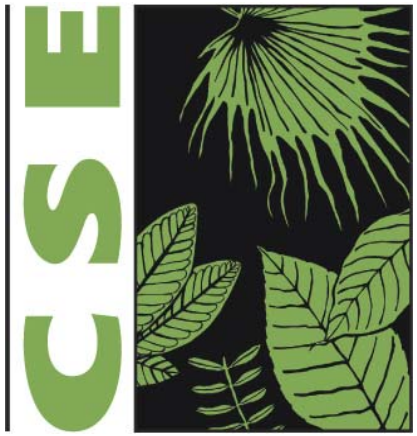
Honey, what's in your honey?

15 September 2010



Centre for Science and Environment
New Delhi

A decade of public science
CSE's Pollution Monitoring Lab

- **Set up in 2000, with state of the art equipment for pesticide residue and other organic and inorganic chemicals, heavy metal and air pollution monitoring.**

CSE's Pollution Monitoring Lab

- **Set up in 2000, with state of the art equipment for pesticide residue and other organic and inorganic chemicals, heavy metal and air pollution monitoring.**
- **We set it up to:**
  - **to investigate issues of public health and environmental concern**
  - **respond to community requests**

CSE's Pollution Monitoring Lab

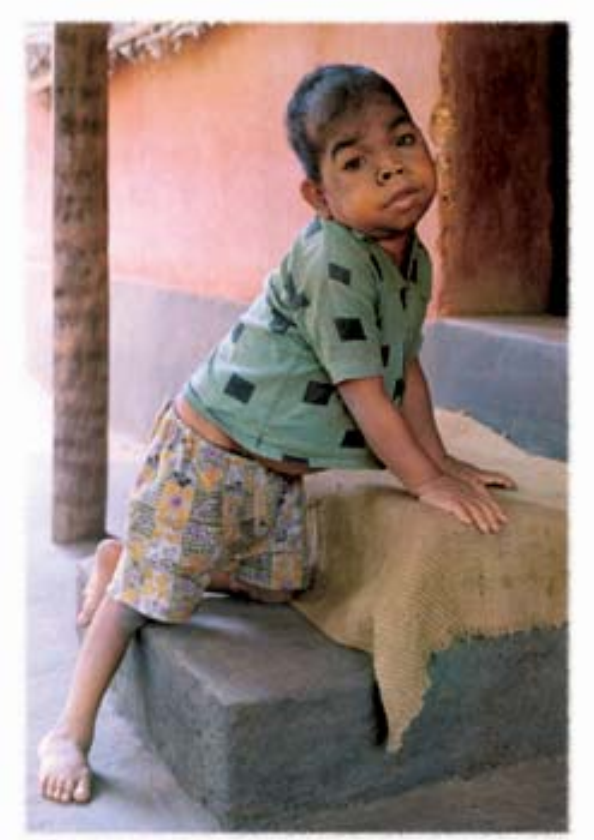
- **Set up in 2000, with state of the art equipment for pesticide residue and other organic and inorganic chemicals, heavy metal and air pollution monitoring.**
- **We set it up to:**
  - **to investigate issues of public health and environmental concern**
  - **respond to community requests**
- **Need independent data. Need it publicly.**

CSE's Pollution Monitoring Lab

- **Set up in 2000, with state of the art equipment for pesticide residue and other organic and inorganic chemicals, heavy metal and air pollution monitoring.**
- **We set it up to:**
  - **to investigate issues of public health and environmental concern**
  - **respond to community requests**
- **Need independent data. Need it publicly.**
- **Concerns our health. Our bodies. Our children.**

The story of Padre village, Kerala

- **2001: Endosulfan poisoning. Mysterious diseases. Ban in Kerala.**



Pesticide residues in bottled water: 2003

Mandatory standard for pesticide residues in bottled water notified by Union health ministry

Centre for Science and Environment

Two studies. Too many questions. And answers too!

