



Antibiotics in Chicken

A study by
**Pollution Monitoring Laboratory,
Centre for Science and Environment**

Press Conference July
30, 2014



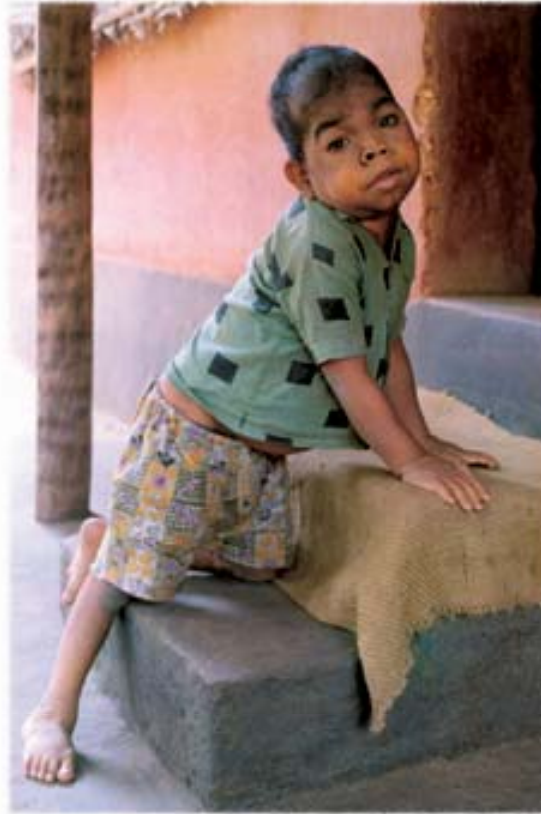
Pollution Monitoring Lab (PML)

- **Set up in 2000, with state of the art equipment for trace organics (pesticide, antibiotics etc.), heavy metals, water and air pollution monitoring.**
- **We set it up to:**
 - investigate issues of public health concern
 - respond to community requests
- **Need independent science for health and ecological security. Need information publicly.**
- **Concerns our health. Our bodies. Our children.**



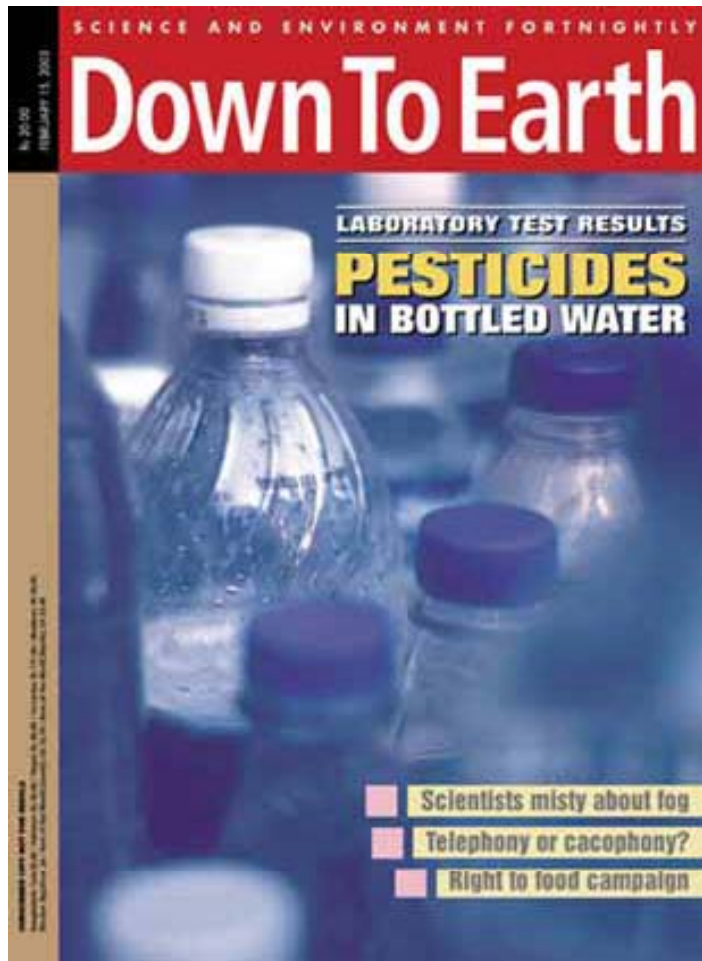
The story of Padre village, Kerala

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





Pesticide residues in bottled water: 2003



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



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

Centre for Science and Environment





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.



