Animal Source Foods to Improve Micronutrient Nutrition in Developing Countries

Global Production and Consumption of Animal Source Foods[1]

Andrew W. Speedy[2]

Animal Production and Health Division, Food and Agriculture Organization of the United Nations, Rome, Italy

ABSTRACT This article provides interpreted statistics and information on global livestock production and the consumption of animal source foods from the Food and Agriculture Organization of the United Nations statistical data base. Country data are collected through questionnaires sent annually to member countries, magnetic tapes, diskettes, computer transfers, websites of the countries, national/international publications, country visits made by the FAO statisticians and reports of FAO representatives in member countries. These data show that livestock production is growing rapidly, which is interpreted to be the result of the increasing demand for animal products. Although there is a great rise in global livestock production, the pattern of consumption is very uneven. The countries that consume the least amount of meat are in Africa and South Asia. The main determinant of per capita meat consumption appears to be wealth. Overall, there has been a rise in the production of livestock products and this is expected to continue in the future. This is particularly the case in developing countries. The greatest increase is in the production of poultry and pigs, as well as eggs and milk. However, this overall increase obscures the fact that the increased supply is restricted to certain countries and regions, and is not occurring in the poorer African countries. Consumption of ASF is declining in these countries, from an already low level, as population increases. J. Nutr. 133: 4048S–4053S, 2003.

KEY WORDS: • *animal source foods* • *production* • *consumption*

This article provides interpreted statistics and information on global livestock production and the consumption of animal source foods (ASF)[3] from the Food and Agriculture Organization of the United Nations (FAO) statistical database (1). FAO, as part of its mandate, compiles information and data on various aspects of food and agriculture from all countries. The data are analyzed and interpreted to support FAO's programs and activities and they are disseminated to the public through publications, CD-ROM, diskettes and the Internet.

Country data are collected through questionnaires sent annually to member countries, magnetic tapes, diskettes, computer transfers and by accessing websites of the countries, national/international publications, country visits made by the FAO statistician and reports of FAO representatives in member countries. However, many developing countries still do not have an adequate system of statistics pertaining to the agricultural sector. Some of the available agricultural data are incomplete in terms of: *1*) range of commodities covered, *2*) range of variables or data sets covered and *3*) coverage of the country (sometimes certain regions of the country are not covered by the national statistical reporting system). Furthermore, even when data are available, their reliability may be questionable.

When official data from member countries are missing, FAO statisticians estimate the minimum data required to calculate world, continental and regional aggregates and to compile secondary derived statistics such as food supply. These estimates are made when no other information is available at the national level. This part of the exercise is undertaken within the framework of the "Supply and Utilization Accounts," for which established guidelines for preparation are available. These accounts also help in checking the consistency of various data sets.

In relation to livestock production and product consumption, the various data sets consulted include: agricultural production, agriculture and food trade, food supply, food balance sheets, supply utilization account, population and fish production. In addition, data are available on agricultural production indices, production values, food aid, exports of cereals by source and destination, oilseeds, oils, fats, cakes and meals, commodity balances, producer prices, land, means of production, forestry data, forestry trade flow and the Codex Alimentarius pesticide and veterinary drug-residue limits in food.

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[2] To whom correspondence should be addressed. E-mail: andrew.speedy@fao.org.

[3] Abbreviations used: FAO, Food and Agriculture Organization of the United Nations; IFPRI, International Food Policy and Research Institute; ILRI, International Livestock Research Institute; ILSI, International Life Science Institute; Mt, metric tons.

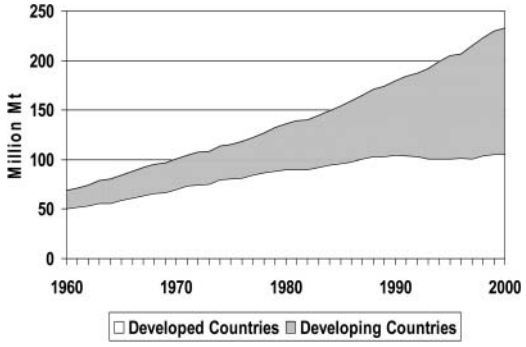

FIGURE 1 Changes in meat production in developed and developing countries, 1960–2000.

