Intensive animal production promotes

- **the emergence of new viruses - a threat to humanity**
- **the development of resistant bacteria from antibiotic use - a substantial medical problem**
- **the spread of food poisoning organisms**

The threat from new emerging viruses associated with intensive animal production is far greater than that of terrorism.

The source of human epidemic viruses. The majority of the epidemic viruses that afflict man have arisen since the advent of farming and its associated animal husbandry 10,000 years ago. Most of them arisen because they jumped from herded animals such as pigs, cattle and poultry. We know this because very similar versions of these viruses can be found in these animals as shown in the table below (Diamond 97). There is a possibility that such viruses jumped the other way but less likely because human numbers and density were inadequate for the maintenance of epidemic viruses until relatively recent times.

Human disease	Animal with most closely related pathogen
Measles	Cattle - Rinderpest
Smallpox	Cattle - Cowpox and other livestock pox viruses
Influenza	Ducks and pigs
Pertussis (Whooping Cough)	Pigs, dogs

An intriguing argument that appears to confirm this is related to the Spanish invasion of the Americas after the arrival of Columbus. Despite their relatively small numbers, men like Cortes and Pizarro were able to easily defeat the numerically vastly superior local inhabitants. Their major weaponry was not swords and guns but microbes such as smallpox, measles, influenza and typhus which devastated these communities in a short time, often spreading in advance before the invading armies arrived. With the exception of perhaps the bacterium of syphilis, the Americas gave no major epidemic diseases back to Europe because they had none to give.

The best explanation of this is that these peoples were not herders. The Incas had small herds of llamas but they were not kept indoors. Turkeys and Muscovy ducks were domesticated but never reached the density of European flocks. Thus animal viruses which have been the main source of human epidemic viruses did not pass to the native Americans because animals were not kept in close quarters (Diamond 98).

The 1918 Influenza epidemic is a good example. More recent examination of this virus is that it jumped directly from chickens to humans, possibly in the US. This strain H1N1 killed vast numbers of people between 2.5 and 5% of the population with estimates of deaths up to 100 million people. Most influenza viruses come from wild duck populations where they have little or no effect or mortality. Jumping to other species such as poultry, they can become lethal to those hosts as has been seen in the recent H5N1 outbreaks in Asia.

What is the danger to humans from such animal viruses? These viruses continually mutate and most likely by chance can acquire a mutation that may increase its potential to jump species into humans. The reason why most animal viruses don't affect humans is that they lack the ability to enter the cell via an existing receptor on the surface of the human cell. However, if by mutation or by acquisition of human genetic code they do, then they can spread rapidly from human to human.

To date the current H5N1 virus has not had this ability. The situation is a bit like cracking a combination lock, given enough time, the entry code can be found by simple trial and error. Hence with the current practice of keeping vast numbers of poultry in confined situations, the development of a new epidemic virus is increased simply by increasing the chance either by mutation within the poultry or by providing more opportunity of newly mutated viruses in wild birds passing via them to humans. The more lottery tickets that you buy in a lottery, the more likely you are to win.

The keeping of vast numbers of poultry using current intensive practices is inherently dangerous. While everyone likes there fried chicken, the production of the quantities consumed is a ticking time bomb because of the risk of emergent epidemic viruses similar to the 1918 H1N1 epidemic. It would be far better for the human race to reduce this consumption dramatically. We are currently buying a very large number of tickets in a lottery the human race definitely doesn't want to win.

The development of resistant bacteria from indiscriminate use of antibiotic use is a substantial medical risk.

The widespread use of antibiotics to increase yields with intensively reared animals has led to the emergence of antibiotic resistant bacteria. While not the only cause of resistant bacteria, their general widespread prophylactic use in these animals has produced new strains which are a significant threat to humans from bacteria such as Salmonella typhimurium, Campylobacter and Escherichia coli.

Even more concerning is the emergence of vancomycin resistant Enterococcus (VRE) almost certainly associated with the use of similar antibiotics in intensively reared animals or CAPOs (confined animal production organisations). Unfortunately, the restrictions on their use are very variable with some countries banning their use for growth production such as Denmark but opposed strongly by others such as the USA. The EU banned the use of bacitracin, spramycin, virginiamycin and tylosin in 1999 and a total ban on prophylactic use in January 2006. In the US, the indiscriminate use of fluoroquinoline antibiotics was banned in 2005 after resistant campylobacter from animals were found to be infecting humans (Collignon 05).

