Livestock Interjurisdictional and Intersectoral Issues

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1

Agriculture - Transitional Economic Sector for Developing Countries

	Upper Middle Income	Lower Middle Income	Low Income
GDP ($US in 2000)	3,100	870	340
Agriculture's % Share GDP	9	17	36
Agriculture Growth (%/year over 1990 -2005)	1.6	2.9	3.2
Poverty (% population below $1/day)	8	23	49

Sources: C. Delgado, 2007, after WDR 2008 draft

2

Agriculture Income Spurs Economic Gain Beyond Farms

	Growth in Non-Farm Income from 1$ Growth in Farm Income		
$ Added	Rural	Urban	Total Regional
India	.26	.51	.77
Kenya	.26	.13	.40
Mexico	.19	.02	.22

Source: C. Delgado, 2007, after Haggblade 2005, and Haggbalde, Hazel, and Dorosh forthcoming.

3

Growth in Consumer Demand for Livestock Products

- LDC meat consumption increased 5-fold and milk consumption 3-fold from early 70's to mid 90's.
- A 50% consumer demand increase in milk, eggs, and meat is projected over the 1997-2020 period.
- Demand for livestock food products increases after income level reaches 2 $/day.

Sources: Christopher Delgado, IFPRI, ; Gregg BeVier, AASV; Henning Steinfeld, FAO; Cees De Haan, World Bank.

4

Livestock Production Growth in Developing Countries

- LDC meat and milk production growth is 4-times growth in DC's.
- LDC production growth in pork and poultry is 2-times growth in ruminate meat.
- By 2020, an estimated 63% of meat and 50% of milk production will be in LDC's.

Sources: Christopher Delgado, IFPRI; Gregg BeVier, AASV; Henning Steinfeld, FAO; Cees De Haan, World Bank.

5

Livestock Production Shifting to Concentrated Animal Feeding Operations (CAFO's)

- CAFO livestock production in LDC's is growing 6-times annual growth of grazing production.
- CAFO poultry production in LDC's expected to grow by ~ 80% from 2001-2020.
- CAFO pork and ruminate production in LDC's expected to grow by ~ 50% from 2001-2020.

Sources: Christopher Delgado, IFPRI; Gregg BeVier, AASV; Henning Steinfeld, FAO; Cees De Haan, World Bank.

6

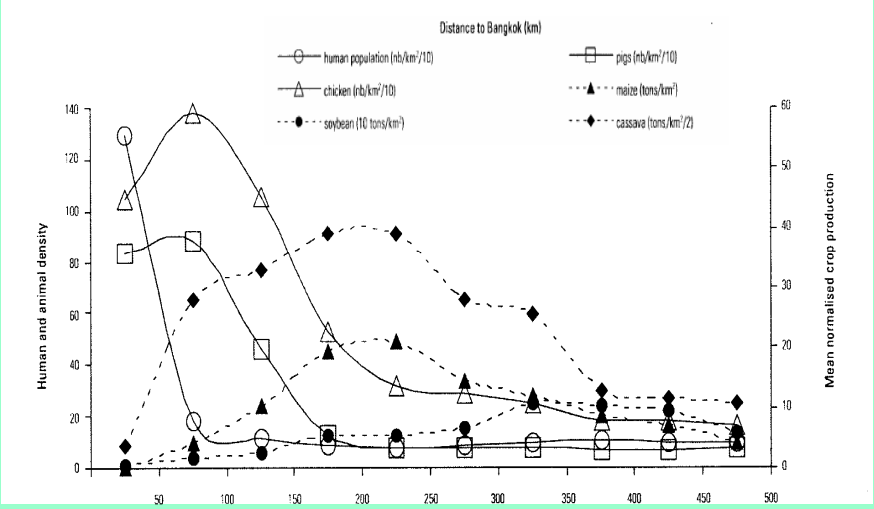
Livestock Production in LDC's Shifting to Concentrated Animal Feeding Operations (CAFO's)

Growth of Meat Production (%/year) in Different Production Systems

Source: C. De Haan, after Livestock to 2020: The Next Food Revolution, a joint IFPRI, FAO, ILRI study.

