Penn Veterinary Medicine

Veterinary medicine Global Health

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Challenges to society in the 21st Century

Soaring population growth

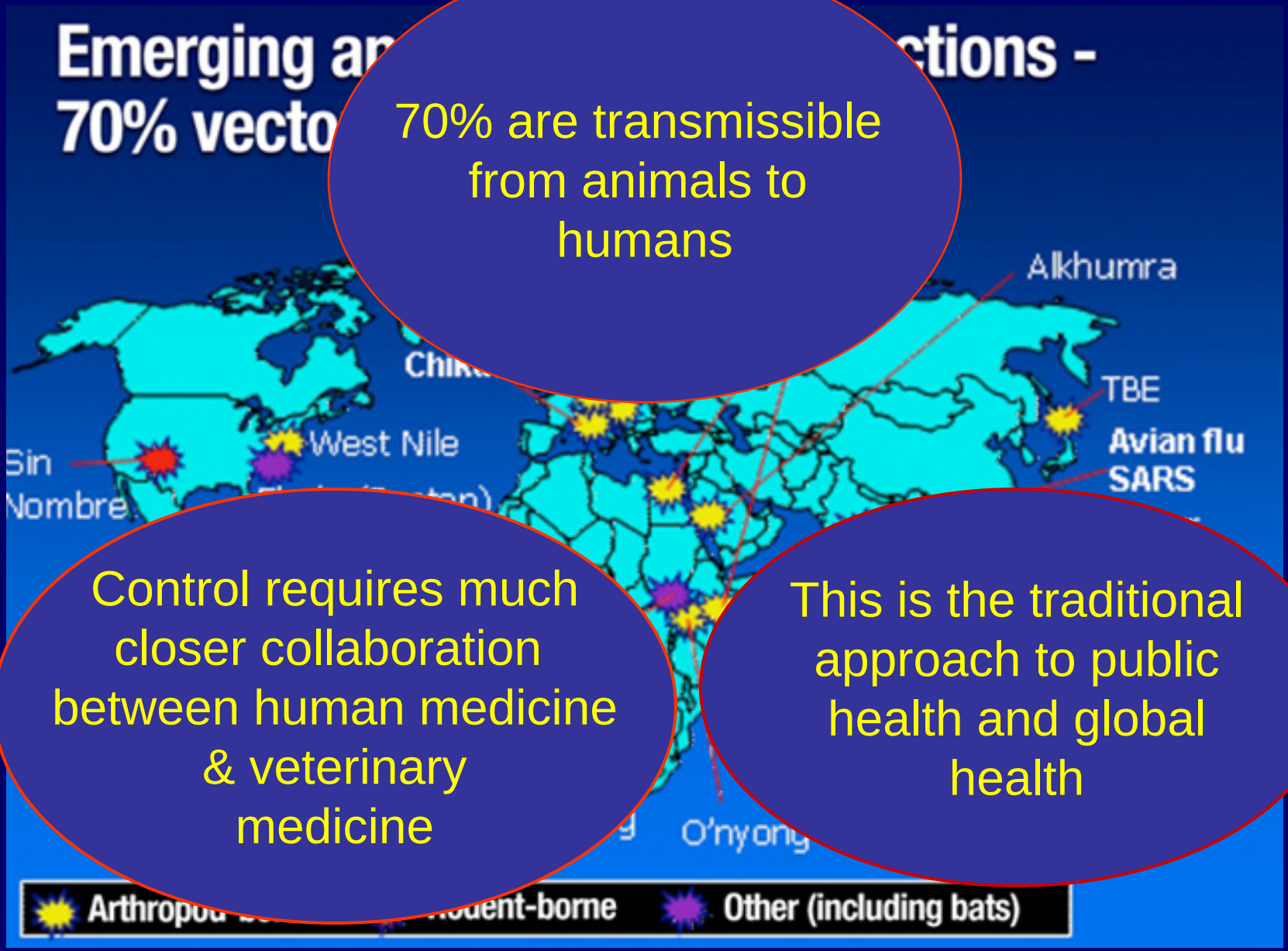
Global warming,

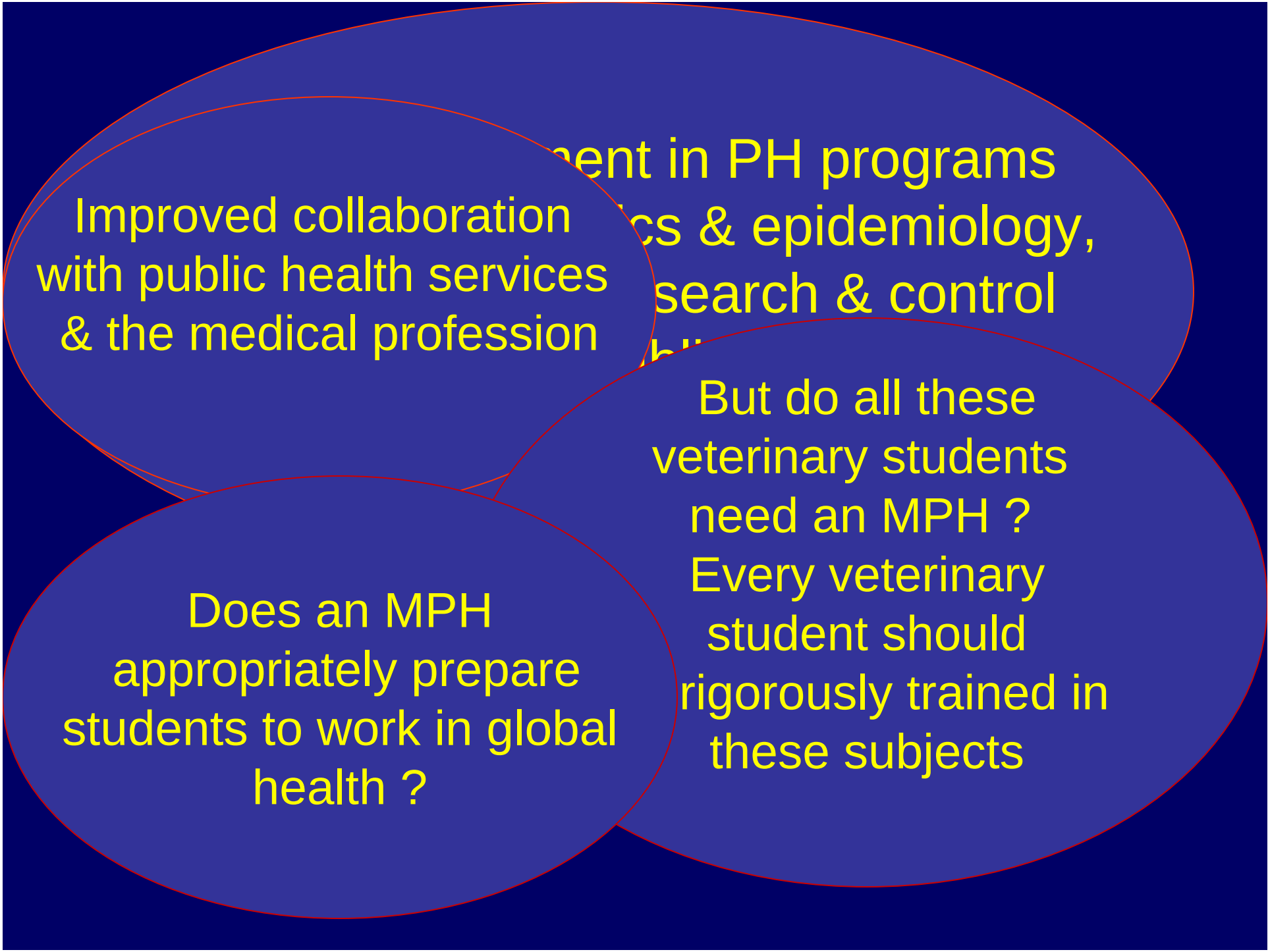
Loss of biodiversity, Ecosystem health,

Spread of infectious diseases,

Drought

How should Veterinary Medicine be involved?


Emerging ar ctions -
70% vecto
70% are transmissible from animals to humans
Alkhumra
TBE
Avian flu
SARS
West Nile
Sin Nombre
O'nyong
Control requires much closer collaboration between human medicine & veterinary medicine