The danger of resistant and often untreatable organisms from all sources is growing steadily and to add more from indiscriminate use of antibiotics in feed lots is plain irresponsible. The major problem for the world is that more and more resistant bacteria are appearing, or existing ones such as methicillin resistant Staphlococcus aureus (MRSA) are spreading further but the number of new and effective antibiotics coming on the market is virtually nil. An effective way to limit antibiotic resistance is to use them when clinically

indicated in a planned way and not to use them indiscriminately or prophylactically outside clinically indicated circumstances.

The widespread use of them as growth promoters in CAPOs is just plain dangerous. A report directed at the British government by a group of five expert organizations in 2003 strongly recommended against their use in this manner (Future of Farming 03). There has been a slight decline in the US but their use is still not uncommon. It has been shown that when the conditions under which intensive production animals are improved, the effect of prophylactic antibiotics becomes negligible.

Food poisoning is more common with animal-based foods and current industrial farming practices enhance its impact.

Food poisoning is a very significant problem with the more serious being spread by food, particularly foods from animal sources. The majority of cases of food poisoning are not investigated or reported because they are usually self limiting and don't have serious effects beyond a lot of discomfort. That said, data from the US indicate that there is still a very significant and concerning problem: continuing, there are 76 million cases causing around 5000 deaths annually in the US alone. The people most affected are the most medically vulnerable: the old, the very young, the pregnant and those with defective immune systems. Data collected by the Center for Science in the Public Interest in the US from 1990 to 2003 shows the size of the problem (CSPI 06).

Food type	Outbreaks	Most common agents, decreasing in prevalence.
Sea food	899	Toxins, bacteria, parasites, viruses
Produce	554	Bacteria (Salmonella, E coli) viruses (Norovirus)
Poultry	476	Bacteria (Salmonella, Clostridium [toxin], Staph aureus, Campylobacter)
Beef	438	Bacteria (E coli 0157:H7, Clostridium [toxin, Salmonella)
Eggs	329	Bacteria (Salmonella was the most common)
Pork	170	Bacteria (Staph aureus)
Dairy	153	Bacteria (Salmonella, Campylobacter)
Other meats	145	Bacteria (Clostridium [toxin])
Bakery	116	Bacteria (Salmonella) Viruses (Norovirus)
Multi-ingredient foods	812	Bacteria (Salmonella) Viruses (Norovirus)
Outbreak refers to a group of people affected in the same episode. The actual number of cases were very much larger averaging from around 200 to 500 people for each category.		

As can be seen, a lot of these outbreaks occur in animal protein type foods with the presumption that if less of this food were consumed, many of these outbreaks would be eliminated. It should be noted that in response to many of these outbreaks, an intensive and somewhat effective effort has been made in the US to reduce their incidence with a drop from 96/98 to 2005 of 30 to 50% for many of the important organisms (FoodNet 05). None-the-less continuing very close surveillance is required, particularly in jurisdictions outside the west where regulations are more lax or not enforced.

The structure of the intensive feed lot animal production industry is such that it increases the potential for rapid spread of dangerous organisms very greatly. Food produced in this way is usually taken to a central processing facility which means that infected material from one distant operation can potentially contaminate all that product gathered from many other areas. It brings added meaning to the old saying of putting all your eggs in one basket. Such facilities increase the potential threat of bio-terrorism.

References:

(Collignon 05) P. Collignon. Fluoroquinolone Use in Food Animals. Emerging Infectious Diseases. 2005; 11:1789-1792

(CSPI 05) Center for Science in the Public Interest. Outbreak Alert: Closing the gaps in our federal food-safety net. 2005 (www.cspinet.org)

(Diamond 97) Jared Diamond. Guns, germs and steel. Vintage 1988 Chapter 11.

(FoodNet 05) CDC MMWR weekly. Preliminary FoodNet Data on the Incidence of Infection with Pathogens Transmitted Commonly Through Food --- 10 States, United States, 2005. 2005; 55:393-395.

(Future of Farming 03) Tim Lang, Geof Rayner Editors. Why Health is the Key to the Future of Food and Farming. A Report on the Future of Farming and Food. 2003.