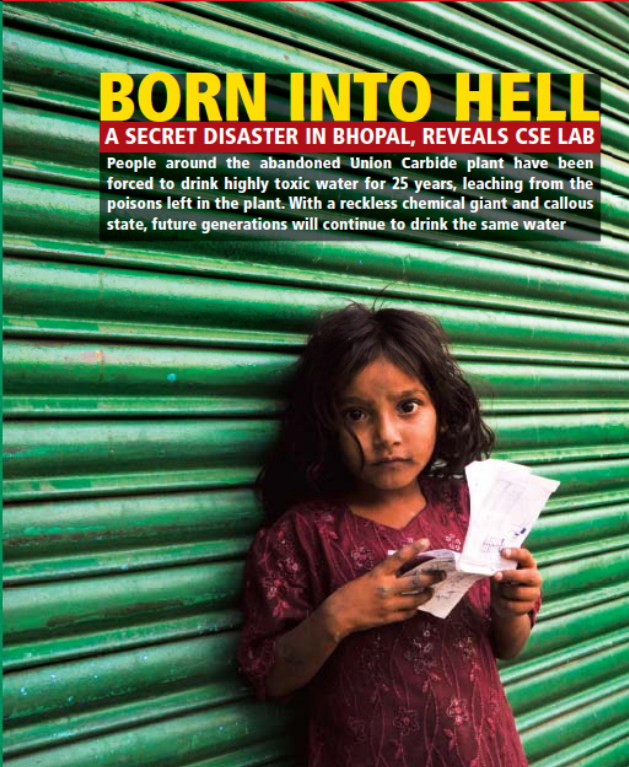


Transfats in edible oil: 2009

- FSSAI notified standards for transfats in 2013.





- DECEMBER 1-15, 2009
- SCIENCE AND ENVIRONMENT FORTNIGHTLY
- # Down To Earth
- Rs. 25.00
- ## BORN INTO HELL
- A SECRET DISASTER IN BHOPAL, REVEALS CSE LAB**
- People around the abandoned Union Carbide plant have been forced to drink highly toxic water for 25 years, leaching from the poisons left in the plant. With a reckless chemical giant and callous state, future generations will continue to drink the same water
- 
- UNION CARBIDE COPY: NEW YORK, US\$4.50
Bhopal: Rs. 15.00 / Pakistan: Rs. 18.00 / France: Rs. 20.00 / Sri Lanka: Rs. 112.00 / Maldives: Rs. 20.00
Bhutan: Hyderabad: Rs. 10.00 / Rest of the World: Rs. 25.00 / Rest of the World (Printed): US\$ 25.00



Antibiotics in Honey, 2010

- Tested 12 brands of honey, including two popular International brands. Found to contain antibiotics from the banned Chloramphenicol to the broad spectrum Ciprofloxacin and Erythromycin.
- FSSAI bans use of antibiotics in honey





Nutritional Analysis of Junk Food, 2012

- Found very high levels of salt, sugar, total fats and transfats; also found misleading labeling and advertisement practices
- CSE in committee to formulate policy for banning junk food in schools.



Antibiotics in Chicken: *From farm to fork*





Antibiotic resistance has reached pandemic levels

- Antibiotic Resistance (ABR) is no longer a future prediction. It is increasing globally including in India. More number of antibiotics are becoming ineffective against a greater number of bacteria to treat a wide-range of infections.
- A 'post-antibiotic era' — in which common infections and minor injuries can kill is a real possibility for the 21st century
- **No new class of antibiotics have been discovered since 1980s.** Preserving the effectiveness of existing antibiotics is the only way to postpone the 'post-antibiotic era'.



How this is affecting people?

- **Common infections are becoming difficult or sometimes impossible to treat**, which is leading to prolonged recovery, increased length of hospital stay, more deaths, higher cost of treatment and greater spread of infection and resistance
- **Most antibiotics are becoming ineffective.** Drugs of choice are being replaced by second line of drugs which are expensive and have greater side effects.
- **Achieved gains of modern medicine are at risk.** Treatment options such as cancer chemotherapy and organ transplantation and post-surgery outcomes fail or turn into high-risk procedures



How big is the problem of antibiotic resistance?