- Tested soft drinks in 2003 & 2006
- **Joint Parliamentary Committee** (JPC) setup to investigate our study
- JPC vindicated CSE's study
- Used JPC to push reforms in food, water and pesticide regulations (Food safety & standards act, an outcome)
- After prevaricating for 5 years the Union health ministry set up mandatory standards for pesticide in soft drinks; **World's first**

Pesticides in blood of Punjab cotton farmers: 2005

- Punjab government ordered study and immediate health remediation measures
- Recently asked ICMR to look into the health concerns and come up with solutions.

Transfats in edible oil: 2009

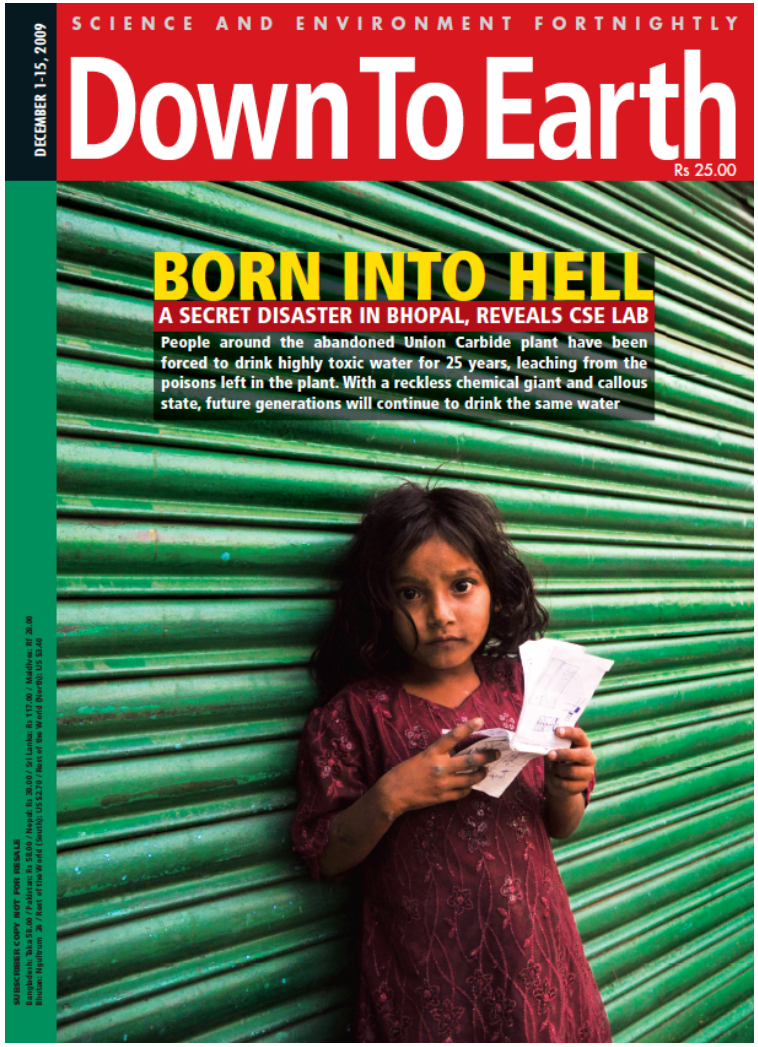
- **Union health ministry finalising draft standards for transfat to be notified under PFA.**
- **BIS too in advanced stages of finalising its standard.**

Lead in Paints: 2009

- **Leading paint manufacturers voluntarily removed lead from household paints**
- **BIS in advanced stages of finalising mandatory standard**

Bhopal's Toxic Legacy: 2009

- First joint study: CSE-CPCB
- Found contamination outside from wastes within the factory
- Re-opened the outside contamination issue
- Strengthened the demand for decontamination of site and groundwater outside



Phthalates in toys: 2010

- **Department of consumer affairs issued a draft notification to make it mandatory for all toys manufacturers to register with BIS.**
- **BIS finalising the mandatory standards for phthalates in toys.**

Antibiotics residues in Honey

The International Regulations

- **Codex:** Standard (Codex Stan 12- 1981 Rev 1 1987 Rev2 2001) defines honey as a ‘natural product’ and lays down standards on quality. **However, no standards for antibiotics**.
- **EU:** Defines honey under the Council Directive 2001/110/EC as a ‘natural product’. **Standards for antibiotics not listed** which means that the use of antibiotics in honeybees **not permitted** and therefore considered **“unauthorised substance”**.
- However, has set Reference Points for Action (RPAs) for few antibiotics for imported honey at the level of detection of the testing instruments