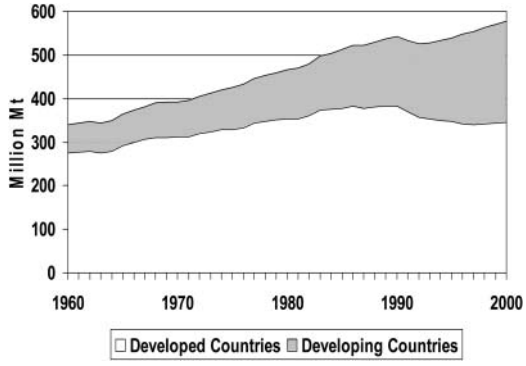

FIGURE 2 Changes in milk production in developed and developing countries, 1960–2000.

Livestock production

The FAO data show that livestock production is growing rapidly, which is interpreted to be the result of the increasing demand for animal products. Since 1960, global meat production has more than trebled, milk production has nearly doubled and egg production has increased by nearly four times. This is attributed partly to the rise in population, as well as to the increase in affluence in many countries. A joint IFPRI/FAO/ILRI study (2) suggested that global production and consumption of meat will continue to rise, from 233 million metric tons (Mt) in the year 2000 to 300 million Mt in 2020, as will that of milk, from 568 to 700 million Mt over the same period. Egg production will also increase further by 30%.

The large increase in demand for ASF over the last few decades has been largely met by the worldwide growth in intensive livestock production, particularly poultry. This is expected to continue as real income grows in the emerging economies. The production of poultry meat has increased from 9 million Mt in 1960, to 15 in 1970, 26 in 1980, 41 in 1990 and 68 million Mt in 2000, thereby overtaking the production of beef (60 million Mt in 2000).

Figures 1–3 show the growth and predicted future growth of production of meat, milk and eggs in developed and developing[1] countries. However, much of the growth in meat production has been taking place in a relatively small number of countries, including some of the most populous ones, e.g., China and Brazil (3). Including these two countries, meat production in the developing countries went from 50 million Mt in 1980 to 180 million Mt in 2000. Excluding these countries, it rose from 27 million Mt to only 50 million Mt over the same period (**Fig. 4**).

Including or excluding China in the totals of the developing countries and the world makes a significant difference for the aggregate growth rates of meat, although not of milk and dairy products, given the small weight of these products in China's food consumption. It is even suggested by FAO's Economic and Social Department (3) that China's meat production may be overestimated.

In particular, the apparently spectacular growth in pig production is very dependent on including China in the statistics. Pig production in China yields a very different commodity to that found in the West and is currently mainly small scale, although with large numbers. It is based on a different system and uses different kinds of feed, although intensive units are developing in the east.

If China's growth in meat consumption in the last decade, which is an increase of ~2 kg/person/y (leading to the 39 kg/person/y intake in 1995–97), were to continue for much longer, the country would soon surpass the per capita consumption of the industrial countries, an untenable prospect. Therefore, a rather drastic deceleration in at least this country and, given its large weight, also in the global aggregates, is to be expected. The production of different meats (beef and buffalo, sheep and goat, pig meat and poultry) is shown in **Figure 5**. For the reason given above, Chinese pig production is differentiated from the rest of the world.

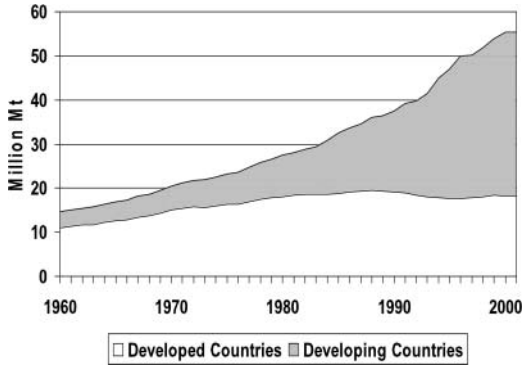

FIGURE 3 Changes in egg production in developed and developing countries, 1960–2000.