Some estimates for developed countries; none for India

- **In the US:**
 - At least 2 million illnesses and 23,000 deaths per year
 - Estimated US\$ 20 billion as direct annual healthcare cost; additional productivity losses up to US\$ 35 billion
- **In the EU:**
 - About 25,000 deaths and about Euro 1.5 billion of healthcare and productivity losses
- **In India** (no national-level estimates; only sporadic data)
 - About one-third of the two lakh children that die in the first four weeks are due to antibiotic resistant
 - About 15% of those retreated for TB are resistant to multiple drugs



CSE Review: 13 studies since 2002 on ABR in India

	Common infections caused	Ciprofloxacin (%)	Doxycycline (%)	Tetracycline (%)
Escherichia coli	Diarrhea, infections of urinary tract and respiratory tract	69-93	-	-
Klebsiella spp. ^a	Pneumonia, blood stream infections, meningitis	37-91	53.3	-
Pseudomonas spp. ^b	Pneumonia, eye and ear infections	52.2-98.5	28.6-88.4	-
Enterobacter spp. ^c	Infections of blood stream, urinary tract and lower respiratory tract	30-100	100	-
Citrobacter spp. ^d	Infections of urinary tract and blood stream	44.9-100	50	-
Acinetobacter spp. ^e	Pneumonia, infections of blood stream and urinary tract	40.7-95	82.6	-
Proteus spp.	Infections of urinary tract and blood stream	0-63	-	-
Enterococcus spp. ^f	Infections of urinary tract and blood stream	70-96.5	-	50-100
Methicillin resistant S. aureus (MRSA)	Pneumonia, infections of blood stream, skin and soft tissues	85	-	61-72



Why Antibiotic resistance?

- Antibiotic overuse and misuse in humans and animals is the single most important cause of emergence and spread of ABR.
- World-over, rampant antibiotic use in food-producing animals such as chicken, cattle, pigs and fish is known to be a key contributor.
- In fact, globally more antibiotics are used in animals than humans; in the US 80% used in animals
- In India, it is estimated that poultry and fishery industry consumes a significant proportion of total antibiotics used – **but no data**



How animals are contributing to ABR in humans?

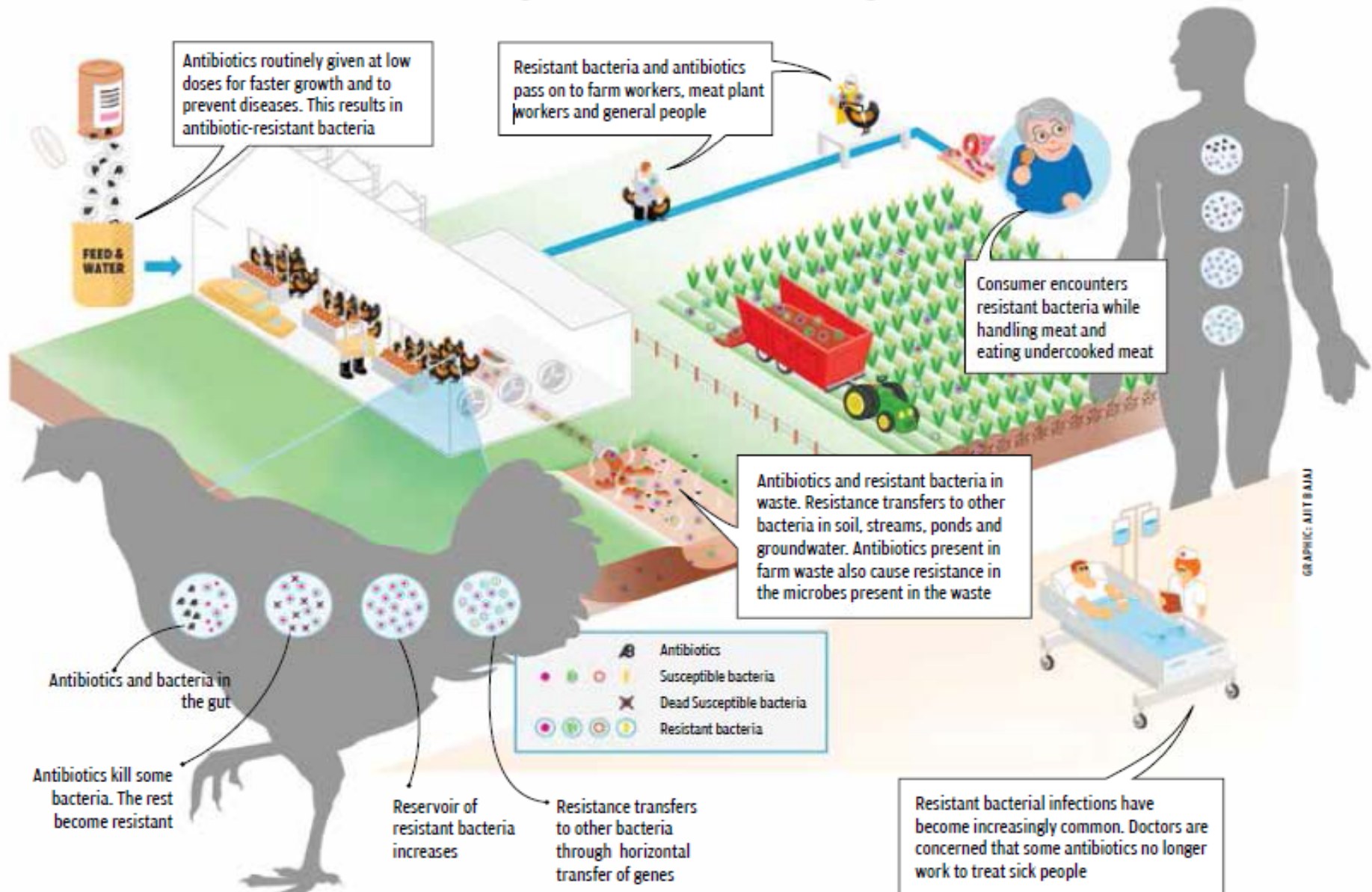
- Low-dose sustained use in animals favours emergence of resistant bacteria in animals. **Resistant bacteria can get transferred to humans through food.**
- **Antibiotic residues** in animal products (meat, egg, milk etc.) pass on to those who consume it and lead to resistance in bacteria present in humans

