Risks with urban and peri-urban milk production in India

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Presentation outline

• Background
  • Risks and benefits with urban dairy
  • Dairy in India
• The Assam study
  • Methods
  • Results
  • Conclusions
• The steps forward
Risks and benefits with urban dairy

Good and bad

• Milk is nutritious
• Closeness to the market, farm inputs & services
• Lower cost & less time for transportation
• It is an opportunity to provide food for the family and an income
• Local markets for live/dead animals
• Poor sanitation & inadequate space for farm waste disposal
• Living in close proximity to the animals kept
• High density of people and animals
Food-borne diseases

- Food-borne diseases are very important
- 1.4 million children die every year of diarrhoea
- The majority is food- and water-associated
Risks and benefits with urban dairy

Pathogens from the cow and from the milk

- *Bacillus anthracis*
- *Mycobacterium bovis*
- *Brucella*
- *Salmonella*
- *EHEC*
- *Streptococcus* spp.
- *Staphylococcus aureus*
- *Clostridium* spp.
- *Listeria* spp.
Risks and benefits with urban dairy: What more is in the milk?

- Microbial load
- Adulterants
Risks and benefits with urban dairy: What more is in the milk?

• Antibiotic residues
  • Frequently detected
• Pesticides
  • High percentage of milk samples
• Mycotoxins- aflatoxins
  • Detected in many milk samples, sometimes high levels
Milk consumption in India

• Milk consumption 46 kg per capita in 1983; 62 kg per capita in 1997; 106 kg per capita in 2011-12

• Estimated total annual consumption of 60 million megatons

• India consumed 13% of the milk in the world
The Assam study

Concerns about milk quality in Assam

Training to promote knowledge and hygiene amongst producers and traders

The objectives was to evaluate the improvements in knowledge

<table>
<thead>
<tr>
<th>Year</th>
<th>Producers</th>
<th>Traders</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009</td>
<td>405</td>
<td>175</td>
<td>580</td>
</tr>
<tr>
<td>2012</td>
<td>161</td>
<td>226</td>
<td>387</td>
</tr>
<tr>
<td>Total</td>
<td>566</td>
<td>401</td>
<td>967</td>
</tr>
</tbody>
</table>
Training on hygiene

- Training & monitoring on hygienic milk production and handling
- Producers and trainers in Kamrup district
- Local partners: Dairy Development Department (DDD), Assam Agricultural University (AAU), Greater Guwahati Cattle Farmers Association and a local NGO
- Media and information campaigns
Can diseases be transmitted from dung?

<table>
<thead>
<tr>
<th></th>
<th>Believe diseases can be transmitted from dung</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Producers</strong></td>
<td></td>
</tr>
<tr>
<td>2009</td>
<td>2.7% (11/404)</td>
</tr>
<tr>
<td>2012</td>
<td>37.2% (60/161)***</td>
</tr>
<tr>
<td>Trained (2012)</td>
<td>69.8% (37/53)***</td>
</tr>
<tr>
<td>Untrained (2012)</td>
<td>21.3% (23/108)</td>
</tr>
<tr>
<td><strong>Traders</strong></td>
<td></td>
</tr>
<tr>
<td>2009</td>
<td>1.1% (2/175)</td>
</tr>
<tr>
<td>2012</td>
<td>47.1% (106/225)***</td>
</tr>
<tr>
<td>Trained (2012)</td>
<td>63.9% (78/122)***</td>
</tr>
<tr>
<td>Untrained (2012)</td>
<td>27.2% (28/103)</td>
</tr>
</tbody>
</table>

Comparison between 2009 and 2012 survey
Comparison between trained and untrained 2012
Comparison between 2009 and untrained 2012
# Can diseases be transmitted by milk?

<table>
<thead>
<tr>
<th></th>
<th>Believe diseases can be transmitted from milk</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Producers</strong></td>
<td></td>
</tr>
<tr>
<td>2009</td>
<td>13.0% (52/401)</td>
</tr>
<tr>
<td>2012</td>
<td>35.4% (57/161)**</td>
</tr>
<tr>
<td>Trained (2012)</td>
<td>64.2% (34/53)**</td>
</tr>
<tr>
<td>Untrained (2012)</td>
<td>21.3% (23/108)</td>
</tr>
<tr>
<td><strong>Traders</strong></td>
<td></td>
</tr>
<tr>
<td>2009</td>
<td>9.1% (16/175)</td>
</tr>
<tr>
<td>2012</td>
<td>41.5% (93/224)**</td>
</tr>
<tr>
<td>Trained (2012)</td>
<td>64.8% (79/122)**</td>
</tr>
<tr>
<td>Untrained (2012)</td>
<td>13.7% (14/102)</td>
</tr>
</tbody>
</table>
## Is the milk completely safe after boiling?