[1] Included in Developing Countries are: Afghanistan, Algeria, American Samoa, Angola, Anguilla, Antigua Barbuda, Argentina, Aruba, Bahamas, Bahrain, Bangladesh, Barbados, Belize, Benin, Bermuda, Bhutan, Bolivia, Botswana, Bouvet Islands, British Indian Ocean Territories, British Virgin Islands, Brazil, Brunei Darsm, Burkina Faso, Burundi, Cambodia, Cameroon, Canton Islands, Cape Verde, Cayman Islands, Central African Republic, Chad, Chile, China, Christmas Islands, Cocos Islands, Colombia, Comoros, Republic of the Congo, Democratic Republic of the Congo, Cook Islands, Costa Rica, Cote d'Ivoire, Cuba, Cyprus, Djibouti, Dominica, Dominican Republic, East Timor, Ecuador, Egypt, El Salvador, Equatorial Guinea, Eritrea, Ethiopia, Ethiopia PDR, Falkland Islands, Fiji Islands, French Guiana, French Polynesia, French South Territories, Gabon, Gambia, Gaza Strip, Ghana, Greenland, Grenada, Guadeloupe, Guam, Guatemala, Guinea, Guinea-Bissau, Guyana, Haiti, Heard Islands, Honduras, India, Indonesia, Iran, Iraq, Jamaica, Johnston Islands, Jordan, Kenya, Kiribati, Korea Democratic Peoples Republic, Korea Rep, Kuwait, Laos, Lebanon, Lesotho, Liberia, Libya, Madagascar, Malawi, Malaysia, Maldives, Mali, Marshall Island, Martinique, Mauritania, Mauritius, Mayotte, Mexico, Micronesia, Midway Islands, Mongolia, Montserrat, Morocco, Mozambique, Myanmar, N. Marianas, Namibia, Nauru, Nepal, Netherlands Antilles, New Caledonia, Nicaragua, Niger, Nigeria, Niue, Norfolk Islands, Oman, Pacific Islands, Pakistan, Palau, Panama, Papua New Guinea, Paraguay, Peru, Philippines, Pitcairn Islands, Puerto Rico, Qatar, Reunion, Rwanda, Samoa, Sao Tome & Principe, Saudi Arabia, Senegal, Seychelles, Sierra Leone, Singapore, Solomon Islands, Somalia, South Georgia, Sri Lanka, Saint Helena, Saint Kitts Nevis, Saint Lucia, Saint Pierre & Miquelon, Saint Vincent, Sudan, Suriname, Swaziland, Syria, Tanzania, Thailand, Togo, Tokelau, Tonga, Trinidad & Tobago, Tunisia, Turkey, Turks Caicos, Tuvalu, U.S. Virgin Islands, Uganda, United Arab Emirates, Uruguay, U.S. Minor Islands, Vanuatu, Venezuela, Viet Nam, Wake Islands, Wallis Fut I, Western Sahara, Yemen, Zambia, and Zimbabwe.

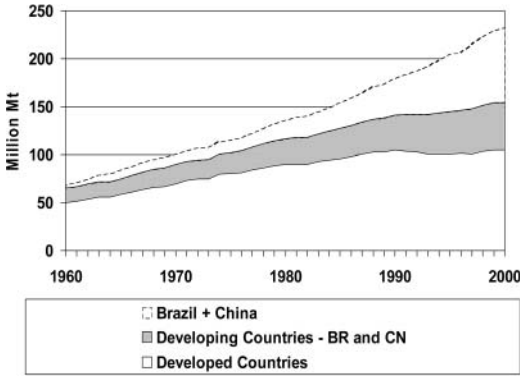

FIGURE 4 Changes in meat production excluding Brazil and China in developed and developing countries, 1960–2000.

To complete the picture, it is important to also consider fish production. There is also a major rise in both fish catch and freshwater fish (including aquaculture). **Figure 6** shows the data, again differentiating China for which there is concern about reliability of the figures. However, it is clear that fish contribute considerably to the ASF supply in developing countries with a total supply of 90 million Mt (45 million Mt, excluding China). This compares with 127 million Mt meat production (50 million Mt, excluding China and Brazil). It should be noted that, in many countries, fish availability is very geographically skewed and is often limited to areas near coasts, rivers and inland lakes.

Consumption of meat, milk and eggs

Although there is a great rise in global livestock production, the pattern of consumption is very uneven. The data on meat, milk, eggs and fish consumption for 180 countries are given in **Table 1**. Consumption of meat in the U.S. is 124 kg/capita/y, compared to the global average of 38 kg. The countries that consume the least amount of meat are in Africa and South Asia; the lowest ten are Sierra Leone, Democratic Republic of Congo, Mozambique, Sri Lanka, Rwanda, India, Malawi, Guinea, Burundi and Bangladesh. Consumption in these countries is between 3 and 5 kg/capita/y. This is compensated to some extent in Bangladesh by higher fish consumption (17.5 kg) and in India and Sri Lanka by higher milk consumption (47.5 kg and 35.9 kg, respectively). Milk consumption in the U.S. is 118 kg/capita/y.