Humans are also exposed through **environment** and **direct contact**:

- Soil and water from animal farm waste having antibiotic residues and resistant bacteria enters into environment and can infect humans.
- Direct contact at poultry farms, slaughter houses, sellers etc.
- **Also, effects those who do not consumes food derived from animals**

Smart moves of a deadly microbe

As a microbe become resistant, it influences other microbes present in the gut of the chicken and then those in the environment, making them resistant to a wide range of antibiotics





Why antibiotics are used in Animals?

The case of Indian poultry industry



Chicken meat production is an industrial process; no longer a backyard activity

- Indian poultry industry is worth more than Rs. 50,000 crore.
- Market for chicken meat is **growing at about 10 percent** for over a decade. 35 lakh tonnes of chicken meat produced in 2013.
- Andhra Pradesh is the biggest chicken meat producer with 5 lakh tonnes in 2012-13. **Haryana with highest growth rate of over 12 percent** in last five years is just short of being at number three
- With 3.4 lakh tonnes in 2012-13, **Haryana produces about 10 percent of chicken meat in India**. It is a major supplier to Delhi NCR



In Haryana (case study), antibiotic use is rampant in chicken production for meat

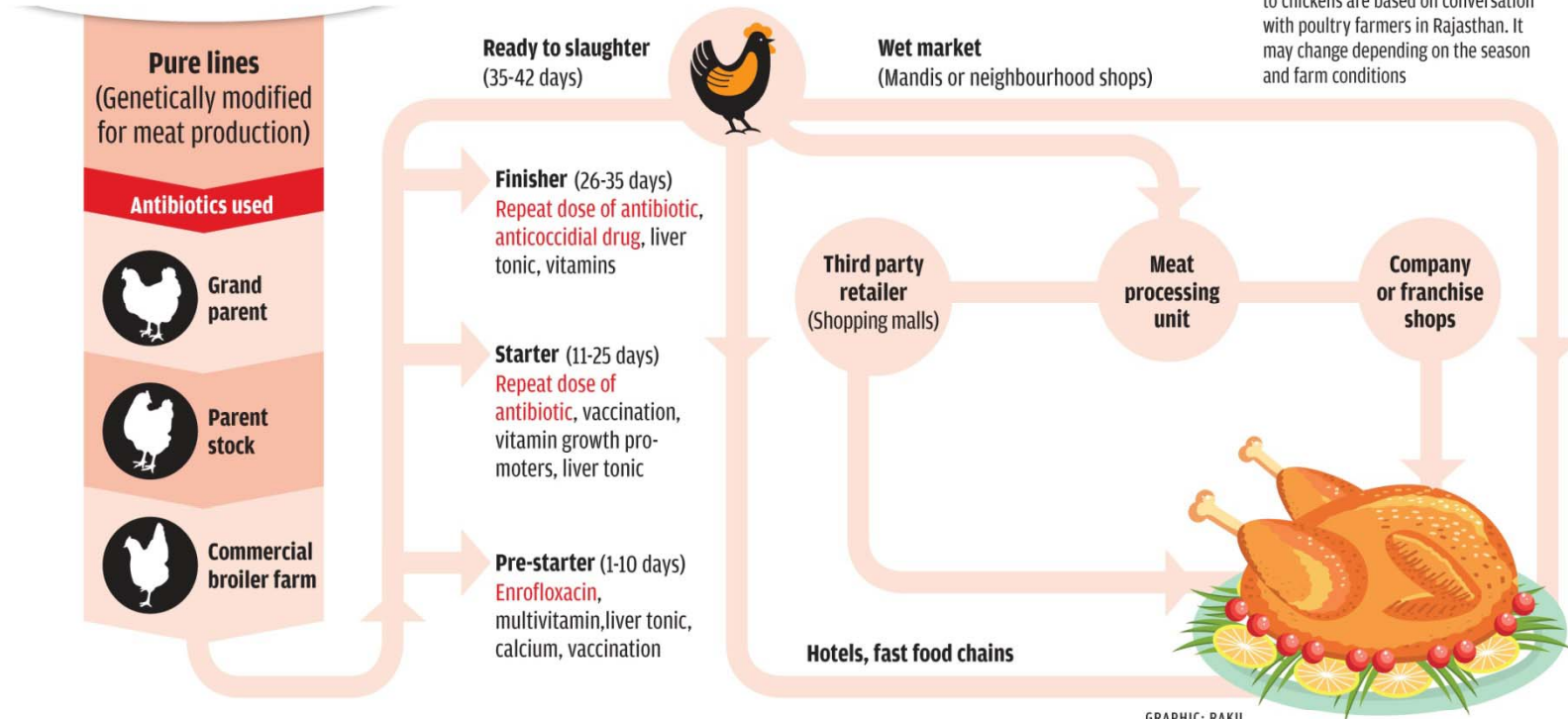
- Antibiotic administration starts when the chick is one day old. They are given 'preventive doses' to avoid infection.
- Use of antibiotic growth promoters (AGPs) is an integral part of the broiler farming. Broilers are fed with antibiotic laden feed through-out their life. This is done to reduce **Feed Conversion Ratio** – AGPs allows chicken to **consumes less feed to grow fat**.
