117.1	1,615	1,951	162	189
Netherlands	79.8	111.5	86.5	99.0	88.3	96.5	5,696	7,480	21,663	..
New Zealand	74.4	142.6	90.7	124.6	95.5	115.8	4,089	5,575	..	..
Nicaragua	122.8	116.7	117.0	122.7	139.7	119.0	1,475	1,611	1,620	1,821
Niger	95.1	134.1	101.4	127.8	109.8	116.6	440	354	222	195
Nigeria	52.3	142.4	57.9	142.5	82.5	135.2	1,269	1,197	414	624
Norway	91.2	94.6	92.1	100.9	95.2	105.2	3,634	4,051	17,044	32,600
Oman	60.4	113.3	62.5	111.1	61.6	99.9	982	2,167	..	..
Pakistan	65.6	116.2	66.4	136.2	59.5	145.5	1,608	2,064	392	623
Panama	97.1	81.7	85.6	99.6	71.3	125.4	1,524	2,164	2,122	2,512
Papua New Guinea	86.5	104.6	86.2	107.8	85.0	130.0	2,087	3,840	717	799
Paraguay	58.4	104.6	60.6	120.0	62.1	114.6	1,511	2,207	2,618	3,448
Peru	82.1	142.2	77.3	140.5	78.0	131.3	1,946	2,726	1,348	1,663
Philippines	87.7	113.8	86.0	125.8	73.3	160.4	1,611	2,437	1,348	1,352
Poland	84.6	89.1	87.9	88.2	98.0	84.0	2,345	2,937	..	1,752
Portugal	84.5	86.9	71.9	97.0	71.8	113.7	1,102	2,456	..	..
Puerto Rico	131.2	64.3	99.7	82.0	90.3	87.6	8,925	4,000	..	..
Romania	114.1	98.5	112.8	95.9	110.0	87.3	2,854	2,867	..	3,193
Russian Federation	..	75.6	..	64.4	..	54.8	..	1,302	..	2,476