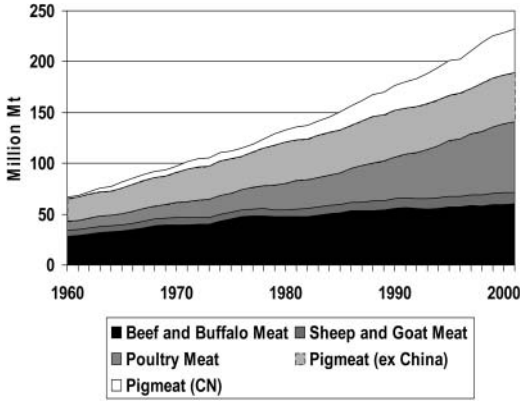

FIGURE 5 Changes in world production of specific meats, 1960–2000.

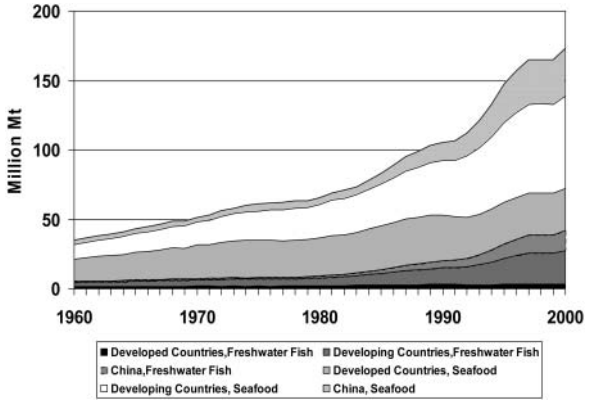

FIGURE 6 Changes in fish production in developed and developing countries, 1960–2000.

Many African countries are in the bottom quartile for consumption of meat plus fish combined, including Benin, Morocco, Cameroon, Somalia, Zambia, Sudan, Sierra Leone, Algeria, Kenya, Angola, Côte d'Ivoire, Djibouti, Guinea, Guinea-Bissau, Liberia, Zimbabwe, Lesotho, Nigeria, Malawi, Democratic Republic of Congo, Burkina Faso, Niger, Ethiopia, Burundi, Eritrea, Mozambique and Rwanda. Also in this lower category are the Central American and Caribbean countries of Guatemala, Honduras, El Salvador, Haiti and Nicaragua, the Balkan-Caucasian-Central Asian countries of Armenia, Bosnia and Herzegovina, Moldova, Azerbaijan, Afghanistan and Tajikistan, as well as the Middle East countries of Syria, Yemen and Iraq and, in South Asia, Pakistan, Nepal, India and Bangladesh. Meat consumption (kg/capita/y) is shown for selected countries in **Figure 7**.

The number of countries in each meat consumption category is shown graphically in **Figure 8**. In **Figure 9**, the number of countries has been multiplied by the size of the population. Although this cannot strictly be seen as the number of people in each category, it does suggest that one-third of the world's population consumes <10 kg meat/y.

Figure 10 shows the time series of meat consumption for a number of selected African countries. It is clear that consumption is falling in these countries, from an already low level to below 15 kg/capita/y, and in some cases, to below 5 kg.

Meat consumption in relation to gross domestic product

The main determinant of per capita meat consumption appears to be wealth (**Fig. 11**). There are particular regional and cultural differences in the exact position of countries on the graph. Traditional herding countries are above the line (Somalia, Ethiopia). Rwanda, Burundi and Mozambique have very low meat consumption after the conflicts in these countries. India is well below the line, and China is above the line. Latin American countries have high meat consumption in relation to their gross domestic product (GDP). Middle East countries have an average level of consumption, whereas in Japan meat consumption is well below the line but fish consumption is high. Scandinavian counties tend to have lower meat consumption than, for example, France, Germany and the U.S.

Although the relationship between GDP and food consumption, including meat, is well known, consideration should also be given to the inverse relationship, i.e., that ASF production may increase GDP. In a recent publication from FAO's Economic and Social Department (4), it is noted that a surprisingly strong relationship appears to link economic

TABLE 1

Consumption of meat, milk, eggs and fish by country (kg/capita/y). (Data from FAO)