7

Livestock Production Growth Shifting to Peri-Urban Areas



Source: C. De Haan, World Bank, Managing the Livestock Revolution

8

LDC examples of Livestock Trends

- **Brazil – by 1998, 73% of broilers from CAFO's with over 10,000 birds/year/farm, and 40% of production controlled by 4 companies – by 2007, cattle numbers exceed 60 million.**
- **China – by 1985, became the world's largest meat producer - by 1990, became the world's largest egg producer – by 2000 produced ~ 28% of total world meat.**

Sources: L. Zianglin, Livestock Revolution and Feed Demand in China; C. De Haan, Managing the Livestock Revolution.

9

Livestock Emissions and Excreta

- **In the US, there is 130 times more animal excreta produced yearly than human excreta.**
- **20-23% of N eaten by sows is emitted from excreta as ammonia.**
- **Manure lagoons loose 70-80% of N to air as ammonia or nitrous oxide.**
- **Animals create organic dusts, including bioaerosols, allergens (e.g., dander), and inflammatory endotoxins and glucans.**
- **Some pathogens in manure can survive for weeks in low temperatures, e.g., HPAI virus, Salmonella, Cryptosporidium parvum.**

Sources: K.J. Donham, DVM, The Concentration of Swine Production; N.G. Gregory, Physiology and Behaviour of Animal Suffering; Iowa CAFO Air Quality Study .

10

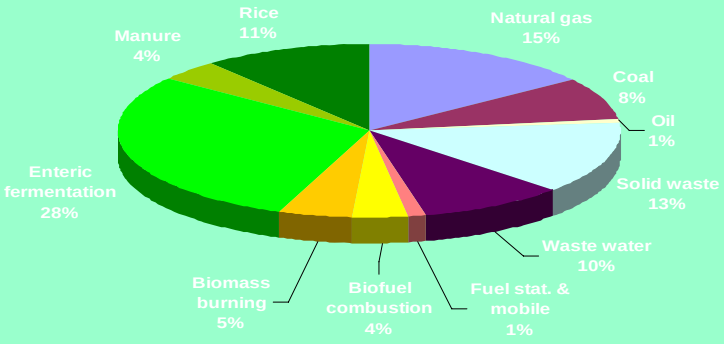
Environmental Issues of CAFO's

- Air emissions of ammonia, hydrogen sulfide, carbon monoxide, methane, organic dusts, and respirable micro-organisms.
- Water emissions of blood and washwater.
- Solid waste emissions of manure, litter, carcasses, pollution control sludges, and packaging.
- Constituents of nitrogen, phosphorus, potassium, arsenic, heavy metals, enzymes, antimicrobials, pathogens and antibiotic-resistant pathogens.
- Animal stress from crowding, rough handling, noise, lack of natural movement, and odors. Animal bruising, foot wear and injury from housing conditions, handling, and transport.
- Animal and human disease from contact with diseased animals and their excreta, and ingestion of infectious bioaerosols.

11

Global Anthropogenic CH4 Budget by Source in 2000

Total emissions in 2000 = 5,933 MtCO2e = 16% of total Global Green House Gases



Source: US EPA

12

High Antimicrobial Use in CAFO's
(banned in EU)

- 70% of all antimicrobials used in the US are sold for livestock. 85% of livestock antimicrobial use is for non-therapeutic feed addition (mostly to promote fast growth and prevent disease in CAFO's).
- 86% of surveyed Canadian pig CAFO's regularly fed antimicrobials, with 25% added antimicrobials to water, out of 86% using non-therapeutic daily doses of antimicrobials.
- Chinese pig CAFO's regularly feed antimicrobials, often at doses far exceeding US and Canada doses (and manure land application rates also tend to be higher).