3.3 Agricultural output and productivity

	Crop production index		Food production index		Livestock production index		Cereal yield		Agricultural productivity	
	1989-91 = 100		1989-91 = 100		1989-91 = 100		kilograms per hectare		Agriculture value added per worker 1995 \$	
	1979-81	1996-98	1979-81	1996-98	1979-81	1996-98	1979-81	1996-98	1979-81	1996-98
Rwanda	88.9	75.5	89.7	79.1	81.0	95.1	1,134	1,218	316	212
Saudi Arabia	27.2	90.7	26.7	78.8	32.8	129.3	820	3,880	2,167	10,742
Senegal	77.6	88.7	74.2	100.4	65.1	134.3	690	719	341	320
Sierra Leone	80.3	99.2	84.5	99.5	84.1	108.1	1,249	1,223	368	411
Singapore	595.0	50.6	154.3	31.8	173.7	34.1	..	..	13,937	42,851
Slovak Republic	..	..	..	74.7	..	..	..	4,209	..	3,379
Slovenia	..	105.5	..	100.3	..	101.7	..	5,435	..	26,521
South Africa	95.0	104.6	92.6	100.8	89.7	90.9	2,105	2,261	2,819	3,884
Spain	83.0	108.7	82.1	110.1	84.2	116.2	1,986	3,173	..	13,499
Sri Lanka	99.3	108.2	98.3	109.1	93.2	131.8	2,462	3,103	648	726
Sudan	131.1	174.8	105.4	156.0	89.3	140.8	645	569	..	..
Sweden	92.0	96.9	100.1	100.8	103.8	103.3	3,595	4,687	..	..
Switzerland	95.5	99.9	95.8	95.8	98.8	93.8	4,883	6,709	..	..
Syrian Arab Republic	100.4	162.1	94.2	148.7	72.2	120.2	1,156	1,586	..	..
Tajikistan	..	64.5	..	59.0	..	41.5	..	1,682	..	396
Tanzania	82.2	96.8	76.9	100.0	69.3	113.9	1,063	1,288	..	174
Thailand	79.0	111.8	80.4	112.6	65.4	130.1	1,911	2,466	630	924
Togo	70.4	140.0	77.0	135.9	51.9	125.4	729	876	345	539
Trinidad and Tobago	119.9	96.9	101.9	99.9	84.3	96.7	3,167	3,292	2,887	2,102
Tunisia	68.5	116.4	67.6	121.4	63.7	129.6	828	1,241	1,743	2,959
Turkey	76.6	113.7	75.8	111.3	80.4	107.3	1,869	2,196	1,852	1,851
Turkmenistan	..	56.7	..	101.7	..	113.8	..	1,292	..	..
Uganda	67.5	110.6	70.4	107.1	84.8	115.7	1,555	1,280	..	345
Ukraine	..	63.8	..	52.3	..	50.9	..	2,211	..	2,544
United Arab Emirates	38.9	232.3	49.2	222.7	46.0	158.5	2,224	1,360	..	..
United Kingdom	80.1	104.2	92.0	99.7	98.1	97.1	4,792	6,891	..	..
United States	98.9	119.1	94.5	117.9	88.8	115.1	4,151	5,380	..	39,523
Uruguay	86.6	148.0	86.9	130.8	85.5	119.6	1,644	3,257	6,821	9,826
Uzbekistan	..	83.6	..	109.8	..	108.7	..	2,292	..	2,128
Venezuela, RB	76.5	109.0	80.3	114.4	84.9	112.4	1,904	2,959	4,041	5,036
Vietnam	66.7	143.7	63.8	140.5	52.9	145.8	2,049	3,754	..	..
West Bank and Gaza	..	..	..	..	..	..	..	..	..	..
Yemen, Rep.	82.3	116.2	75.0	120.7	68.9	129.0	1,038	902	..	302
Yugoslavia, FR (Serb./Mont.)	..	93.3	..	102.4	..	112.9	..	3,799	..	..
Zambia	65.7	95.5	74.0	104.5	86.2	116.3	1,676	1,584	328	209
Zimbabwe	77.9	118.7	81.9	101.9	84.5	99.2	1,359	1,283	307	347
World	79.5 w	125.1 w	75.7 w	130.3 w	80.7 w	134.1 w	1,600 w	2,022 w	.. w	.. w
Low income	73.3	121.0	68.7	138.7	71.9	135.5	1,097	1,267	..	348
Excl. China & India	..	..	73.8	127.1	..	..	1,069	1,251	..	..
Middle income	74.4	134.7	80.2	123.1	69.4	168.5	1,789	2,358	..	..
Lower middle income	71.7	144.8	..	126.1	57.8	208.2	1,724	2,084	..	..
Upper middle income	80.8	111.4	78.5	119.9	84.3	117.5	1,884	2,892	..	..
Low & middle income	74.1	130.3	71.7	134.7	70.0	160.7	1,419	1,828	..	568
East Asia & Pacific	69.6	132.1	67.0	152.1	49.6	185.8	2,116	2,729	..	..
Europe & Central Asia	..	192.7	..	..	..	263.3	2,677	2,383	..	2,186
Latin America & Carib.	82.1	118.5	80.5	123.9	82.2	121.6	1,842	2,453	..	..
Middle East & N. Africa	68.5	126.8	70.1	137.9	65.0	125.0	925	1,412	..	..
South Asia	72.5	117.4	70.4	122.1	63.9	131.1	1,510	2,099	265	356
Sub-Saharan Africa	77.1	114.1	78.8	124.3	92.6	121.8	895	1,143	418	379
High income	92.7	112.5	93.1	107.4	91.5	107.4	3,170	4,051	..	..
Europe EMU	90.1	105.0	91.9	100.9	95.0	100.2	4,035	5,673	..	..

a. Includes Luxembourg.



Agricultural output and productivity 3.3

About the data

The agricultural production indexes in the table are prepared by the Food and Agriculture Organization (FAO). The FAO obtains data from official and semi-official reports of crop yields, area under production, and livestock numbers. If data are not available, the FAO makes estimates. The indexes are calculated using the Laspeyres formula: production quantities of each commodity are weighted by average international commodity prices in the base period and summed for each year. Because the FAO's indexes are based on the concept of agriculture as a single enterprise, estimates of the amounts retained for seed and feed are subtracted from the production data to avoid double counting. The resulting aggregate represents production available for any use except as seed and feed. The FAO's indexes may differ from other sources because of differences in coverage, weights, concepts, time periods, calculation methods, and use of international prices.