Country	Meat	Milk	Eggs	Fish	Country	Meat	Milk	Eggs	Fish
Uruguay	126.5	131.6	9.3	8.6	Belarus	62.2	130.2	13.2	1.6
U.S.	124	117.3	14.5	22.4	Bulgaria	61.5	125.2	11.2	4.4
Cyprus	117.6	148.9	11.2	23.5	Chile	61	65	4.6	18
Spain	113.1	108.1	13.9	42.4	Estonia	57.6	137.7	11.4	23
Denmark	112.4	37.1	14.7	27	Norway	55.8	91.4	10.2	61.9
New Zealand	109.9	63.2	11.9	24.7	Brunei Darussalam	55.6	53.7	14.1	21.9
Australia	108.9	103.6	6.3	20	Dominica	55.4	119.2	2.7	36.7
Canada	101.1	53.7	10.8	24.4	St Vincent/Grenadines	54.7	56.8	5.2	19.4
France	99.9	61.1	16	32.1	Jamaica	54.3	27.3	9.9	17.8
Ireland	99.4	174.8	6.9	17.2	Malaysia	54	17.3	13.7	54.2
Argentina	97.7	107.5	6	9.9	Panama	53.4	46.6	4.5	14.3
Slovenia	96.2	88.3	10.4	7.3	Mexico	52.9	78.5	14.4	11.8
Mongolia	95.9	124.7	0.1	0.1	Saudi Arabia	52.6	50.1	4.8	8
Bahamas	95.1	42.9	4.5	21.8	Romania	52.3	176.8	9.9	2.4
Portugal	92.8	83.7	9.3	58.7	Lithuania	52.2	61.1	9.8	18.3
Barbados	92.7	63	3.4	41	Suriname	49.8	30.3	11.1	23
Italy	91.3	45.6	12.9	25.3	Bolivia	49.4	25.6	6.9	2.4
Austria	90.9	83.3	13	16.8	China, Mainland	48.1	6.4	15.6	35.7
Fr. Polynesia	90.6	50.1	6.5	67.5	Gabon	44.9	18.9	1.4	52.7
Netherlands Antilles	87.6	49.5	2.7	23.1	Grenada	43.8	65.9	7.7	27.6
Netherlands	85.9	140	16.1	18.1	Fiji Islands	42.9	44.5	4.2	32.5
Greece	85.5	67.1	10.3	29.6	Japan	42.4	43.5	19.2	71.9
Germany	85.3	66.2	12.2	17	Venezuela, Boliv Rep of	42.4	42.3	5.6	22.1
Bermuda	84.6	25	8.7	45.7	Korea, Republic of	42.3	16.8	9.2	50.3
Hungary	84.3	78.6	15.7	6.7	Costa Rica	41.4	143.5	5.4	8.4
Belgium-Luxembourg	84	55	14.4	23.1	Russian Federation	41	124.9	12.3	25.4
Yugoslavia, Fed Rep of	82.7	146.9	6.9	4	Dominican Republic	40	41	5.1	12.6
Antigua and Barbuda	82.5	116.4	2	38.6	Kazakhstan	39.5	174.2	4.7	5.4
Czech Republic	81.3	42.3	16.4	12.9	Kyrgyzstan	38.4	173.9	2.7	0.7
Malta	80.4	96.9	16.9	40.9	Belize	38	85.7	6.3	8.5
China, Taiwan Prov of	79.7	31.1	14.6	43	Ecuador	35.3	90.8	3.2	7.6
Iceland	79.3	120.6	5.7	94	Mauritius	34.4	88.8	3.2	22.5
Slovakia	78.1	45.9	13.2	6.4	Colombia	34.4	103	7.1	6.4
United Kingdom	76.3	121.1	9.2	24.5	Jordan	34	39	7.5	3.5
Saint Lucia	75.6	54.8	3.2	22.7	Swaziland	34	62	2.8	0.2
United Arab Emirates	74.6	120.9	9.9	27.1	South Africa	33.2	43.2	6.3	7.4
Saint Kitts and Nevis	73.4	71.4	5.3	37.6	Trinidad and Tobago	32.7	45.5	7.6	14.2
Brazil	73	118.7	6.7	8.6	Latvia	32.7	127.4	9.4	12.5
Sweden	72.4	73.2	11.6	30.6	Libyan Arab Jamahiriya	32.7	52.9	10	6.1
Paraguay	72.4	83.9	7.8	11.1	Ukraine	32.4	150.4	9.6	9.6
Switzerland	72.3	92.5	10.5	21.5	Guyana	32.1	57.7	8	73
Kuwait	70.3	45.8	11.6	11.2	Vanuatu	32	17.4	1.6	24.8
Poland	70.2	68.6	10.5	15.6	Lebanon	31.5	31.8	7.3	6.9
China, Macao SAR	68.5	27.2	10	49	Macedonia, The Fmr Yug Rep	31.2	16	9.9	5.4
Israel	68.3	59.2	11.9	26.4	Botswana	30.4	88.1	1.7	8.9
Finland	67.3	131.3	9.3	43.9	Croatia	30.4	108.6	9.8	4.9
New Caledonia	66.5	85.5	6.9	25.2	Albania	29.3	242.2	5.7	2
Turkmenistan	28.5	122.4	3.2	3.9	Cambodia	14.4	2.3	1.1	12.5
Cuba	26.9	28.9	5.9	16.4	Congo, Republic of	13.9	9.3	0.5	30.6
Uzbekistan	26.8	131.9	2.7	0.9	Benin	13.8	5.1	2	12.9
Seychelles	26.6	33.5	5.8	62.3	Kenya	13.7	76.7	1.3	8.5
Kiribati	26.3	18.4	1.4	76.3	Pakistan	12.4	87.2	2	3.5
Philippines	25.8	4.4	7.6	33.2	Zimbabwe	12.1	14.1	1.2	3.2
Thailand	24.6	12.2	9.6	40	Niger	12	10.2	0.6	1.4
Georgia	24.5	116.1	6.7	2.3	Burkina Faso	11.5	18	1	2.1
Cape Verde	24.3	76.9	4.2	24.4	Yemen	11.2	4.5	2	6.6
Tunisia	23.9	73.2	7.3	9.2	Zambia	11	5	3.9	13.9
Viet Nam	23.8	0.9	2	22.8	Togo	10.5	3.2	1.1	18.2
Somalia	23.7	187.4	0.3	1.7	Ethiopia	10.5	14.6	1.1	0.4
Papua New Guinea	22.9	3.7	0.7	16.2	Uganda	10.3	21.5	0.7	17.2
Armenia	22.9	45.8	3.3	1.8	Nepal	10.3	30.4	1	2
Central African Republic	22.8	16.5	0.3	7.1	Haiti	10.2	13	0.4	3.3
Egypt	22.6	13.6	2.1	14.1	Tanzania, United Rep of	9.5	18.2	1.5	17.6
Peru	22.3	44	4.8	27.1	Liberia	9.5	2	1.7	6
Mauritania	22.1	121.4	1.5	16.1	Indonesia	9.4	3.2	2	22
Iran, Islamic Rep of	21.6	24.7	6.5	6.5	Côte d'Ivoire	9.3	10.2	0.9	10.8
Sudan	21.1	117.6	1.2	3	Ghana	9.2	3.1	0.8	26.2
Turkey	21	93.5	8.6	7.7	Eritrea	9.2	16.4	0.4	0.3
Guatemala	21	28.8	9.1	2	Tajikistan	8.8	46.4	0.1	0.1