This is the traditional approach to public health and global health
Other (including bats)


ent in PH programs
cs & epidemiology,
search & control
Improved collaboration with public health services & the medical profession
But do all these veterinary students need an MPH ? Every veterinary student should rigorously trained in these subjects
Does an MPH appropriately prepare students to work in global health ?

Programs in global health
are dominated by the medical
profession and schools of public health.
Their definition is narrow

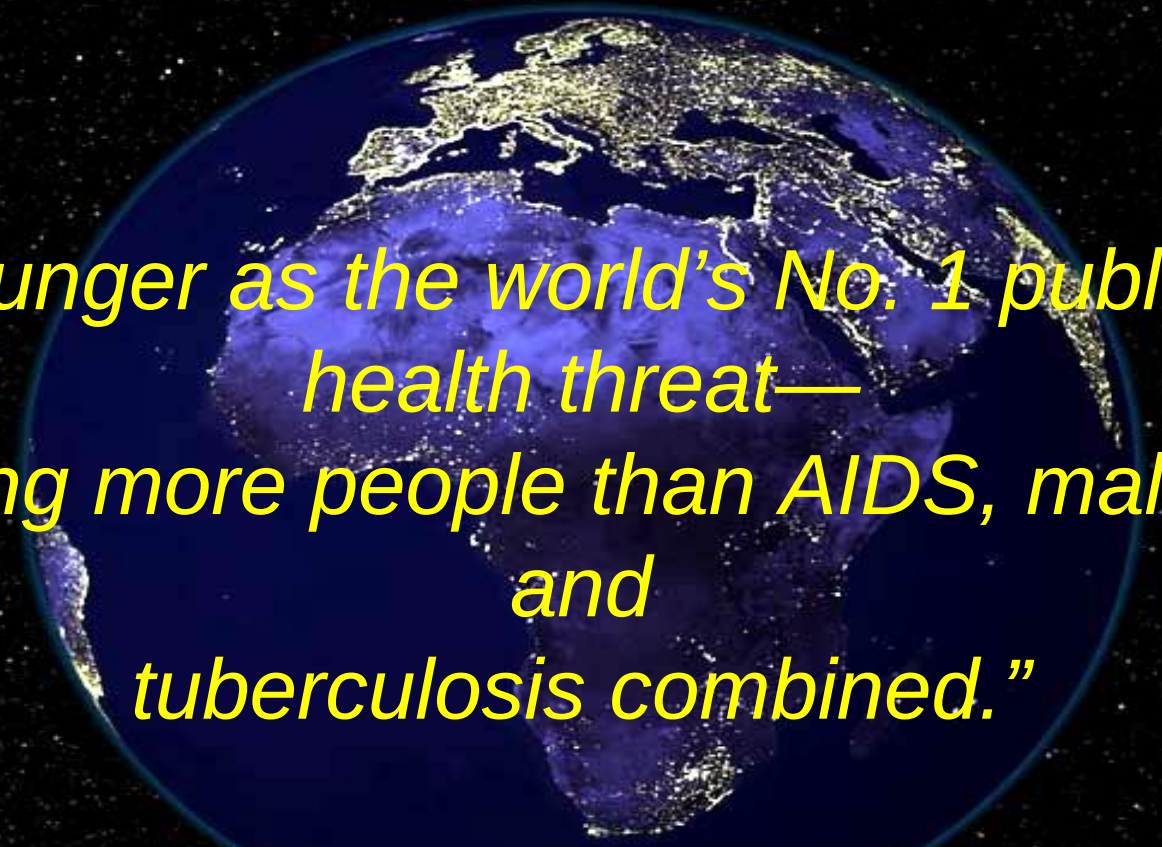
For veteri
pa
the defin
has to

Because of our broad
education
veterinarians should lead
the “One Health”
initiative