To ease cross-country comparisons, the FAO uses international commodity prices to value production. These prices, expressed in international dollars (equivalent in purchasing power to the U.S. dollar), are derived using a Geary-Khamis formula applied to agricultural outputs (see Inter-Secretariat Working Group on National Accounts 1993, sections 16.93–96). This method assigns a single price to each commodity so that, for example, one metric ton of wheat has the same price regardless of where it was produced. The use of international prices eliminates fluctuations in the value of output due to transitory movements of nominal exchange rates unrelated to the purchasing power of the domestic currency. Unlike the International Comparison Programme (ICP), the FAO calculates international prices only for agricultural products. Substantial differences may arise between the implicit exchange rate derived by the ICP and that of the FAO. (For further discussion of the FAO's methods see FAO 1986. For a discussion of the ICP see *About the data* for tables 4.11 and 4.12.)

Data on cereal yields may be affected by a variety of reporting and timing differences. The FAO allocates production data to the calendar year in which the bulk of the harvest took place. But most of a crop harvested near the end of a year will be used in the following year. In general, cereal crops harvested for hay or harvested green for food, feed, or silage and those used for grazing are excluded. But millet and sorghum, which are grown as feed for livestock and poultry in Europe and North America, are used as food in Africa, Asia, and countries of the former Soviet Union.

Agricultural productivity is measured by value added per unit of input. (See *About the data* for

tables 4.1 and 4.2 for further discussion of the calculation of value added in national accounts.) Agricultural value added includes that from forestry and fishing. Thus interpretations of land productivity should be made with caution.

To smooth annual fluctuations in agricultural activity, the indicators in the table have been averaged over three years.

Figure 3.3a

The world's food production has outpaced its population growth . . .

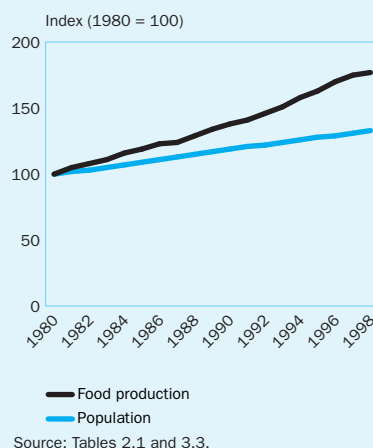
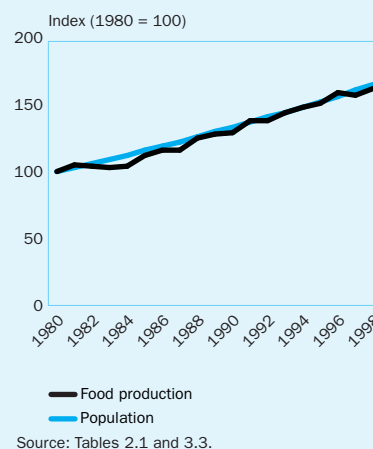


Figure 3.3b

. . . except in Sub-Saharan Africa, where food production has barely kept up with population growth



Definitions

- **Crop production index** shows agricultural production for each period relative to the base period 1989–91. It includes all crops except fodder crops. The regional and income group aggregates for the FAO's production indexes are calculated from the underlying values in international dollars, normalized to the base period 1989–91. The data in this table are three-year averages. However, missing observations have not been estimated or imputed.
- **Food production index** covers food crops that are considered edible and that contain nutrients. Coffee and tea are excluded because, although edible, they have no nutritive value.
- **Livestock production index** includes meat and milk from all sources, dairy products such as cheese, and eggs, honey, raw silk, wool, and hides and skins.
- **Cereal yield**, measured in kilograms per hectare of harvested land, includes wheat, rice, maize, barley, oats, rye, millet, sorghum, buckwheat, and mixed grains. Production data on cereals refer to crops harvested for dry grain only. Cereal crops harvested for hay or harvested green for food, feed, or silage and those used for grazing are excluded.
- **Agricultural productivity** refers to the ratio of agricultural value added, measured in constant 1995 U.S. dollars, to the number of workers in agriculture.

Data sources

The agricultural production indexes are prepared by the FAO and published annually in its *Production Yearbook*. The FAO makes these data and the data on cereal yields and agricultural employment available to the World Bank in electronic files that may contain more recent information than the published versions. For sources of agricultural value added see table 4.2.