TABLE 1 *(Continued)*

Country	Meat	Milk	Eggs	Fish	Country	Meat	Milk	Eggs	Fish
Syrian Arab Republic	20.8	59.6	6.8	1.4	Myanmar	8.6	7.9	1.4	18.9
Namibia	19.8	40.8	0.9	12.5	Maldives	8.5	46.6	1.1	154
Madagascar	19.1	33.1	0.9	9.5	Korea, Dem People's Rep	8.5	3.7	4	19.7
Bosnia and Herzegovina	19.1	116.8	4.6	2.1	Comoros	8.2	8.3	1	19.1
Moldova, Republic of	18.9	116	3.2	1.2	Solomon Islands	8.1	2.7	0.9	32.2
Afghanistan	18.9	61.8	0.7		Sao Tome and Principe	8.1	2	1.9	22.4
Algeria	18.7	74.4	3.5	3.5	Nigeria	8.1	5.8	3.5	6.7
Mali	18.6	42.6	0.7	18	Gambia	6.1	15.8	0.7	24.3
Morocco	18.5	10.6	5.2	7.3	Iraq	5.7	10.2	0.4	2.7
Senegal	17.8	13.2	2.8	43.7	Sierra Leone	5.4	4.9	1.4	18
Honduras	17.3	104.7	6.8	3.8	Congo, Dem Republic of	5.2	0.6	0.1	9.1
Azerbaijan, Republic of	17.2	113.6	4.2	1.9	Mozambique	5.2	3.9	0.7	2.7
El Salvador	16.4	71.9	6.9	3.2	Sri Lanka	4.8	35.9	2.4	22
Djibouti	15.9	53.5	0.7	3.5	Rwanda	4.8	13.1	0.3	0.9
Laos	15.6	2.2	1.4	16.3	India	4.6	47.5	1.5	7.1
Chad	15.4	25.7	0.5	12.6	Malawi	4.5	3.7	1.7	10.3
Guinea-Bissau	15.4	14.8	0.5	3.1	Guinea	4.2	9.4	0.9	15.2
Cameroon	15.1	14.2	0.7	10.5	Burundi	3.9	4.5	0.4	6.4
Lesotho	14.9	12.8	0.6	0	Bangladesh	3.2	12.8	1.1	17.5
Angola	14.8	13.8	0.3	6.7					
Nicaragua	14.5	29.6	6	1.7	World	37.9	46.4	8	20.1