Source: T. Lasky, USDA; Li, Chinese Acdemey of Science.

13

Feeding Antimicrobials Has Health Consequences

- Antimicrobials leave residues in meat and especially liver products for human consumption, including arsenic and metal residues (Cu, Zn).
- Antimicrobials remain in carcasses that can be consumed by wildlife in poor disposal settings, and can influence disease resistance in wildlife.
- Sampling of pathogens in livestock and meat products demonstrates resistance to antibiotics has been increasing over last decade.

Sources: Iowa CAFO Air Quality Study

14

Feeding Antimicrobials Has Environmental Consequences

- Antimicrobial residues can concentrate in manure and livestock litter.
- Antimicrobials don't all decompose readily during treatment.
- Antimicrobials can dramatically reduce biogas outputs in anaerobic digesters.
- Arsenic and heavy metals in some antimicrobials can build up to phyto-toxic and carcinogenic levels in soils.
- Arsenic can cycle to mobile and toxic forms in reducing settings.
- Antimicrobials can reduce soil microbial populations.
- Burning of animal wastes with antimicrobials can release high arsenic and heavy metal stack gas emissions.

15

LDC Livestock Waste Mgmt. Issues

- Livestock production manures usually are applied to land without treatment or quality control
- Animal by-products from public slaughterhouses usually are sold to informal sector recyclers for animal feed.
- Washwater and unrecycled blood often is discharged to sewers, rivers and the sea with no wastewater treatment.
- Unrecycled animal by-products, carcasses from diseased rejected livestock, and manures often are discharged to municipal open dumps
- Domestic animals, dogs, rats,and wildlife, including wild birds, scavenge at open dumps for food.

16

Livestock Losses from Animal Disease Outbreaks

- SARS outbreak, over 100 million birds culled.
- EU Mad Cow outbreak, 5 million cattle culled.
- Dutch swine fever outbreak, 11 million hogs culled.
- UK foot-and-mouth outbreak, 6 million cattle culled.
- Highly pathogenic avian influenza, over 250 million birds culled.

Sources: World Bank, EU, CIDRAP, OIE and USDA data

17

Possible Project Action Items

- Reduce the spread of livestock diseases by safe excreta, bedding, carcass, and slaughter waste systems.
- Improve food safety by reconstructing old live markets and slaughterhouses to enable adequate hygiene, facility cleansing and segregation of wastes.
- Improve informal sector recycling of animal processing wastes into animal feed.
- Curtail direct ingestion of animal wastes by domestic livestock by prohibiting livestock grazing at waste disposal sites and daily covering raw wastes to limit bird and wildlife access.
- Develop regulatory controls for potential toxic feed additives and antimicrobials in treated wastes for land application.
- Determine land carrying capacity for land policies controlling CAFO siting permits.

18

Externalities Need Instruments

- Widespread public education on food choices.
- Certify "eco-meat" and improve organic certification.
- Instruments to support improvements in hygiene and waste segregation of live markets and slaughterhouses.
- Instruments to assure only treated and safe manures are used to amend farm soils and to augment pond aquaculture.
- Tradable carbon and nutrient quotas to support sustainable manure treatment.
- Incentives for CAFO's to control toxic antimicrobials and those significant to priority antibiotic-resistant pathogens.
- Market pricing policies for feed, energy, water, and other services to address externalities of CAFO's.
- Manure treatment and land application strategies to address degraded lands and encourage carbon sequestration.
- Reduce subsidies on feed corn and soy that benefit CAFO's.

19

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For waste management information:
http://www.worldbank.org/solidwaste
For carbon finance:
http://www.carbonfinance.org
For animal welfare good practice note:
http://www.ifc.org/environpublications
For zoonotic disease updates:
FAO, OIE, WHO, CIDRAP
For carcass and waste disposal guidance:
USDA APHIS, AUSVET, OIE, FAO

20