

UNDERSTANDING THE LINKS BETWEEN AGRICULTURE AND HEALTH

Livestock and Health

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The linkages between livestock and health are significant, particularly for the poor, whether as livestock raisers or as consumers of meat and milk, or even as users of the environment. The processes of livestock production and consumption bring both benefits and problems for human health.

BENEFITS OF LIVESTOCK FOR HUMAN HEALTH AND NUTRITION

Animal source foods (ASFs) such as meat, milk, and eggs are guaranteed sources of high-quality protein and essential structural fats. They are also a major source of highly bioavailable (that is, easily absorbed and used by the body) essential micronutrients, such as iron, zinc, vitamin A, and calcium, that are either lacking or not as bioavailable in many developing-country diets that are predominantly composed of cereals. These nutrients are essential to maintain adequate growth and development. For example, a Kenyan study of more than 500 children in 12 schools revealed that increased intake of ASFs is strongly associated with significantly improved health, growth, and cognitive function. Micronutrients also protect against infectious diseases and mortality: zinc, for instance, reduces the incidence, duration, and severity of infections, and vitamin A reduces child mortality. Deficiency of some micronutrients is also associated with increased risk of or vulnerability to some chronic diseases.

The distribution of ASFs to people across the globe is highly uneven. Vulnerable segments of the population with particularly high micronutrient requirements, such as young children, pregnant and lactating women, and HIV/AIDS-affected people, often receive less than their share of ASFs because of lack of access or inadequate allocation within the household. At the same time, other groups are consuming large amounts of ASFs and thus excessive amounts of saturated fats, which pose risks for health. The challenge now lies in making ASFs more available to poor people while not promoting excessive consumption.

Livestock production can also have positive health effects by improving the livelihoods of the poor. Mixed crop and livestock production systems provide a critical source of income to 84 percent of the world's rural poor. In India more than 70 million farm families rely directly on microlevel dairying for employment and income, and in Viet Nam 60–70 percent of all rural households raise chickens and pigs. Many of these mixed-farm households have little access to other assets or resources, and therefore the animals they keep provide them with a pathway out of poverty. Dairy products, eggs, wool, leather goods, and even manure can be traded for cereals. The prevailing trend of industrial livestock production in recent years may therefore threaten the positive impact of livestock on the livelihoods of many of the world's poor.

RISKS OF LIVESTOCK FOR HUMAN HEALTH

Livestock production and consumption can lead to four main types of human health risks: (1) diseases transmitted from livestock to humans; (2) environmental pollution; (3) foodborne diseases and risks; and (4) diet-related chronic diseases.

Diseases transmitted from livestock to humans. Zoonoses are diseases that can be transmitted from animals to humans via bacteria,

parasites, viruses, and unconventional agents. The more common and serious zoonoses caused by infectious agents include salmonellosis, swineherds' disease caused by *Leptospira* species, brucellosis, the hepatitis E virus (HEV), bovine spongiform encephalopathy (BSE) and the variant Creutzfeldt-Jakob disease (vCJD), Rift Valley fever (RVF), adult meningitis caused by *Streptococcus suis*, and the influenza virus.

Zoonoses pose a significant human health risk. Take, for example, the influenza virus. The Spanish flu outbreak in 1918–19 was, together with HIV/AIDS, one of the most important infectious disease outbreaks of the 20th century, claiming the lives of at least 50 million people. Now, at the onset of the 21st century, the gravest among the viral zoonoses is the highly pathogenic “bird flu,” caused by the H5N1 virus. It was first detected in humans in Hong Kong in 1997, and between 2003 and February 2006 it caused 173 outbreaks and 93 deaths, mainly in Southeast Asia. In February 2006 the virus was detected in wild and domestic birds in India, the African countries of Niger and Nigeria, and in a dozen European countries. Scientists believe mutations of H5N1 have striking similarities to those found in the Spanish flu strain.

In the past, attempts at eradicating zoonoses associated with livestock included quarantine, vaccination, depopulation, cleaning and disinfection of farms, and mass culling of animals. Today, unconventional measures are being suggested, such as Hazard Analysis and Critical Control Point Program (HACCP) controls by food processors, bans on imports of live animals, and early warning systems. Bird flu is a real concern because there is no tried and tested vaccine, and while the experimental licensed drug oseltamivir phosphate appears to work, the world does not have enough for widespread use.

The death of livestock from disease epidemics severely impoverishes poor households, as does the ill health or death of the breadwinner from disease. Thus, for small livestock-keeping households in developing countries to ascend from poverty, the provision of human and animal health care is crucial.

Environmental pollution. Livestock production systems are intensifying worldwide, particularly in urban and peri-urban areas. As a result, livestock waste is emerging as a serious environmental and public health concern. Livestock waste can lead to huge nutrient surpluses concentrated in areas close to humans and has even been implicated in climate change. Untreated and ill-disposed hog waste can become airborne and waterborne, leading to health effects such as gastrointestinal diseases; respiratory ailments primarily caused by inhalation of noxious gases like hydrogen sulfide, methane, and ammonia; and skin irritation, “blue baby syndrome,” and cognitive impairments due to the growth of *Pfiesteria* in the air and water at high nitrate concentrations.