The International Regulations

- **USA:** Regulated by the Food and Drug Administration, but there are no standards for antibiotics in honey.
- **Australia:** Australia has set standard for only Oxytetracycline in honey at 300 ppb. For others, no standards.
- In all these countries, **'no standards'** means that antibiotics in honey is an **"unauthorised substance"** and therefore not permitted. *Reason why honey consignments from India have been rejected and now there is EU ban on Indian honey.*
- **What about our regulators? What about the honey we eat?**

The Indian Regulations

- One mandatory and two voluntary standards for honey sold in the domestic market
- **PFA Act and Rules,** which is mandatory, defines honey as ‘natural product’. Has standards for ‘quality’ but **no standards for antibiotics**.
- **Bureau of Indian Standards:** Standard for **Extracted Honey (IS 4941:1994)**. Brands with ISI mark will have to meet this standard. But **no antibiotic standards**.
- **IS 6695: 1998** – Honey Bees - Code for conservation and maintenance, recommends Oxytetracycline for European Foul Brood. For American Foul Brood the treatment specifies “Antibiotics’—**no name mentioned**

The Indian Regulations

- **Honey Grading and Marking Rules, 2008** under the Agricultural Produce (Grading and Marking) Act, 1937 (AGMARK); implemented by Ministry of agriculture.
- Domestic honey to meet PFA standards but honey for exports to meet as per buyer's requirements.
- So no standards for honey sold in the domestic market – produced domestically or imported.
- **Since no standards, not monitored, tested or checked by our regulators.**
- **But this is not the case for honey destined for exports.**

Indian Export Regulations

- Department of Commerce, under the Export Inspection Council of India (EIC) Act monitors the quality of products exported from India.
- To promote the exports of honey, the Export Inspection Council (EIC) has setup a Residue Monitoring Plan (RMP) to monitor the level of antibiotics, heavy metals and pesticides contamination in honey destined for exports.
- EIC has setup **'Level of Action' (standards)** for antibiotics in exported honey. Sample found to be containing antibiotics beyond the standard is deemed non-compliant and rejected for exports.

Indian Regulations

- **So, we have no standards for honey sold in the domestic markets, but care about what we export.**
- **We import honey but have no standards to check contamination.**
- **We practically have no information on what is the level of contamination in the honey we eat.**

Objective

- **To find out the level of antibiotics in honey sold in the domestic market**

Sample

- **12 branded honey sample – 10 domestic brands and 2 imported brands**
- Dabur Honey of Dabur India Ltd, which holds over 75% of the market share
- Himalaya Forest Honey of Himalaya Drug Company
- Patanjali Pure Honey of Patanjali Ayurved Ltd
- Baidyanath Wild Flower Honey of Shree Baidyanath Ayurved Bhavan Pvt Ltd, holds 10% market share
- **Six lesser known brands** - Khadi Honey, Mehsons Honey, Gold Honey, Umang Honey, Himflora Gold and Hitkari Honey of Hitkari Pharmacy.

Sample

- **Imported brands:**
- Capilano Pure & Natural Honey of Capilano Honey Ltd, Australia. This company is the market leader in Australia
- Nectaflor Natural Blossom Honey of Narimpex AG, Switzerland.

Antibiotics

- Tested for six antibiotics (from five classes) that are reportedly used for disease control and as growth promoters in commercial honey production
- **Oxytetracycline (OTC)**: used against bacterial foul brood diseases. ***EIC standard: 10 ppb***
- **Chloramphenicol**: banned from use in food-producing animals in many countries because of toxicity. ***EIC standard: 0.3 ppb***
- **Ampicillin**: Not recommended for honeybees, but reportedly used against bacterial diseases. **No EIC standard**

Antibiotics

- **Erythromycin**: used for poultry, and now reportedly being used in beekeeping. **No EIC standard**
- **Enrofloxacin and Ciprofloxacin**: synthetic antibiotics used as a growth promoter in cattle, now being used in beekeeping as well. **No EIC standard**