growth to nutritional factors. A detailed econometric analysis is given in that publication. The impact of nutrition on economic growth would appear to operate directly, through nutrition's effect on labor productivity, as well as indirectly, through improvements in life expectancy. However one looks at the problem, achieving the goal of reducing the prevalence of food inadequacy by half by 2015, as enunciated at the World Food Summit of 1996 and reiterated recently at the World Food Summit five years later, would not only improve human welfare considerably but also substantially increase the rate of economic growth. If this is true for general food and energy consumption, it is likely that dietary quality is also involved and that ASF consumption is also affecting human productivity and economic growth. The low and declining figures for Sub-Saharan Africa are therefore of even greater concern.

The food-feed controversy

Given the picture of ASF consumption, the question needs to be answered whether there should be a focus on increasing ASF consumption and particularly whether cereals and other foods that humans can eat should be fed to livestock. Firstly, feeding grain is very much a developed country practice. Forty per cent of cereals are fed to livestock in the U.S. whereas only 14% are fed in Africa (data from FAOSTAT). Globally, some 670 million tons of cereals are used as livestock feed each year. This represents just over one-third of total world cereal use. FAO country statistics do show that there has been an increase in the feeding of cereals to animals since the 1970s in particular countries, notably Brazil and Thailand, that have developed successful poultry export industries, as well as other products (beef and shrimp, respectively). The simple view sees this use of cereals as a threat to food security; it appears to remove supplies of essential foods that would otherwise be available to poor countries and families and to raise food prices. However, the feed use of cereals may actually help food security. The commercial livestock sector is extremely responsive to the price of cereals; whenever shortages raise cereal prices, livestock producers tend to reduce their use of cereals as feed, releasing more for food use. As a result, the food use of cereals needs to contract less than it would otherwise. Thus the use of cereals as feed may serve as a useful buffer, protecting the food supply from annual variations.

Although it is true that rich consumers in developed countries probably consume too many animal products (particularly fat), most people in developing countries would benefit from eating more meat, milk and eggs. In recent years, it has been recognized that inadequate quantity and quality of dietary micronutrients is the underlying cause of many nutrition problems in developing countries, including anemia,

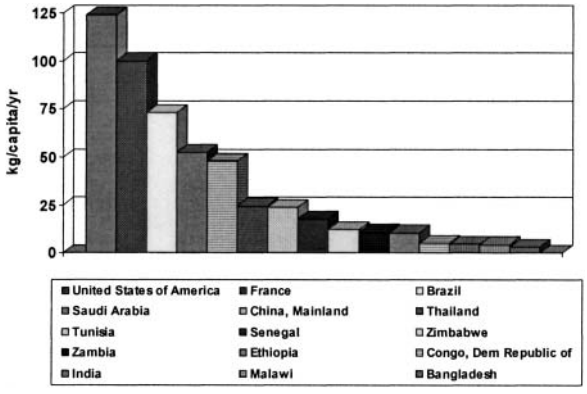

FIGURE 7 Meat consumption in selected countries, 1960–2000.

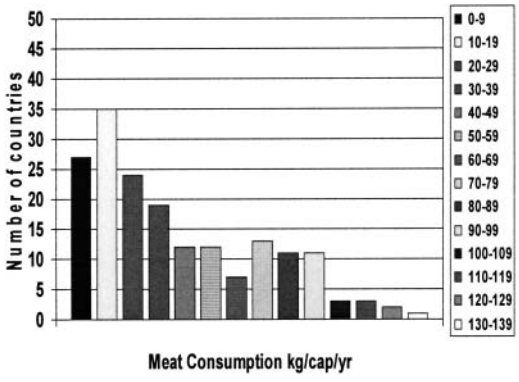

FIGURE 8 Distribution of meat consumption by number of countries, 1960–2000.

