IoT and the Dairy Value Chain in India

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Overview of Dairy Supply Chain in India

Actors
- Cattle
- Farmer
- Collection Agent
- Chilling agent
- Dairy
- Agent
- Customer

Key activities
- Milk production
- Farm management
- Livestock management
- Grading of milk
- Pricing of milk
- Chilling of milk
- Product mix
- Packaging
- Energy Optimisation
- Product sell
- Quality retention
- Consumption

Flow
- Milk flow
- Money flow
Overview of Dairy Supply Chain in India

A Village Collection Center, A large Chilling Center

A Village-Level Collection Center

A Downstream Chilling Center
Indian Dairy scenario: a growing dairy market

Milk is the largest ‘crop’ in India and across the world

Dairy - Total market size (India)
480 million Liters Per Day

Organized market size
145 million liters per day

CAGR 8%

Total milk output and animal value represents around 7.6% of India’s GDP*

Why not just focus on livestock?
Why take a supply chain view?

- Small holder farmers (~50 million)
- 300 million bovine

Transition fueled by tech because of the supply chain and demand-backward model

- Poor productivity (5LPD)
- Low profitability

- Moving from subsistence to dairy as livelihood
- SHFs to grow into medium sized farms

- Historically, emphasis has been to reach quantity-based milestones
- India is the largest producer of milk in the world today
- The yield per cow, however, is amongst the lowest

Farm-side unit economics is a function of demand mappability
- India has a very good appetite currently for high quality milk and VADP
- With right interventions, this should translate to good economic value and should flow back to the farms
Creating value-chain impact with intervention at each node in the “Milk Route”

Leveraging advanced analytics and AI/ML to drive P, Q and T

- **Farm**
  - Peak yield management
  - Nutrition services
  - **Productivity improvement**

- **Collection center**
  - Automated milk procurement
  - Grade-to-pay service
  - **Quality**

- **Chilling center**
  - Cold chain protocol adherence
  - Energy optimization
  - **Quality**

- **Misc.**
  - Performance monitoring
  - Route optimization
  - **P,Q and T**

**Quality & Traceability**

Data analytics
Key Learnings from our interventions at the farm level

- Data Analytics: Completely dependent on quality of raw data
- More data that is human driven ⇒ More bias in the raw data
  - Unfortunately, human inputs cannot be eliminated
- Automate data capture where possible
- Demystify data capture
  - Use devices and interfaces that are easily available to farmers and agri extension staff
  - Use tech that do not overwhelm end-users
- Push content and information to users (rather than getting them to “login to portals”)
- Can individual farmers shape up to become role models?
Tech-based Interventions at the Farm for better Quality of the Data

- Cattle Farmer
- Milk production Farms management Livestock management
- Collection center
  - Collection Agent
  - Grading of milk Pricing of milk
- Chilling center
  - Chilling agent
  - Grading of milk Chilling of milk
- Dairy processor
  - Dairy
  - Product mix Packaging Energy Optimisation
- Retailer / Distributor
  - Agent
  - Product sell Quality retention
- Consumer
  - Customer
  - Consumption

- Animal wearable for small farms
- Herd management solution
- Thermal imaging
- Visual imaging
- Blockchain
- NLP based VUI
- Spectral analysis of feed
- Financial Models
- Contributing to Genomic Data

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Data Capture at the Farm

- Real-time cattle activity tracking
- Predictive analysis
- Disease detection based on animal activity
- Alerts to vets, para vets and farmers
- Digitizing animal health records
- Alive or dead status useful for cattle insurance
Data Capture at the Farm

**Musculoskeletal problems** - thermal imaging cameras can be used to diagnose a variety of disorders associated with neck, back and limbs (e.g. Lameness, hoof diseases)

**Infection:**
- Subclinical Mastitis and Clinical Mastitis
- FMD Infection (comparison between normal and affected)

[https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5234052/](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5234052/)
Authors: ICAR-NDRI, Bangalore
Data Capture at the Farm

Democratised Devices

Computer vision

Machine learning

Artificial Intelligence

Extending this to Thermal Imagery
Farm and cattle data that can aid broader decisions, involving multiple contributors

- **Public Blockchain**
  - Cattle Information - Available to anybody
  - Farmer Information (should not be on public blockchain)
  - Good as a census/demographic database

- **Permissioned Blockchain**
  - Cattle Information - Privately held
  - Farmer Information - Privately held
  - Enables commercial transactions with stakeholders such as insurance providers, feed providers etc
The goal: Farm services

- Credit
  - Credit Score Monitoring & Improvement
  - Small ticket Loans
  - Cattle Financing
  - Bill Payments
  - Money transfer
- Payments
  - Cash Withdrawal / Deposit
- Wealth Management
- Insurance
  - Health Insurance
  - Cattle Insurance
  - Life Insurance
  - Artificial Insemination services
  - Veterinary Services
- Cattle Health
  - Cattle Health Monitoring
  - Quantity of milk
  - Quality of milk
  - Fodder
  - Food Supplements
- Dairy Income
- Cattle Nutrition
  - Fodder
  - Food Supplements
  - Composite Feed
- Expense Management
- Financing against receivables
- Small ticket Loans
- Cattle Financing
- Bill Payments
- Money transfer
- Cash Withdrawal / Deposit

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Smart Systems, Stellar Applications.
THANK YOU