- Routine preventive administration of antibiotics is a common practice. It involves periodic administration of sub-therapeutic doses to the entire flock in the absence of any symptom of a disease. ([Video](#))
- **No prescription is needed; antibiotics and antibiotic laden feed freely available in the market.**



Antibiotics fed from birth till death

From farm to plate

Antibiotics are used extensively throughout the 35-42 day life cycle of chicken





Its all about profits!

	FCR = 2	FCR =1.5
Cost of a chick	Rs 25	Rs 25
Cost of feed @ Rs 25 per Kg	Rs 100 (4 Kg)	Rs 75 (3 Kg)
Operational cost during the lifecycle	Rs 15	Rs 15
Total cost of chicken weighing 2 Kg	Rs 140	Rs 115
Saving per chicken due to less feed consumed	-	Rs 25
Saving per 100,000 chicken	-	Rs 25 Lakh
Per year saving for 100,000 chicken assuming seven cycles	-	Rs 1.75 Crore
Additional expenses on antibiotics in feed (AGP cost of Rs 100 per per tonne of feed)	-	Rs 2.1 Lakh

Antibiotics in Chicken: The lab study





Study Design and Methodology

Seventy chicken samples were tested from Delhi NCR

- Delhi: 36, Noida: 12, Gurgaon: 8, Faridabad: 7, Ghaziabad: 7
- Tests were done in two phases:
 - In Phase 1 (Sept-Oct, 2013), 50 samples were tested. In four samples, muscles, liver and kidney were tested. In remaining 46 only muscles were tested.
 - In Phase 2 (May-June, 2014), 20 samples were tested. In 10 samples, muscles and liver were tested. In remaining 10 only muscles were tested.
- Biggest study of India, so far.