<table>
<thead>
<tr>
<th></th>
<th>Believe milk is completely safe after boiling</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Producers</strong></td>
<td></td>
</tr>
<tr>
<td>2009</td>
<td>96.0% (380/396)</td>
</tr>
<tr>
<td>2012</td>
<td>93.1% (148/159)</td>
</tr>
<tr>
<td>Trained (2012)</td>
<td>86.8% (46/53)*</td>
</tr>
<tr>
<td>Untrained (2012)</td>
<td>96.2% (102/106)</td>
</tr>
<tr>
<td><strong>Traders</strong></td>
<td></td>
</tr>
<tr>
<td>2009</td>
<td>89.1% (156/175)</td>
</tr>
<tr>
<td>2012</td>
<td>93.8% (212/226)</td>
</tr>
<tr>
<td>Trained (2012)</td>
<td>91.8% (112/122)</td>
</tr>
<tr>
<td>Untrained (2012)</td>
<td>96.2% (100/104)*</td>
</tr>
</tbody>
</table>
### Which diseases can be transmitted?

<table>
<thead>
<tr>
<th></th>
<th>Tuberculosis</th>
<th>Food poisoning/gastrointestinal disease</th>
<th>General disease symptoms (fever, cough, cold)</th>
<th>Worms</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Producers</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2009</td>
<td>3.5% (14/405)</td>
<td>18.3% (74/405)</td>
<td>0.3% (1/405)</td>
<td>4.7% (19/405)</td>
</tr>
<tr>
<td>2012</td>
<td>8.7% (14/161)**</td>
<td>36.0% (58/161)***</td>
<td>11.2% (18/161)***</td>
<td>9.3% (15/161)*</td>
</tr>
<tr>
<td>Trained (2012)</td>
<td>18.9% (10/53)***</td>
<td>64.2% (34/53)***</td>
<td>20.8% (11/53)**</td>
<td>9.4% (5/53)</td>
</tr>
<tr>
<td>Untrained (2012)</td>
<td>3.7% (4/108)</td>
<td>22.2% (24/108)</td>
<td>6.5% (7/108)***</td>
<td>9.3% (10/108)</td>
</tr>
<tr>
<td><strong>Traders</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2009</td>
<td>4.0% (7/175)</td>
<td>9.7% (17/175)</td>
<td>0% (0/175)</td>
<td>2.9% (5/175)</td>
</tr>
<tr>
<td>2012</td>
<td>13.7% (31/226)***</td>
<td>42.9% (97/226)***</td>
<td>11.5% (26/226)***</td>
<td>4.0% (9/226)</td>
</tr>
<tr>
<td>Trained (2012)</td>
<td>23.8% (29/122)***</td>
<td>61.5% (75/122)***</td>
<td>20.5% (25/122)***</td>
<td>6.6% (8/122)*</td>
</tr>
<tr>
<td>Untrained (2012)</td>
<td>1.9% (2/104)</td>
<td>21.2% (22/104)**</td>
<td>1.0% (1/104)</td>
<td>1.0% (1/104)</td>
</tr>
</tbody>
</table>

*Comparison between 2009 and 2012 survey*
*Comparison between trained and untrained 2012*
*Comparison between 2009 and untrained 2012*
What do you use most often to wash your hands?

- Traders
  - Untrained: 74% answered soap
  - Trained: 92% answered soap ($p<0.001$)

- Producers
  - Untrained: 53% answered soap
  - Trained: 92% answered soap ($p<0.001$)
Some specks of dirt in the milk are not harmful

- **Traders**
  - Untrained: 37.5% agree
  - Trained: 28% agree

- **Producers**
  - Untrained: 58% agree
  - Trained: 77% agree (p=0.046)
You can tell if milk is safe to drink

- **Traders**
  - Untrained: 96% agree
  - Trained: 89% agree

- **Producers**
  - Untrained: 96% agree
  - Trained: 77% agree (p<0.001)
It is good for the cow if you add water to the milk

- Traders
  - Untrained: 72% agree
  - Trained: 53% agree (p<0.001)

- Producers
  - Untrained: 6% agree
  - Trained: 64% agree (p=0.052)
Customers prefer cheap to good quality milk

- Traders
  - Untrained: 6% agree
  - Trained: 3% agree
- Producers
  - Untrained: 1% agree
  - Trained: 6% agree
In practice

- **Traders**
  - No difference in if milk was free from dirt (3.5% were not)
  - 82% of trained traders had clean clothes, compared to 50% of untrained (p<0.001)

- **Producers**
  - No difference in the number of milk containers that were free from dirt (92% were not)
  - No difference in if milk was free from dirt (2.5% were not)
  - 79% of trained producers had clean clothes, compared to 68% of untrained (p<0.001)
Moving forward

- Continue monitoring
- Continue evaluation of the training
  - Mastitis frequency
  - Antibiotic use, residues and resistance
  - Animal health, welfare and productivity
Moving forward – next project

- Can we affect the incidence of bovine tuberculosis?
- Can we affect the prevalence of antibiotic residues?

- Evaluate the risks
- Identify risk practices
- Pilot interventions
Risk mitigation at the human-livestock interface

- It is possible to change people’s perceptions and habits but difficult to assess the effect

- Farmers at high risk for zoonoses
- Milk is a risk product

- Assess the risks, mitigate the risks, increase the profits
Thank you for your attention

Any questions?
Acknowledgements

• Partners: Dairy Development Department (DDD), Assam Agricultural University (AAU), Greater Guwahati Cattle Farmers Association, Health & Family Welfare Department, Guwahati Municipal Corporation (GMC) and Animal Husbandry & Veterinary Department
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• The participants in Assam