Global Health, Veterinary Medicine

Food production plays a central role in governing life on earth

HUNGER



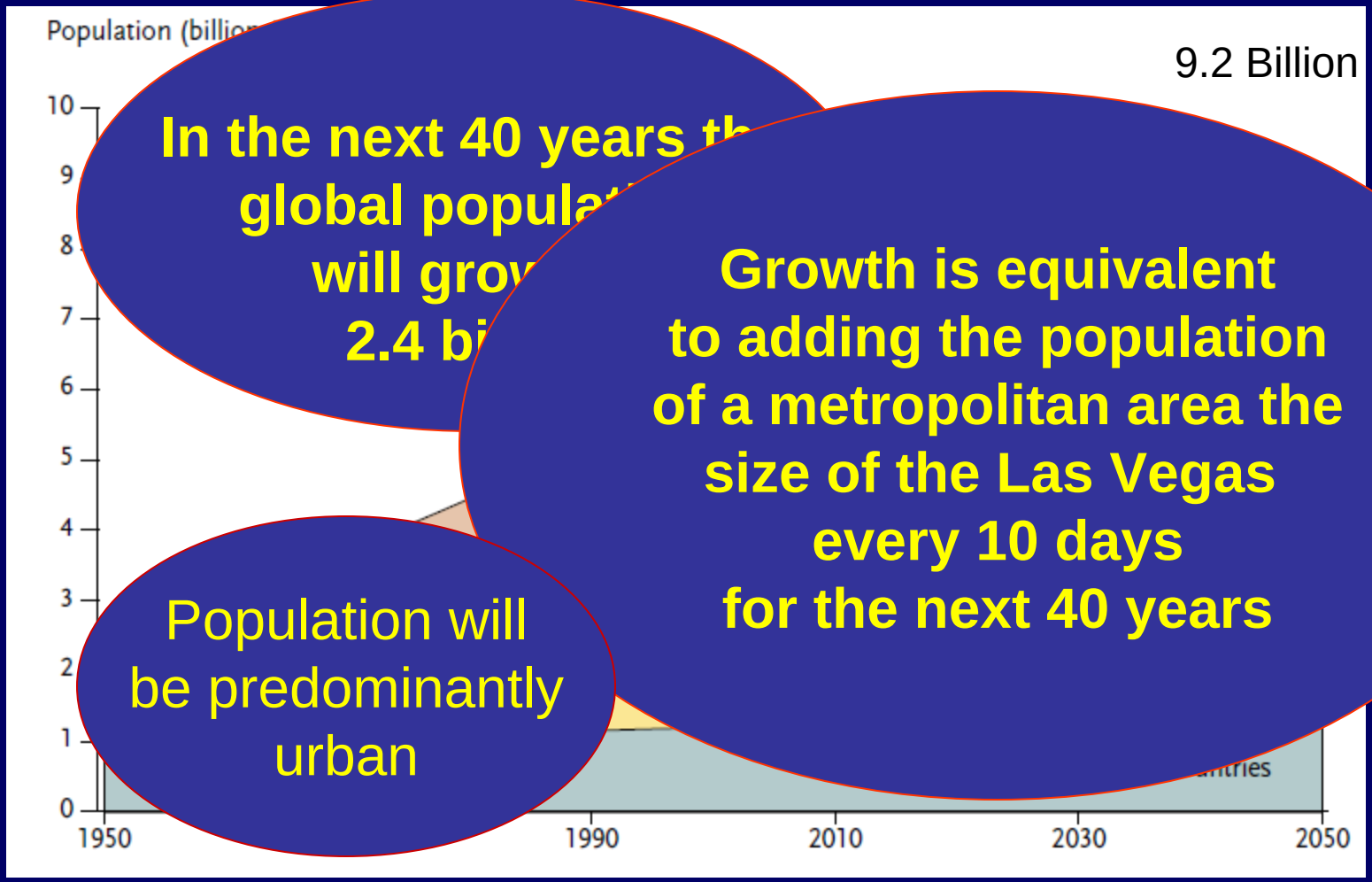
hunger as the world's No. 1 public health threat—
killing more people than AIDS, malaria and
tuberculosis combined."

—James T. Morris, Executive Director,
U.N. World Food Programme
March 15, 2007

Photos by Astronaut Sunita Williams


imal diseases
Disease
fever
Va
In the 21st Century food production
will be crucial
Controlling 1 or 2 infectious
diseases is important but not enough

Population Growth



Source: UN Population Division, *World Population Prospects: The 2006 Revision*, Medium Variant (2007)
*Steinfeld. The livestock revolution—a global veterinary mission

Urbanization is the engine of globalization
It will have the most consequential effect on the structure of society and agriculture in the 21st Century

Cities need a constant supply of foods that are safe & of uniformly high quality

There are estimates that 900 million people will live in cities in China by 2020
How do you provision these metropolises ?

How
do you feed 9 billion people
without wrecking
the environment ?

In the next 40 years
it is estimated
the world will need an
increase in food production
of 100%

Simmons, J; Economics and Consumers Choice.
Technology's role in the 21st Century

FAO estimates:
20 % from added farm land
10 % from increased farming intensity
on existing

Where are the
greatest needs?

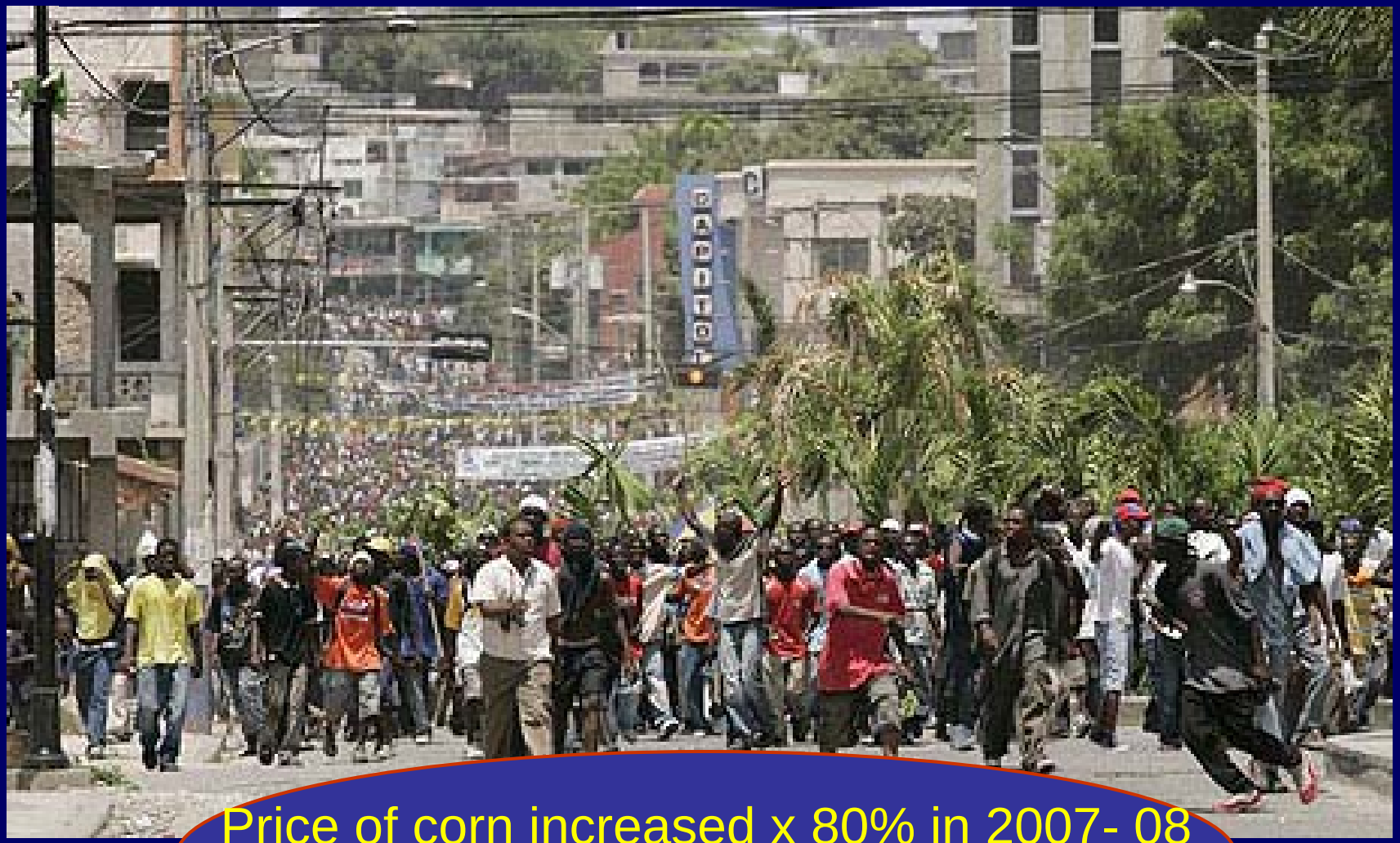
China has 20% of the world's population but Only 7% of the arable land.