Study Design and Methodology

- Six antibiotics tested from three classes:
 - Oxytetracycline, Chlortetracycline and Doxycycline (class Tetracyclines)
 - Enrofloxacin and Ciprofloxacin (class Fluoroquinolones)
 - Neomycin (class Aminoglycosides) – **Not tested in Phase 2**
- **Tests done using High Performance Liquid Chromatograph (HPLC) with Diode Array Detector (DAD) and Fluorescence Detector (FLD).**
 - Tests were conducted based on internationally accepted and published methods. The methods were validated at PML. **Each chicken sample was analysed in triplicate.**



Antibiotics found in 40% of chickens

Antibiotics found	Chickens with antibiotic (number)	Overall level of antibiotic (µg/kg)	Level of antibiotic in muscle (µg/kg)	Level of antibiotic in liver (µg/kg)	Level of antibiotic in kidney (µg/kg)
Oxytetracycline	11.4% (8)	8.25–15.16	8.45-13.60	9.13	8.25
Chlortetracycline	1.4% (1)	10.20	10.20	-	-
Doxycycline	14.3% (10)	11.94–20.66	14.61-20.66	11.94	15.73
Enrofloxacin	20% (14)	3.37–131.75	3.84-58.06	3.37-131.75	-
Ciprofloxacin	14.3% (10)	3.55 – 64.59	3.55-26.27	7.55-64.59	-



Five of six tested antibiotics were present

- No significant difference in results from different parts of NCR.
- Antibiotics found in **all tissues tested** - muscle, liver and kidney. No significant difference in residues in different parts of Chicken.
- More than one antibiotic in **17 percent** chickens
- Fluoroquinolones in **28.6 percent (20)** chickens
- Tetracyclines in **14.3 percent (10)** chickens
- Residues were in the range of **3.37-131.75 µg/kg**
- Neomycin not detected.



What the results mean?

- **Antibiotics found include those:**
 - **Banned** in certain countries for use in animals due to ABR concerns (Enrofloxacin and Ciprofloxacin)
 - Considered **critical** (Ciprofloxacin) and **highly important** (Tetracyclines) to humans
 - Among the **highest prescribed** in India (Ciprofloxacin)



Antibiotics found in chickens are similar to those getting resistant in bacteria

	Common infections caused	Ciprofloxacin (%)	Doxycycline (%)	Tetracycline (%)
Escherichia coli	Diarrhea, infections of urinary tract and respiratory tract	69-93	-	-
Klebsiella spp. ^a	Pneumonia, blood stream infections, meningitis	37-91	53.3	-
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What the results mean?

It also indicates:

- Rampant and unregulated use of Antibiotics in poultry industry, mostly for growth promotion.
- The presence of more than one class of antibiotics in a sample means that multiple antibiotics are being used.
- Withdrawal period is not being followed
- **Its free for all**



How is antibiotic use in poultry industry regulated in India?



No mandatory regulations

No effective policy or mandatory regulations on antibiotics for poultry industry

What we have is advisory and voluntary guidelines – all ineffective.

- **2007:** The BIS recommends not using antibiotics with systemic action as growth promoters in feed. The standards are voluntary; no one follows it
- **2011:** The National policy on containment of antimicrobial resistance barely focus on resistance emanating from food-producing animals
- **2012:** The National programme on containment of antimicrobial resistance, 2012-17, has yet not started monitoring of resistance in humans
- **2013:** National Livestock policy just mentions that states would be encouraged for judicious use of antibiotics
- **June 2014:** A circular by Dept. of Animal Husbandry, Dairying and Fisheries **requesting states to advice veterinarians on judicious use of antibiotics** and stopping antibiotics in feed;
- **No specifics, no timelines and no punitive measures**



No regulation to speak off...

And freely available

In open packets

For a song

No idea of health implications of this
sale



How the world is regulating antibiotic use in animals and what can India learn?