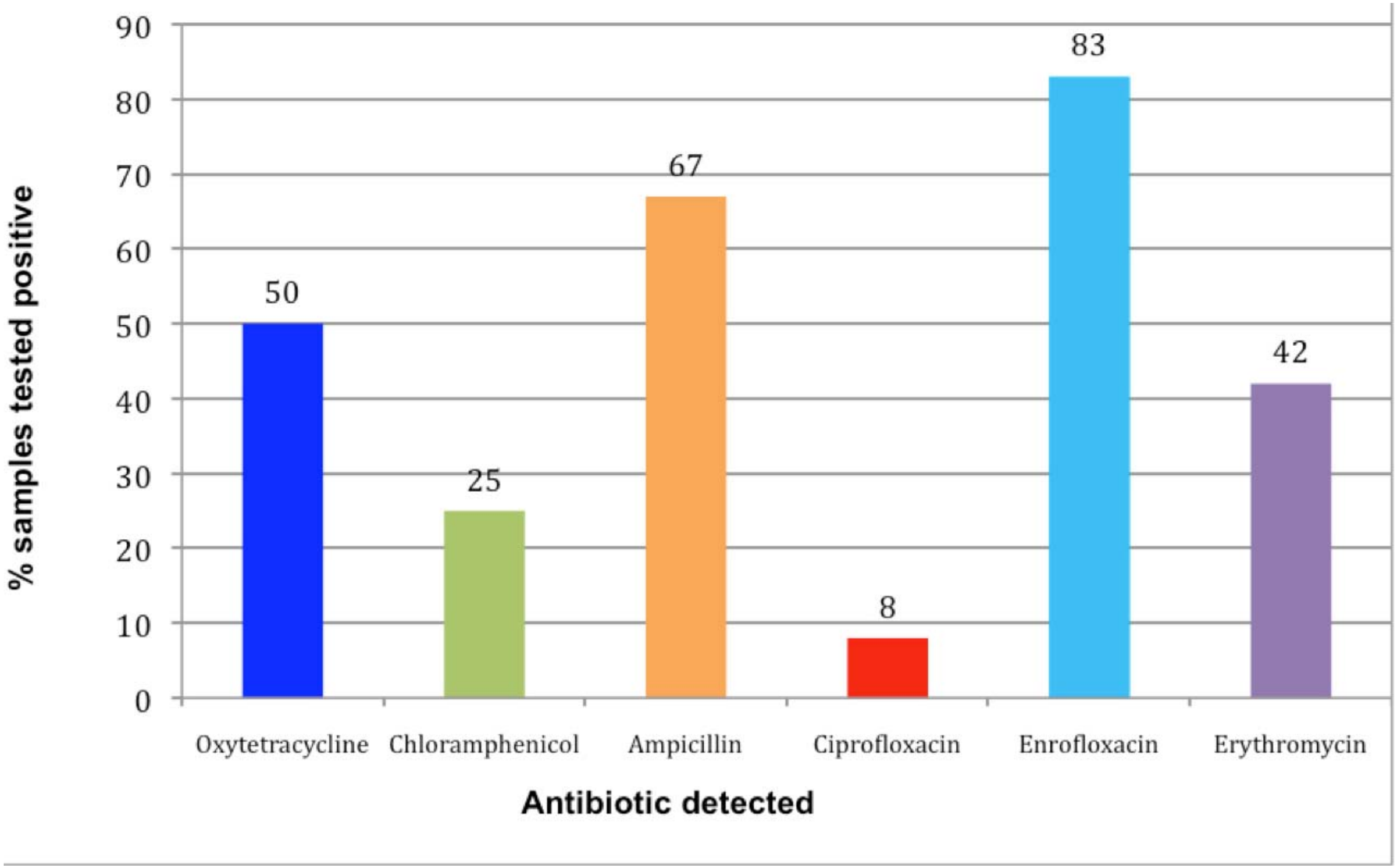
Methodology

- The samples analysed in triplicate using High Performance Liquid Chromatography (HPLC) with Diode Array Detector (DAD) and Fluorescence Detector (FLD).
- Internationally accepted published methods were used for analysis and validated by PML.
- The results were confirmed by spiking.