Increased efficiency of production is critical

Food must be cheap.
High food prices have pushed more than 1 billion people into extreme hunger

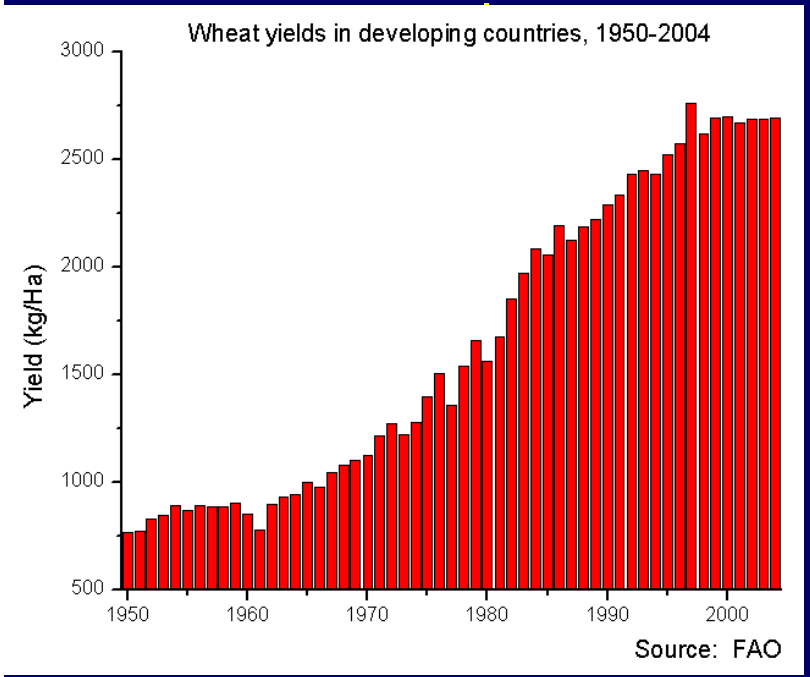
Josette Sheeran
Executive Director U.N. World Food Program, August, 2009

Food must be inexpensive to preserve political stability & avoid extremism



Price of corn increased x 80% in 2007- 08
Food riots in 30 countries including Haiti