The Philippines is noteworthy for the rapid increase in its hog production, both in backyards and in large commercial lots. A study of 82 pig-producing households and 94 families residing near industrial pig farms in a periurban area in 2000 revealed that both groups suffered from respiratory and gastrointestinal ailments, conjunctivitis, influenza, and skin allergies. The study also measured the health costs paid by livestock raisers and households residing near pig farms. It found that the annual costs (including medical expenses, forgone

income, and cost of discomfort) paid by commercial livestock raisers' households averaged US\$601 for pneumonia, US\$47 for diarrhea, and US\$49 for influenza. Households near commercial or industrial pig farms spent relatively more money to mitigate health effects—an average of US\$8,239 for pneumonia, US\$176 for diarrhea, and US\$77 for conjunctivitis. For the majority of the rural poor, who are either producers or neighboring consumers, the costs just to keep themselves healthy seriously erode their meager earnings.

Foodborne diseases and risks. Several deadly bacteria are associated with the consumption of ill-prepared livestock products, notably *Campylobacter*, *Salmonella*, *E. coli* O157:H7, and *Enterococcus* (see Brief 5).

Antibiotics are used widely in developed countries in intensive livestock operations and are used increasingly in developing countries as growth promoters and to prevent the spread of infection. Though they have the potential benefit of increasing the availability of ASFs to poor families in developing countries, a recent study estimated that the benefit was negligible. Antibiotics are also a foodborne public health risk: there are concerns that the use of antibiotics in animals could lead to the emergence of strains of resistant pathogens that also cause diseases in humans, thus reducing the ability to treat human disease. The United States and European Union banned the use of certain antibiotics as growth promoters in the late 1990s; by 2006 all antibiotic growth promoters will be banned in the United Kingdom.

Concern about livestock-related foodborne diseases has led industrialized countries to develop strict food safety standards, but compliance with high-technology, process-based food safety standards, like HACCP, is prohibitively costly for many small, developing-country producers. Unless addressed, this situation could lead to negative feedback effects on income and poverty reduction.

Diet-related chronic diseases. Although consumption of livestock products can bring nutritional benefits, ASFs are energy-dense and contain high levels of saturated fats. Excess saturated fat and calorie consumption are associated with the development of obesity and diet-related chronic diseases such as cardiovascular disease, diabetes, and some cancers (see Brief 4). Societies in developing countries are now en route to adopting the typical Western diets high in saturated fats—largely contributed by increasing intakes of animal source foods—and in consequence are experiencing rapid rises in obesity and chronic disease.

CONCLUSION

The key to managing the linkages between livestock and health is to promote the benefits and mitigate the problems as they affect poor and vulnerable groups.

One problem that must be mitigated is the spread of zoonoses. Effective surveillance, prevention, and control of zoonoses are indispensable and require improved coordination among farmers,

public health agencies, and animal disease control officials, as well as organizations involved in food and water safety. International organizations and affluent countries must strengthen the capacities of resource-poor countries and other partners to detect, control, and prevent zoonoses. There must also be systematic integration between public health infrastructure and policy, as well as between human and animal health surveillance and control. To enhance global surveillance and response to zoonotic diseases, the Food and Agriculture Organization of the United Nations, the World Organisation for Animal Health, and the World Health Organization have jointly initiated a Global Early Warning System (GLEWS) for transboundary animal diseases. Sharing the information generated from this initiative is crucial.

In developing countries, smallholders have only rudimentary methods of protecting themselves from diseases and preventing their spread to neighboring farms and communities. There may be a need to rethink the trends toward wholesale privatization of animal health services and public disinvestment in these services and to look more deeply into public and private partnerships.

Although the developed countries have put in place extensive regulatory and market-based measures to mitigate environmental damage from intensive livestock production in urban and peri-urban centers, in developing countries both monitoring and compliance costs are prohibitive. It may be necessary to rethink concentrated livestock feeding operations to better handle waste disposal problems linked to the ill health of livestock keepers and the community at large. Less intensive livestock operations could also potentially reduce animals' susceptibility to infection and disease and reduce the indiscriminate use of antibiotics.

Overall, there should be no need for conflict among the goals of health, environmental safety, and wealth creation; rather they should be viewed as ideal complements. ■

For further reading, see M.A. Catelo, M. Dorado, and E. Agbisit, Jr., *Backyard and Commercial Piggeries in the Philippines: Environmental Consequences and Pollution Control Options*, EEPSEA Research Report No. 2001-RR6 (Ottawa, Canada: International Development Research Centre, 2001); M.W. Demment, and L. H. Allen, eds., *Animal Source Foods to Improve Micronutrient Nutrition and Human Function in Developing Countries*, Supplement to the *Journal of Nutrition* 133 (1 S-II; 2003): 3875S–4061S; World Health Organization, Food and Agriculture Organization of the United Nations, and World Organisation for Animal Health, *Report of the WHO/FAO/OIE Joint Consultation on Emerging Zoonotic Diseases* (Geneva: 2004), available at whqlibdoc.who.int/hq/2004/WHO_CDS_CPE_ZFK_2004.9.pdf; and P. Walker, P. Rhubart-Berg, S. McKenzie, K. Kelling, and R. S. Lawrence, "Public Health Implications of Meat Production and Consumption," *Public Health Nutrition* 8 (2005): 348–356.

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