European countries started regulating animal antibiotic use 40 years ago

- Some European countries **banned penicillin, streptomycin, and tetracyclines** as antibiotic growth promoters in 1970s.
- In 1986, **Sweden banned antibiotic growth promoters and Denmark followed it.**
- The EU **prohibited antibiotic growth promoters in 2006.**
- The regulatory initiatives across several EU countries include:
 - **Prohibiting** antibiotic growth promoters and antibiotics critical for human use
 - **Creating infrastructure** to monitor resistance in human, food-producing animals and in food chain
 - **Increased supervision** on antibiotic prescriptions by veterinarians and its use by farmers; unlicensed antibiotics not sold
 - Setting antibiotic standards for food

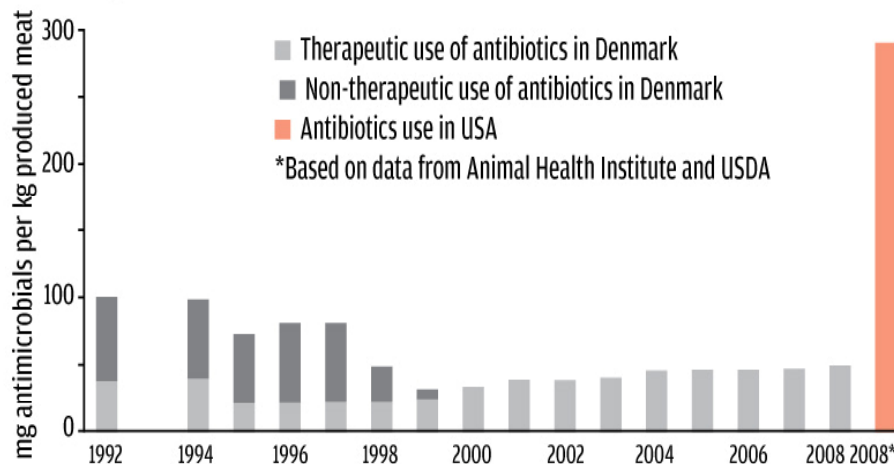


Denmark's holistic approach to address ABR in food-producing animals

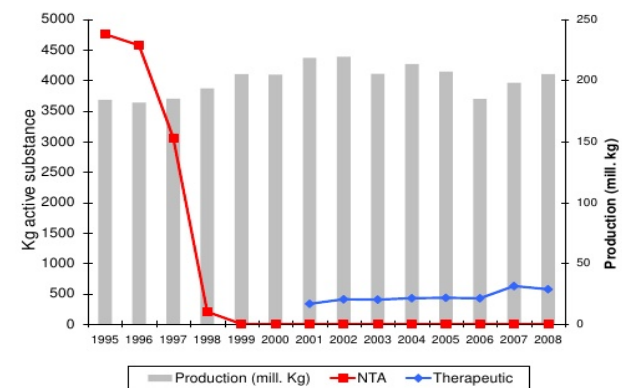
Between 1995-2008, just before and years after the ban on antibiotics

- Antibiotic used per kg of meat decreased. Antibiotic use reduced by 90% in poultry and 51% in pigs
- In broilers, productivity and mortality was not effected and cost of production remained almost same. No effect on swine production. Just one percent increase in cost of production was estimated.

Consumption of antibiotics in Denmark and the US



Production of poultry and consumption of NTA and therapeutic antimicrobials



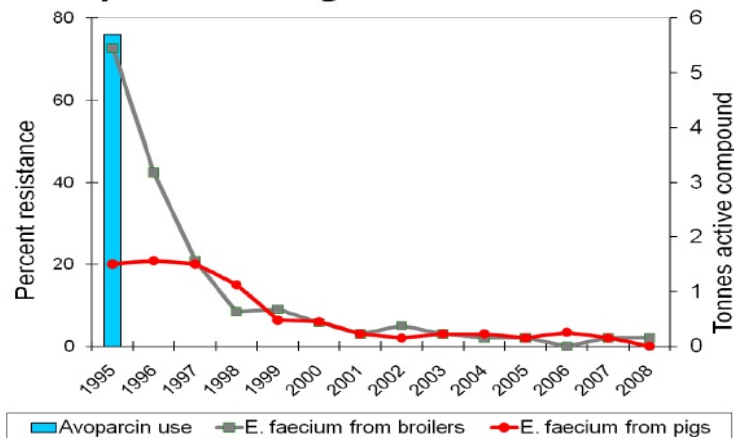
National Food Institute, Technical University of Denmark



Resistance drops markedly against antibiotics that were banned in animals

- Resistance against Avoparcin and Virginiamycin decreased in *Enterococcus* in pigs and broilers
- In broilers, Avilamycin and macrolide resistance (due to tylosin) reduced significantly