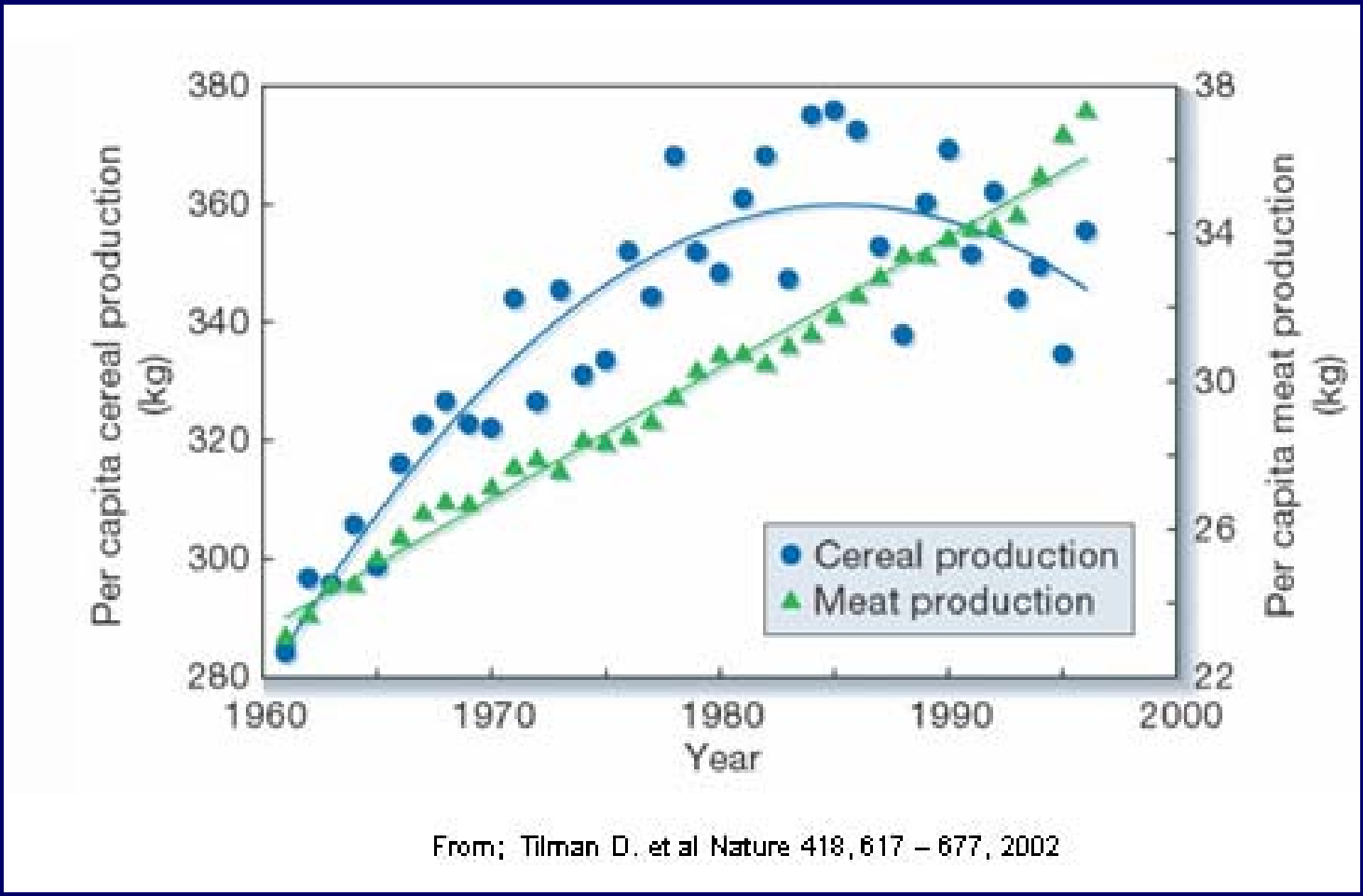
The Green Revolution
Norman Baurlog



1960 -1990 The Green Revolution
Food abundance

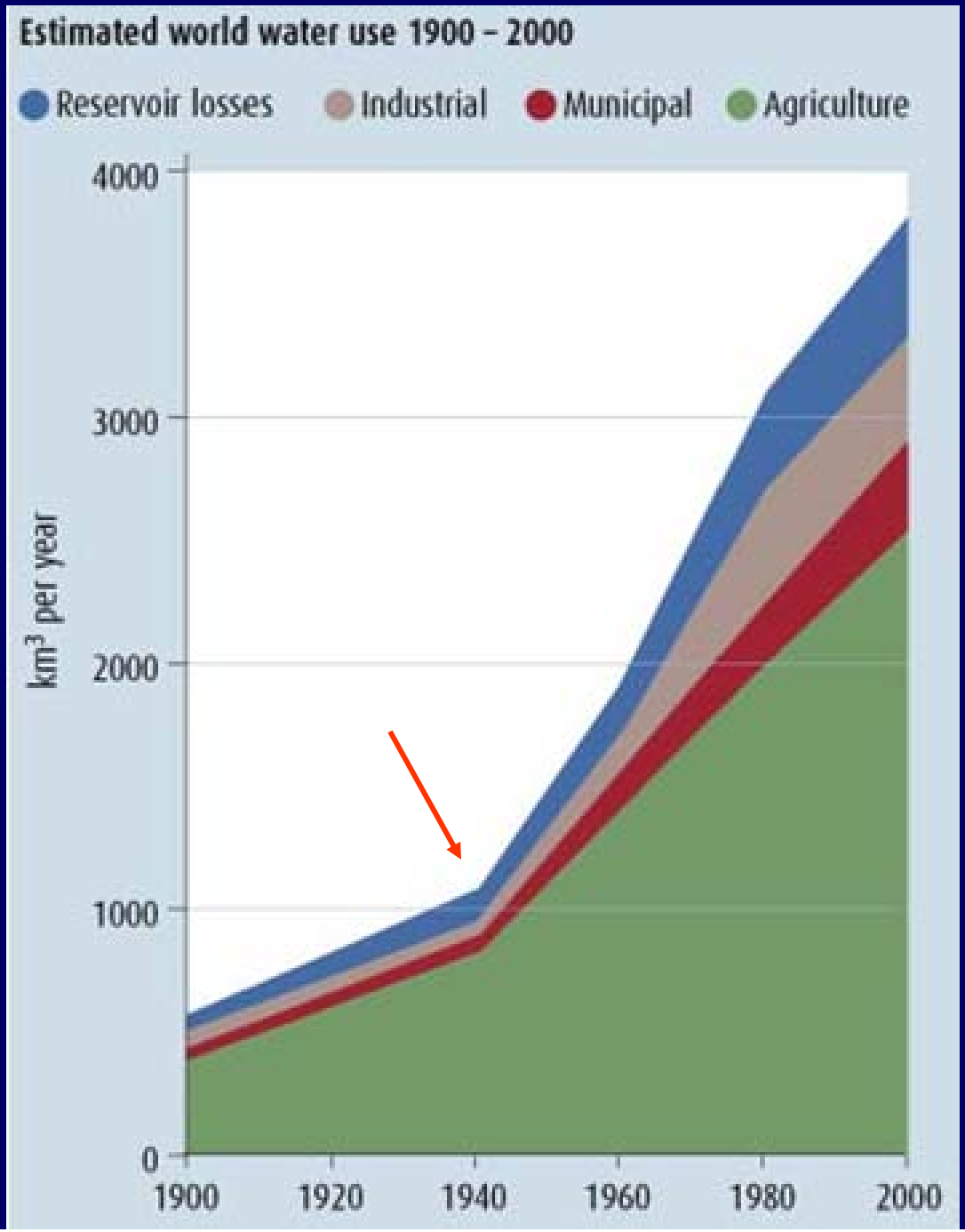
The Green Revolution increased intensity of production & was land sparing. Estimates it spared an area the size of California from deforestation

The world is moving from 40 years of food abundance to an era of constrained food supplies



From; Tilman D. et al Nature 418, 617 – 677, 2002

Can genetic engineering of crops change the trajectory ?



¾ of all water used goes to agriculture

livestock and poultry production use large quantities of water

7,000 gallons water/1lb beef

Asia has 60% of the world's population but only 36% of the world's water resources

