Evaluating risks in the informal milk value chain in North East India

-with particular focus on risk communication through stakeholders involvement

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Presentation outline

• Background
  • Risks and benefits of milk
  • Dairy in India
• The importance of stakeholders
• The Assam study
  • Methods
  • Results
• Conclusions
Milk consumption in India

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

- Estimated total annual consumption of 60 million megatons

- India consumed 13% of the milk in the world
The importance of milk

• Nutritious
• Important animal-source food for many vegetarians
• Often targeted towards women and children
  • Adapted for growing offspring
Food-borne diseases

- Food-borne diseases are very important
- 1.4 million children die every year of diarrhea
- The majority is food and water-associated
- Animal-source food over-represented as a cause
Risks and benefits with dairy

Pathogens from the cow and from the milk

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

- Microbial load
- Adulterants
Risks and benefits associated with dairy - What else is in the milk

- Antibiotic residues
  - Frequently detected
- Pesticides
  - High percentage of milk samples
- Mycotoxins - aflatoxins
  - Detected in many milk samples, sometimes high levels
Aflatoxins are a major issue

- Economic impact
  - Production losses
  - Regulation costs
  - Health costs (hard to know)

- Health impact
  - Acute poisoning
  - Cancer
  - Immunosuppression
  - Stunting?

- Invisible toxin
  - Odourless
  - Heat-stable
Risks and benefits of urban dairy

**Good and bad**

- Closeness to the market, farm inputs & services
- Reduced cost & 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
The importance of dairy production-Assam

• One of the poorest states
• Over 30 million people, 27% rural
• Agriculture accounts for ¼ of the state domestic product
• 8.5 million cattle, >90% indigenous
• 97% marketed in the informal traditional market
• Most initiatives focus on the organized sector
<table>
<thead>
<tr>
<th></th>
<th>FAT(%)</th>
<th>SNF (%)</th>
<th>Added water</th>
<th>Total bacteria (log)</th>
<th>Total coliforms (log)</th>
</tr>
</thead>
<tbody>
<tr>
<td>UHT</td>
<td>3.6</td>
<td>7.9</td>
<td>6</td>
<td>3.5</td>
<td>0</td>
</tr>
<tr>
<td>Pasteurised</td>
<td>3</td>
<td>8</td>
<td>4</td>
<td>5.5</td>
<td>3.5</td>
</tr>
<tr>
<td>Raw</td>
<td>3.1</td>
<td>6.6</td>
<td>20.5</td>
<td>6.1</td>
<td>4.1</td>
</tr>
</tbody>
</table>
Pathways

Adulteration!

Trader

Adulteration!

Hotels

Restaurants

Adulteration!
Adulteration- a problem?

1. Producers in 2009: 0-66% water added
2. Traders in 2009: 2-55% water added
3. Producers in 2012: between 0-28 % water added
4. Traders in 2012: 0-31 % water added

Adulteration occurs at every step!
Consumers can not tell the difference!
No clear association with bacterial count
Unorganized Dairy Development Model in Assam

Policy Environment
- Certification
- Licensing
- Branding
- Business development

More milk production & marketing
More livelihood benefits
Better health for men and animals
More organised dairying

Producer

Traders
Sweet makers
Consumer

Friendly approach

Dairy Development Department
- JCMC
  Dairy Dept.
  Vety Dept.
  Health Dept.
  Municipality
  District Adm
  ILRI

ILRI
CGIAR
Working with stakeholders

- Using outcome mapping
  - Social change
  - Meaningful development outcomes
- Identify all relevant stakeholders
- Risk communication
Risk communication

Risk analysis
*Scientific*

Risk management
*Policies*

Risk communication
*Interactive, participatory*
The Assam study:

- Concerns about milk quality in Assam
- Training to promote knowledge and hygiene amongst producers and traders

The objectives were to evaluate the improvements in knowledge from 2009 to 2012 among producers and traders.

<table>
<thead>
<tr>
<th>Year</th>
<th>Producer</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
- Media and information campaigns
Stakeholders identified

1. Dairy Development Department (DDD)
2. Animal Husbandry & Veterinary Department (AHVD)
3. Guwahati Municipal Corporation (GMC)
5. Assam Agricultural Competitiveness Project (AACP, World Bank sponsored)

Joint Coordination & Monitoring Committee (JCMC)
## 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>
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>
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 is 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 – 76% 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 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
    - Trained farmers less subclinical mastitis
  - 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

- Bihar
- Guwahati
- Bangalore
- Ludhiana
Risk mitigation at the human-livestock interface

- It is important to bring along all stakeholders
- 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
- Communicate the risks- in the best ways
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
• All members of the research team in the field
• The participants in Assam
Thank you for your attention

Any questions?