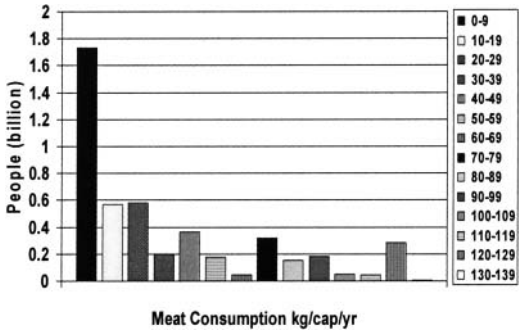

FIGURE 9 Meat consumption by population number in countries (excluding China), 1960–2000.

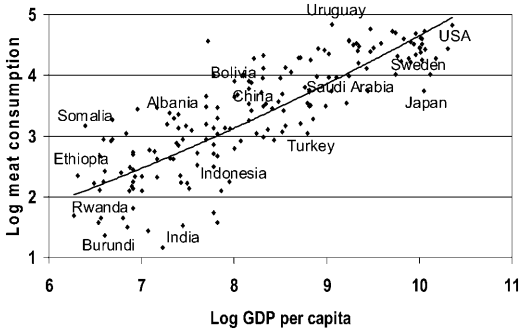

FIGURE 11 Per capita meat consumption in relation to GDP.

poor growth and poor motor and mental function. To a large extent this is due to a low intake of ASF, which contain high amounts of available micronutrients. Regrettably, as the population increases, consumption of ASF is actually declining, particularly in the poorer African countries (see above). Research presented elsewhere in this conference suggests that children in these countries would benefit from a supplement of meat, milk and eggs with better physical and mental development.

Meat is a good source of high quality protein, of available iron and zinc and of all the B-vitamins except folic acid. Pig meat is particularly rich in thiamin. Liver, and to a lesser extent kidney, are also rich in vitamin A and folic acid and in iron, riboflavin and other B-vitamins. Fish is an equally good source of protein and vitamins, including vitamins A and D in fatty fish. It also contains a well-balanced supply of minerals, including iodine, and if the bones are eaten, calcium, phosphorus and fluoride. Milk is the most complete of all foods, containing nearly all the constituents of nutritional importance to man, although it is comparatively lacking in iron and vitamins C and D. It also contains substantial amounts of lactose and protein. Eggs make a useful contribution to the daily intake of vitamin D, retinol, riboflavin, iodine, iron and protein.

In recent years the use of cereals as livestock feeds has declined in relative terms, from 39% of total cereal use in the mid-1980s to 36% in 1995–1997. One explanation for this is the shift of meat production to poultry, which is a much more efficient converter of feed to meat than other species of domestic livestock. The use of oilseed meals in livestock feed rations is increasing but this is being driven by an increasing demand for vegetable oil for human consumption. The high protein meals and cakes are a useful by-product.

In any case, livestock are fed many plant materials that are not useful as human food. The FAO Animal Feed Resources Information System contains data and information on over 700 materials that can be used as animal feeds (5). These include grasses and legumes, which can be used by ruminants and to some extent pigs, as well as crop and other by-products. FAO has carried out many projects to promote the use of alternative feedstuffs and to develop integrated farming systems where crops and livestock are complementary.

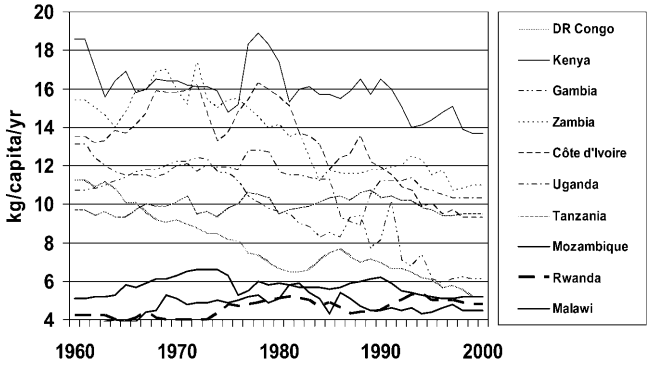

FIGURE 10 Changes in meat consumption in Africa, 1960–2000.

Conclusions

There has been a great rise in the production of livestock products and this is expected to continue in the future. This is particularly the case in developing countries. The greatest increase is in the production of poultry and pigs, as well as eggs and milk. However, this overall increase obscures the fact that the increased supply is restricted to certain countries and regions, and is not occurring in the poorer African countries. Consumption of ASF is declining in these countries, from an already low level, as population increases. Although there is overconsumption of meat in developed regions, there is clearly a need to promote the development of livestock production and the consumption of ASF in many developing countries, to improve physical and mental health and fitness. Livestock production can make good use of resources, some of which would otherwise not be used, and contributes high quality protein and important micronutrients to the human diet.

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