Results

- Multiple antibiotics (2 to 5) in high amounts were found in 11 out of the 12 samples.
- All 11 samples failed the EIC standards for exported honey.
- The two imported honey samples were also highly contaminated with antibiotics. **Both would have failed their own domestic standards.**
- The fact that more than one antibiotic was found in the samples indicates most are blended honey from multiple sources. **So one does not know from where the honey has been sourced.**

Results


% samples tested positive
90
80
70
60
50
40
30
20
10
0
50
25
67
8
83
42
Oxytetracycline
Chloramphenicol
Ampicillin
Ciprofloxacin
Enrofloxacin
Erythromycin
Antibiotic detected

Brand-wise results

- **DABUR HONEY:** Had 3 antibiotics. It had 91.3 μg/kg OTC, which is nine times the EIC standard; 26.6 μg/kg of ampicillin and 88.7 μg/kg of enrofloxacin. **Sample non-compliant with EIC standards. Would be rejected if placed for exports**.
- **HIMALAYA FOREST HONEY:** 3 antibiotics detected. 23.8 μg/kg of ampicillin, 63.8 μg/kg of enrofloxacin and 69.7 μg/kg of erythromycin. **Sample non-compliant, as there are no standards.**

Brand-wise results

- **PATANJALI PURE HONEY:** Contaminated with 4 antibiotics. OTC at a level of 27.2 μg/kg, almost three times the EIC standard. Also had 30.5 μg/kg of ampicillin, 75.17 μg/kg of enrofloxacin and 186 μg/kg of erythromycin. **Non-compliant.**
- **BAIDYANATH WILD FLOWER HONEY:** Two antibiotics detected. Ciprofloxacin 19.9 μg/kg and ampicillin at a level of 25.2 μg/kg. **Non-compliant.**
- **HITKARI HONEY:** No antibiotics detected. Sold by Hitkari Pharmacy, Delhi. This is a small company involved in the seasonal honey business

Brand-wise results

- **CAPILANO PURE & NATURAL HONEY:** Three antibiotics detected. OTC at a level of 150.8 μg/kg -- 15 times the EIC standard. 3.6 μg/kg of chloramphenicol (12 times over the EIC standard). **Interestingly, chloramphenicol is banned for food production in Australia.** Enrofloxacin at a level of 144.8 μg/kg.
- **Sample non-compliant with EIC export standards as well as Australian standards.**

Brand-wise results

- **NECTAFLOR NATURAL BLOSSOM HONEY:** Of the six antibiotics tested, **the highest number—five—detected**. 112.0 μg/kg of OTC, 11 times the EIC standard. Chloramphenicol, banned by the EU, detected at a level of 3.6 μg/kg, which is 12 times over the EIC standard. **Highest levels of ampicillin and erythromycin at concentrations of 614.2 μg/kg and 280.3 μg/kg, respectively.** Enrofloxacin too at a level of 56.1 g/kg.
- **Sample non-compliant with the EIC as well as EU regulations.**

2 questions and implications

- **1. Antibiotics are medicine so why are we concerned with antibiotics in food?**
- **2. Why are antibiotics found in honey? What is the implication for the food we eat?**

Health implications

- **Chronic health impact due small doses of antibiotics being ingested over long period**

- **Antibiotic resistance in microorganisms – bugs/bacteria resistant to many antibiotics become super bugs. Our bodies lose ability to fight disease**

Chronic health impacts

- Chronic exposure to **oxytetracycline** can lead to blood related disorders, liver injury and can damage calcium-rich organs such as teeth and bones
- **Chloramphenicol** could be a potential carcinogen and genotoxin. Repeated or prolonged exposure can lead to organ damage, bone marrow toxicity etc, while long-term exposure can cause aplastic anaemia, a condition where the bone marrow does not produce sufficient new cells to replenish blood cells.

Antibiotic resistance

- Ability of a microorganism to withstand the effects of an antibiotic thereby making treatment of diseases caused by that microorganism difficult.

- Antibiotic resistance happening not only because of indiscriminate uses by humans but also because of indiscriminate uses in food producing animals.