Most rivers of Asia

Likely source of future conflict

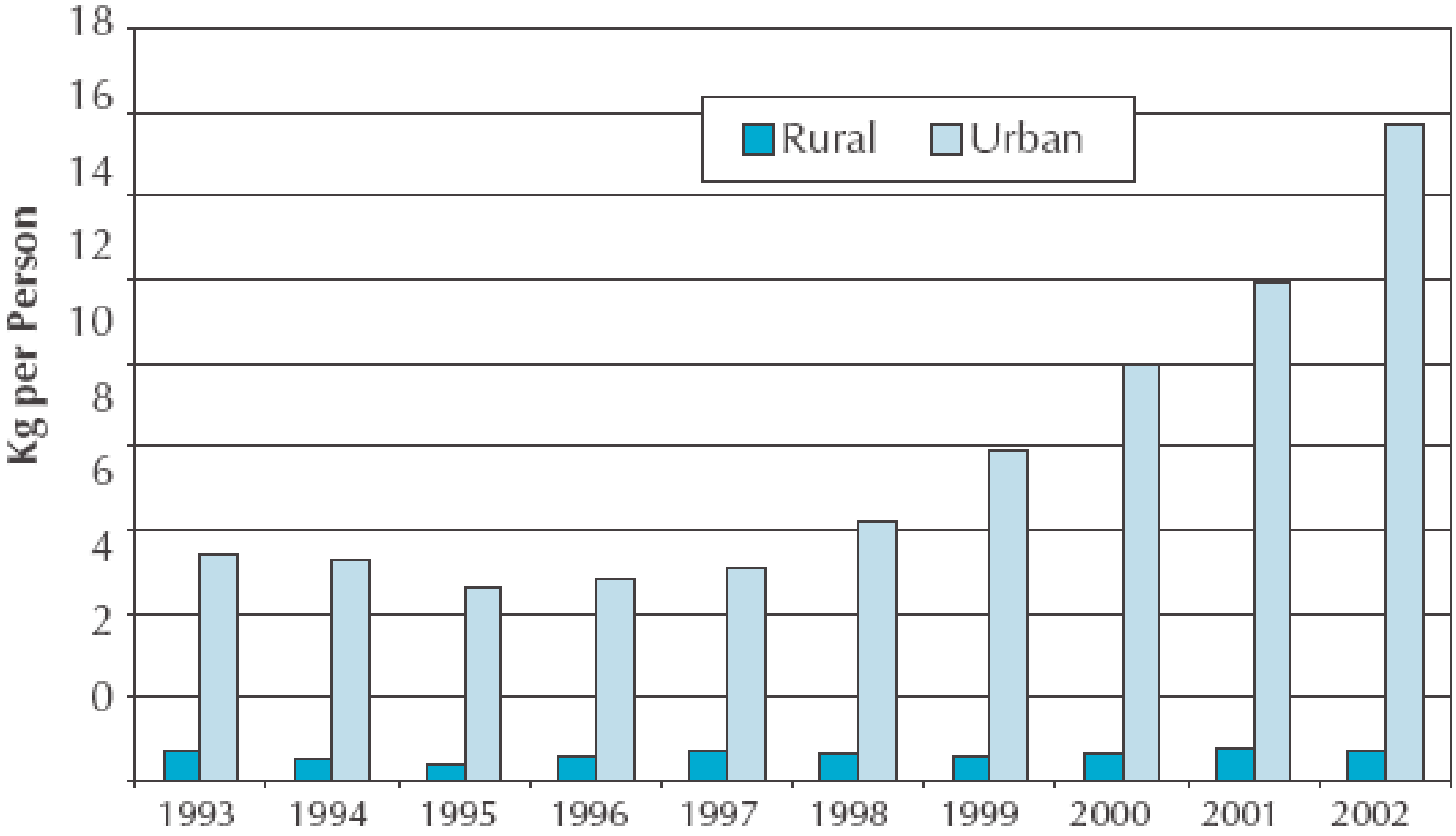
UN estimate climate change will lead to a 20% rise in global water scarcity

Food production in emerging economies

Urb re
ani ns

Demand is driven by the d an urban middle-class
Refrigeration, supermarkets, fast food outlets,
ice cream parlors, + obesity & diabetes

China, urban and rural milk consumption



Meat & Milk Consumption estimates

Meat consumption per person per yea	2030
Developing w	
Industriali	
Milk cons person pe	
Developing	e
Industrialized wo	ease

Efficiency of livestock production is key to conserving the environment
Veterinary medicine has an essential role to play

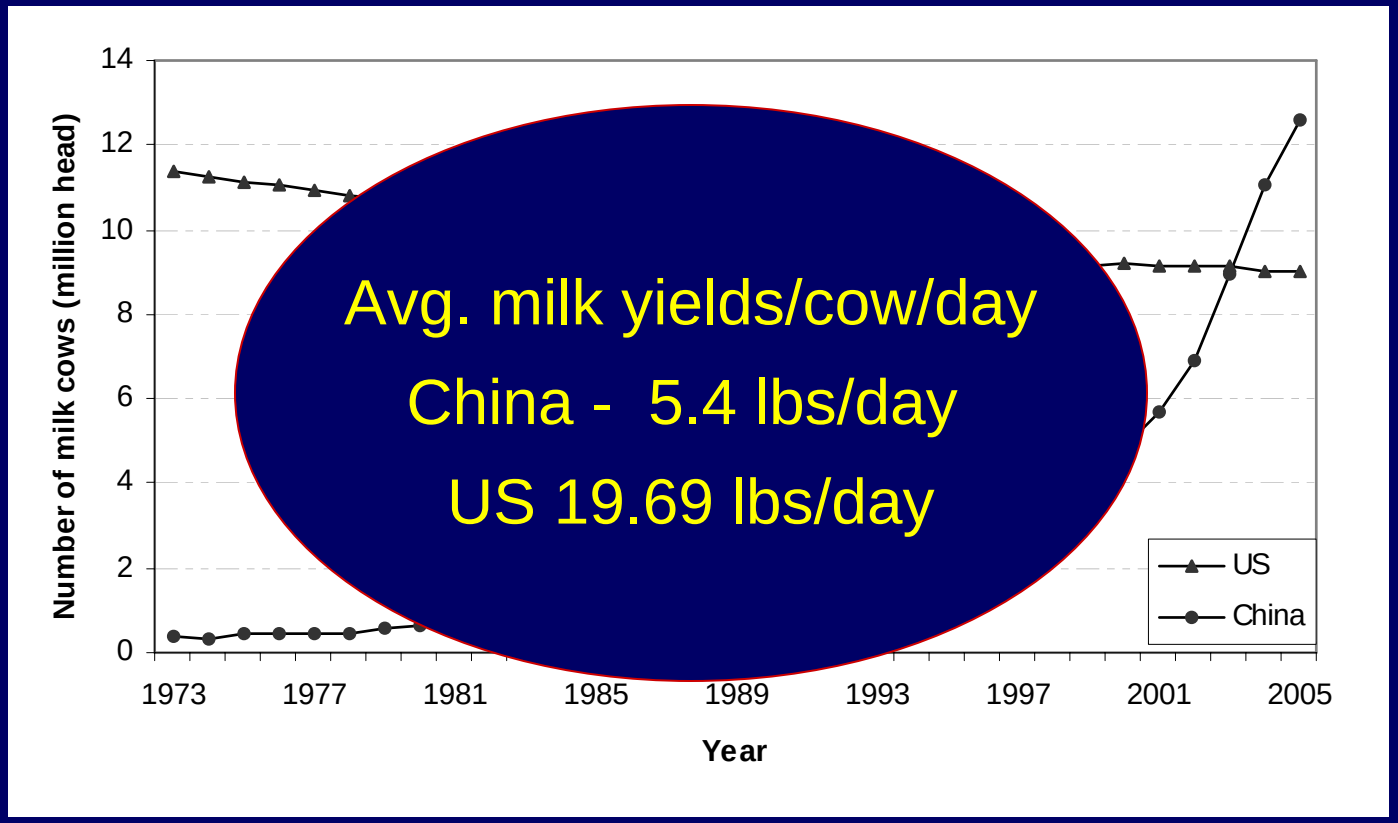
UN Population Division, *World Popula* edium Variant (2007)
*Steinfeld. The livestock revolution—a global veterinary mission Vet. Parasit. 125, 19 – 41, 2005

80% of the increase in animal protein production in SE Asia has come from intensive systems of production.