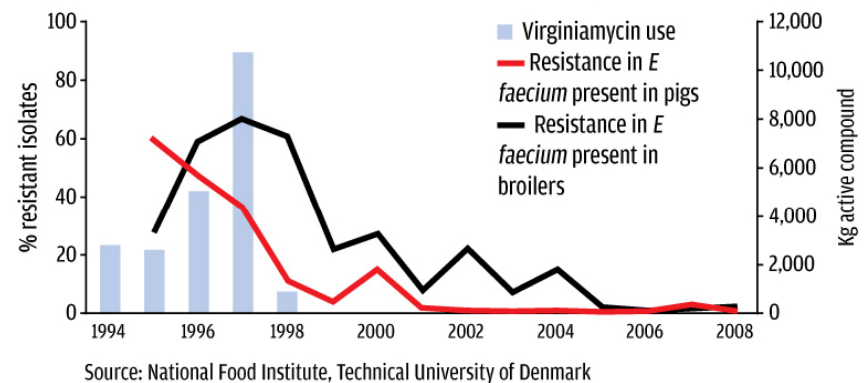
Avoparcin consumption and resistance to avoparcin among *E. faecium*



National Food Institute, Technical University of Denmark



In Denmark, resistance in pigs and broilers against antibiotic Virginiamycin decreases following its reduced use



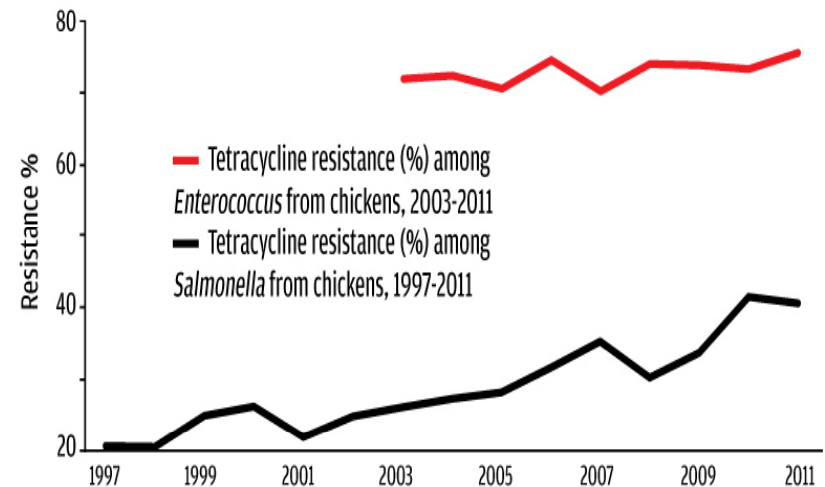
Source: National Food Institute, Technical University of Denmark



Voluntary approach doesn't work. In US, Antibiotic use continues to increase

- **No signs of decrease in antibiotic usage**
 - About 80% used in food-producing animals. Between 2009-11, use of lincosamides, penicillins and tetracyclines grew by 64%, 44% and 22%.
- **Finding more resistant bacteria in chicken meat**
 - Tetracycline resistant *Salmonella* and *Enterococcus* from Chickens increasing
 - More Tetracycline resistant *Campylobacter* found in retail chicken meat in 2011 than in 2010

In US, resistance in chicken against antibiotic tetracycline continues to increase



Source: National Antimicrobial Resistance Monitoring System, USDA



What Should India do?



WAY AHEAD is minimising antibiotics use through a set of comprehensive measures

- Ban the use of antibiotics for growth promotion and mass disease prevention. It should only be used to cure the sick based on prescription of veterinarians
- Antibiotics should not be allowed in feed. Government should set standards for animal feed and regulate the business
- Antibiotics that are critical for humans should not be allowed for use in animals
- Encourage development, production and use of alternative antibiotic-free growth promoters, such as herbal supplements and better farm management practices
- Set standards for antibiotic residues in chicken



WAY AHEAD

- Veterinarians should be trained and educated on judicious use of antibiotics and infection prevention. Government should ensure that veterinarians do not get incentives for prescribing more antibiotics
- Ensure that a licensed antibiotic reaches to a registered user through a registered distributor of veterinary medicines. All animal antibiotics should be traceable from manufacturing site to user. Implement stringent control on import of antibiotics and feed supplements
- Set pollution standards and install pollution control systems to limit transfer of resistant bacteria, antibiotics from poultry to environment



WAY AHEAD

- The poultry raised without use of antibiotics should be labeled through **reliable certified schemes** to facilitate consumer choice.
- Develop an **integrated surveillance system to monitor antibiotics use and antibiotics resistance trends in humans, animals and food chain.**