Antibiotic resistance: WHO advisory

- In 2003, FAO, the World Organization for Animal Health and WHO concluded *"there is clear evidence of adverse human health consequences due to resistant organisms resulting from non-human usage of antimicrobials. These consequences include infections that would not have otherwise occurred, increased frequency of treatment failures, and increased severity of infections".*
- *WHO recommended that antibiotics which are licensed in human medicine should not be used any more as growth promoters in animals.*

Antibiotic resistance: link to farm animals and feed

- Outbreak of ampicillin, chloramphenicol, streptomycin, sulfonamides, and tetracycline resistant *Salmonella typhimurium* infection in humans in Denmark from pig farm.
- *Denmark followed WHO recommendation and withdrew antibiotic growth promoters from food animals in 1999.*

The changing biodiversity of bees

- **Three trends:**
  - Use of exotic species (*Apis mellifera*) to produce honey wiping out Indian adapted bee (*Apis cerana*)
  - Focus of quantity – extraction of immature honey – coaxing honeybees to produce more
  - Artificial feeding of sugar syrup and antibiotics to produce more honey

  The result: Changing disease profile; more antibiotics and pesticides use; more of these in honey.

  All these because the business of bees have changed

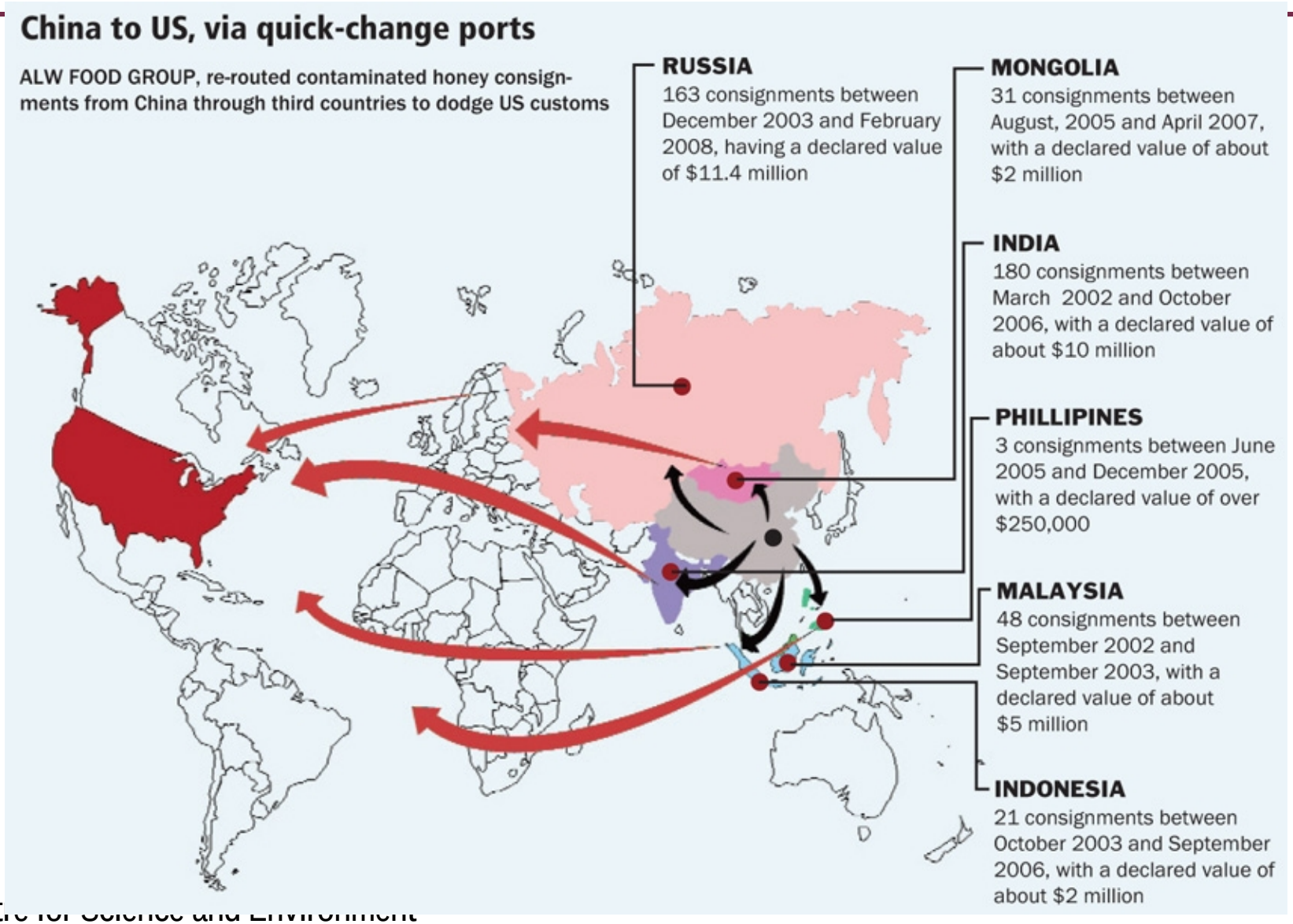
The business of bees

- The business of honey is today controlled by few big companies – **packers and exporters**.
- They control the domestic production chain; control the individual beekeepers; monopolize the market
- **They also import and export honey and they supply honey to all major brands**
- **The result: we don't know whether we are eating Chinese honey, Indian honey, High Fructose Corn Syrup, Inverted Sugar or mix and match of all.**

International Trade: Honey laundering

- China is the world's leading producer exporter of honey; at a price that none can match
- But China has had its share of rejection in the EU and USA. While the former banned Chinese honey due to the presence of chloramphenicol in its honey, USA banned Chinese honey as a measure to protect its own beekeepers
- 2001: USA slapped an anti dumping duty of 221% on Chinese honey