Requires exp
productio

Veterinary education in China & SE Asia is unfamiliar with production medicine. Veterinary medicine in the U.S. has clear lead

The dairy industry in the U.S. & China

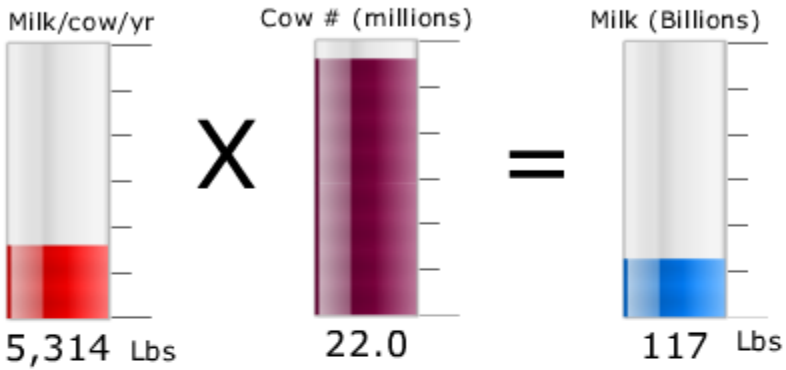


Number of milk cows in China & U.S. (data for 1997-1999 missing;
USDA Economic Research Services, 2007;
USDA National Agricultural Statistical Services, 2007).

Milk Yield/cow, Environmental Impact and Societal Demand

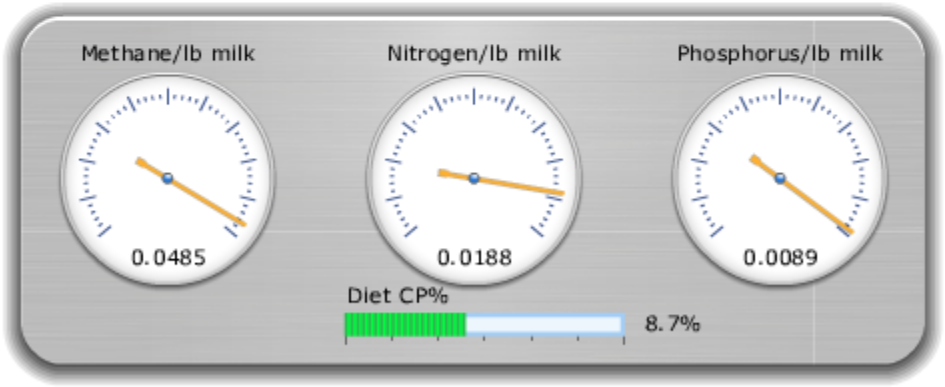
Year 1950

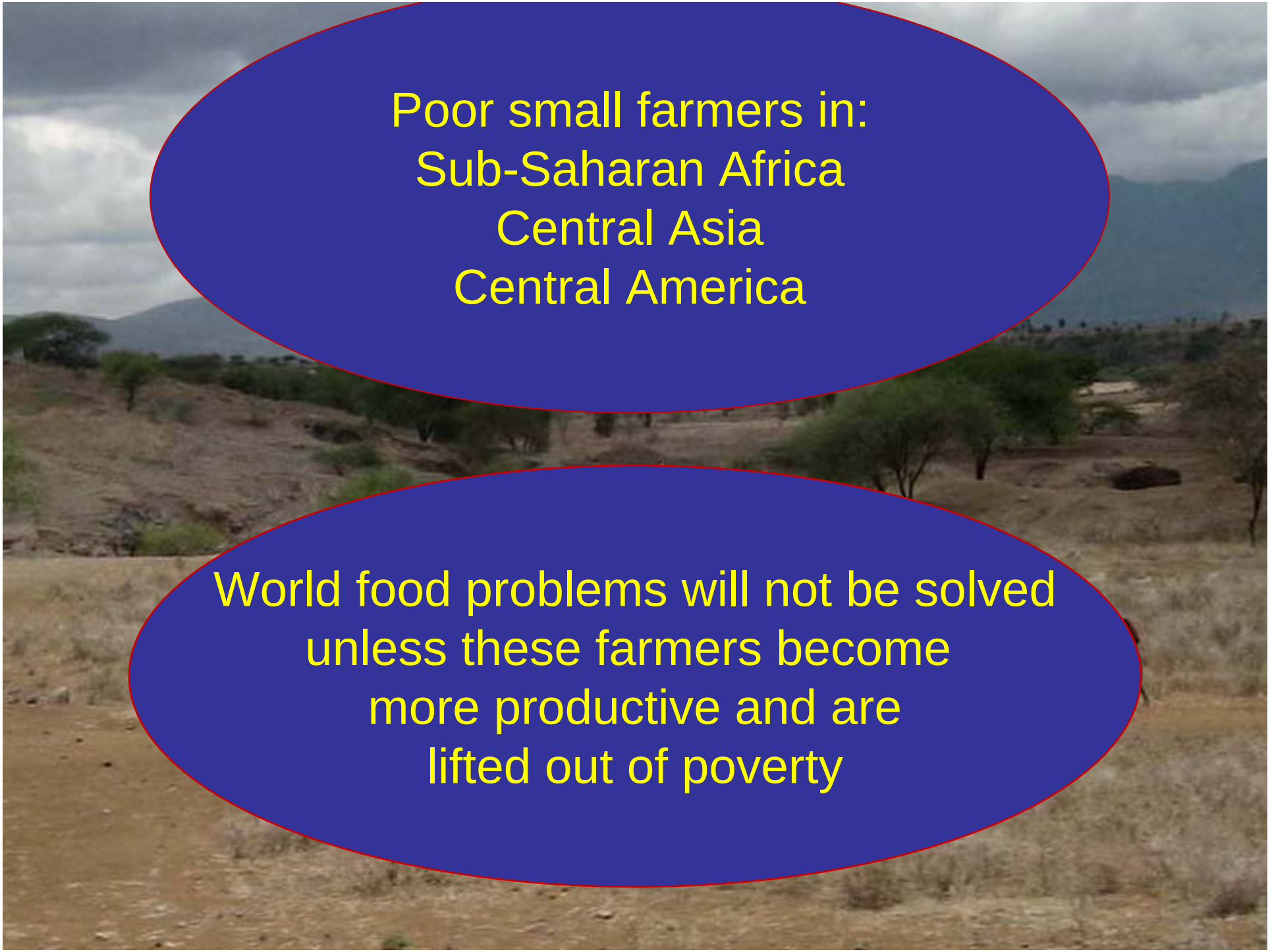
Galligan, Ferguson,
Munson Dou, Wu 2008



Externalities | Per Million lbs | Balance Eq. | Envir./cow | Envir./lb milk | Milk/acre

Metric




Poor small farmers in:
Sub-Saharan Africa
Central Asia
Central America
World food problems will not be solved
unless these farmers become
more productive and are
lifted out of poverty

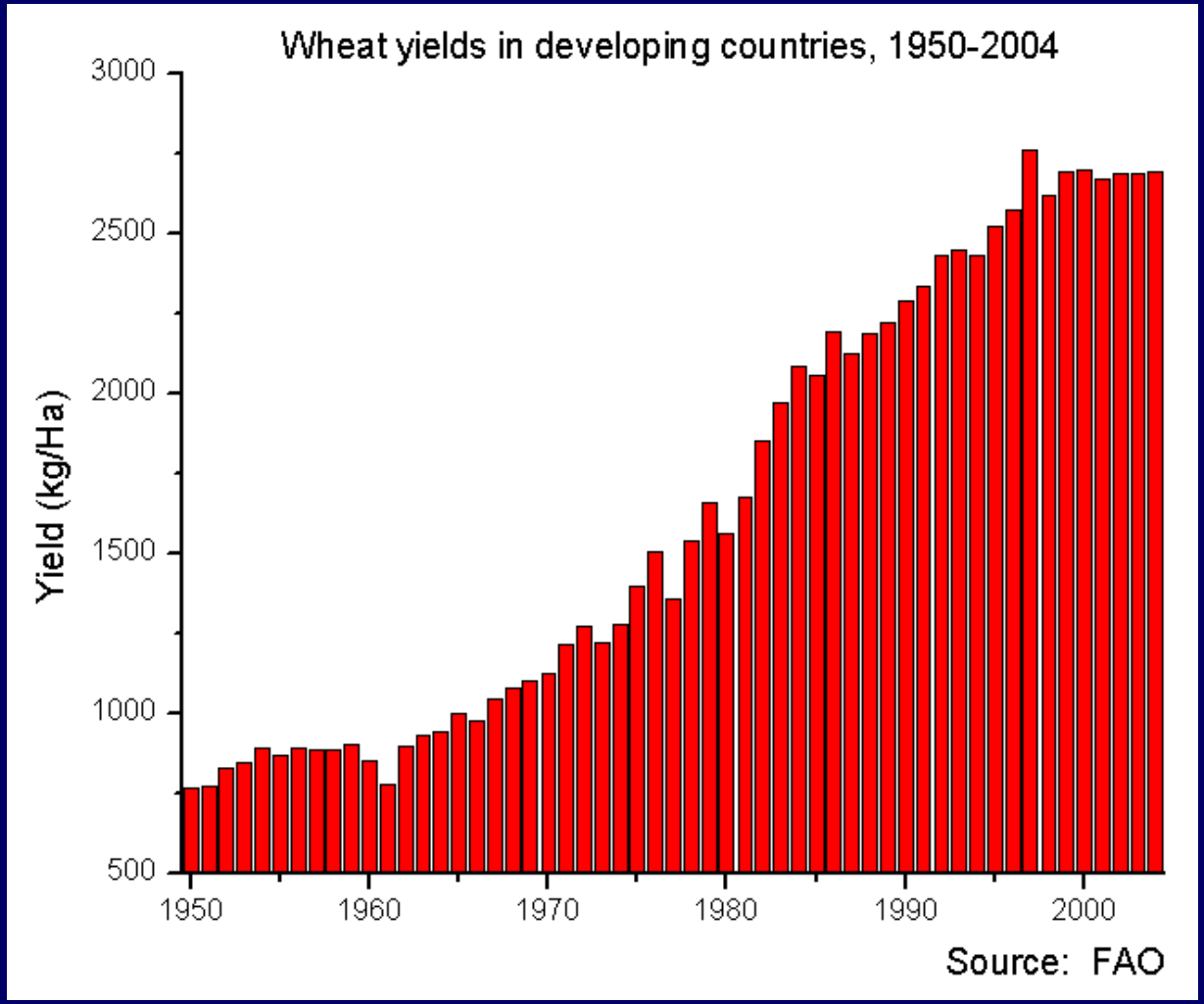
Trillions of $ $ spent on aid with little to show

TRADE NOT AID

- Consider the entire farming operation from pastures/crops to production, to marketing.
- Economics, Production medicine different management

- Must be what community leaders want
- Widely scattered peoples & animals
- Inexpensive services
- Train community animal health workers
- Fee for service

We need to do this with global livestock yields



Veterinary medicine has an important role to play

Thank you for your attention

1972 National Academy of Sciences study
New Horizons for Veterinary Medicine, page 21

As the services provided by food animal practitioners expand, utilization of and demand for larger numbers of formally trained animal technicians will increase. Food animal practitioners will recognize that manyof essential animal health services, though supervised by veterinarians, need not actually be provided by professionals. Thus improved efficiency will be achieved by expanded veterinary paramedical manpower. Thus, although more total veterinary services will be provided, the number of professionals needed in the United States by 1980 will be about the same as the number now primarily engaged in this activity .

NRC Specialized Veterinary Manpower Needs 1982

- Demographic data indicate that numbers of food animal practitioners increased little in the past decade.
- The problem is in large part a matter of the economics of food animal veterinary practice.
- Areas with perceived shortages commonly do not provide satisfactory remuneration ..
- Some food-animal practices .. supplement their income through companion animal practice.

Value of livestock products and price of corn, 1970 to 2007 in 1980 adjusted dollars

Year	1970	1980	1990	2000	2006	2007	
Milk ($/cwt) (1980$)	14.59	15.84	10.51	7.29	5.3	7.63	-48%
Beef Cattle ($/cwt) (1980$)	70.29	76.08	57.07	39.84	35.85	35.73	-49%
Hogs ($/cwt) (1980$)	59.22	46.4	41.08	24.56	18.8	18.52	-69%
Lambs ($/cwt) (1980$)	69.32	79.81	42.4	46.34	39.03	39.14	-44%
Broilers (cents/lb) (1980$)	35	35	25	20	17	15	-57%
Eggs (cents/doz) (1980$)	102	66	54	36	24	35	-66%
Corn price $/bushel	1.33	3.11	2.28	1.85	3.04	4.2	+216%
Corn Price CPI adjusted to 1980	$0.65	$3.11	$3.73	$4.02	$7.77	$10.96	+1596 %

Source: United States Department of Agriculture, National Agriculture Statistics Service, Commodity costs and returns

U.S. Veterinary MPH & Master's in Prevent. Med. Programs

	2004	2009
# programs	4	22
# students	30 - 40	~300