- Duty has led to incidents of honey laundering – trans shipments to avoid duty through different countries

Honey laundering: busting rings



Honey business not sweet

- 2008: US justice department arrests top officials of German food multinational – Alfred L Wolff (ALW)
- Investigations reveal multi-country ring in honey trade – laundering via different countries
- September 2010: US justice department charge sheets 21 individuals and companies
- Indian connection revealed. Name withheld by US justice department
- Independent investigations point to shipments from Tuglakabad Container Depot involving Chinese companies and Indian (Apis India Natural Products)
- Honey scandal unfolding…

Regulatory implications

- Antibiotic contamination known to government for atleast last 5 yrs
- But no action by the food safety regulators
- We care for exports but not for health and safety of Indians

Year	Jan-Dec 2005	Jan-Dec 2006	Jan 2007-March 2008	April 2008-March 2009	April 2009-March 2010
Agency	APEDA	APEDA	APEDA	EIC	EIC
Total samples drawn	1443	1189	1260	310	362
Samples not certified	290 (20.1%)	302 (25.3%)	519 (41.2%)	143 (46.1%)	103 (29.2%)
No.of EU Alerts	5	0	0	0	1
ANTIBIOTICS Tetracycline	69 (4.7%)	165 (13.9%)	351 (27.86%)	74 (23.9%)	42 (11.9%)
Sulfonamides	04 (0.3%)	00	74 (5.9%)	36 (11.6%)	06 (1.7%)
Chloramphenicol	20 (1.4%)	65 (5.5%)	05 (0.4%)	05 (1.6%)	00
Nitrofurans	02 (0.1%)	00	00	00	00
Streptomycins	01 (0.08%)	00	00	00	00
HEAVY METALS					
Lead	202 (14.0%)	108 (9.1%)	161 (12.8%)	52 (16.8%)	80 (22.7%)
Mercury	01 (0.08%)	28 (2.35%)	05 (0.4%)	00	00
Copper	18 (1.25%)	05 (0.4%)	05 (0.4%)	00	01 (0.3%)
Cadmium	00	14 (1.2%)	05 (0.4%)	01 (0.3%)	00

Regulatory implications

- Honey banned by the EU and the US for antibiotic contamination, but we import antibiotic contaminated honey from them with no health and safety checks
- Food safety regulations are supposed to be monitored by the Food Safety and Standards Authority of India.
- Act passed in 2006, Authority set up. Building and big establishment built.
- More interested in allowing business interest then in protecting health of Indians.
- **This must change.** Clearly business of food is about not business but our bodies. Our health