Implementing a Quality-Based Milk Payment System (QBMPS) in Kenya

Prepared by

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Project period

January 2015 -

January 2019

Start: The QBMPS project

Partners in the project

- Happy Cow Ltd - HC, dairy processor at Nakuru
- Two dairy societies: Ngorika and Olenguruone
- SNV Kenya Market-led Dairy Program (KMDP) funded by Netherlands Embassy

Start of the Project

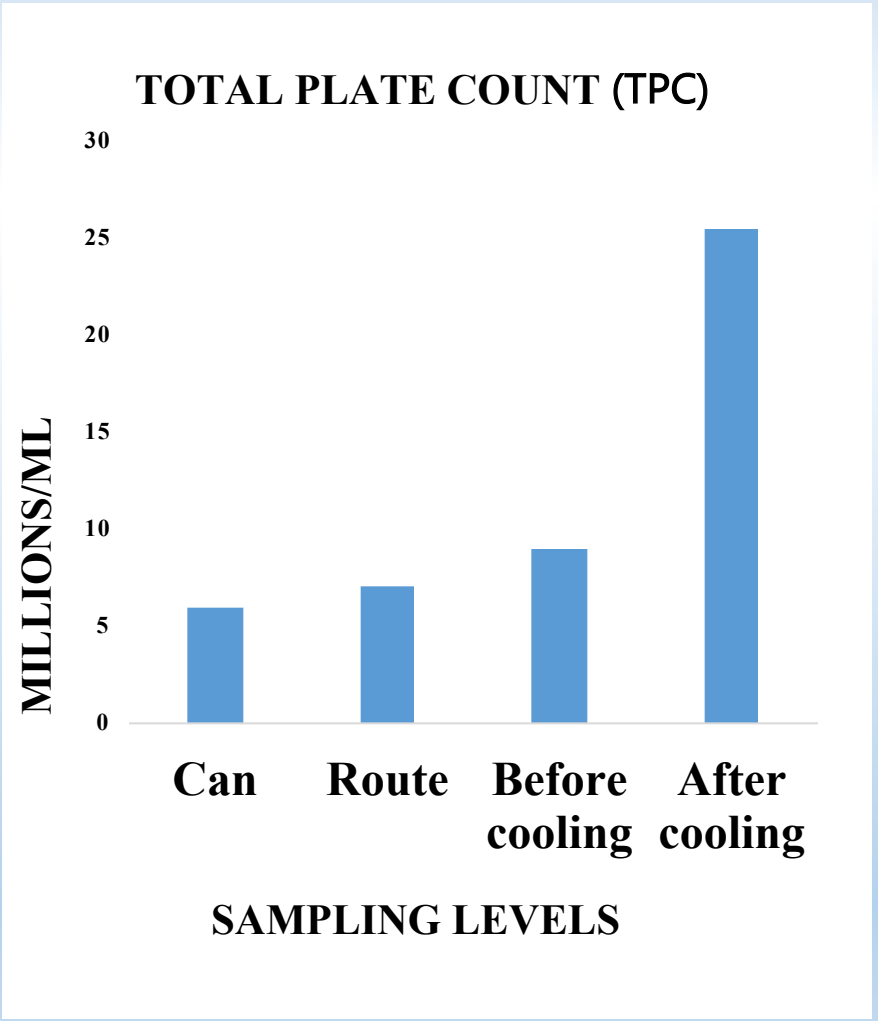
- Historical data shows major challenges in Total Plate Count (TPC), adulteration & antibiotic residues in milk; far above Kenya Bureau of Standards (KEBS) limits
- HC submitted a project proposal to KMDP to pilot a Quality Based Milk Payment System (QBMPS)
- A track and trace (T&T) system and a zero-setting baseline were preconditions

Start: Some historical HC data on raw milk

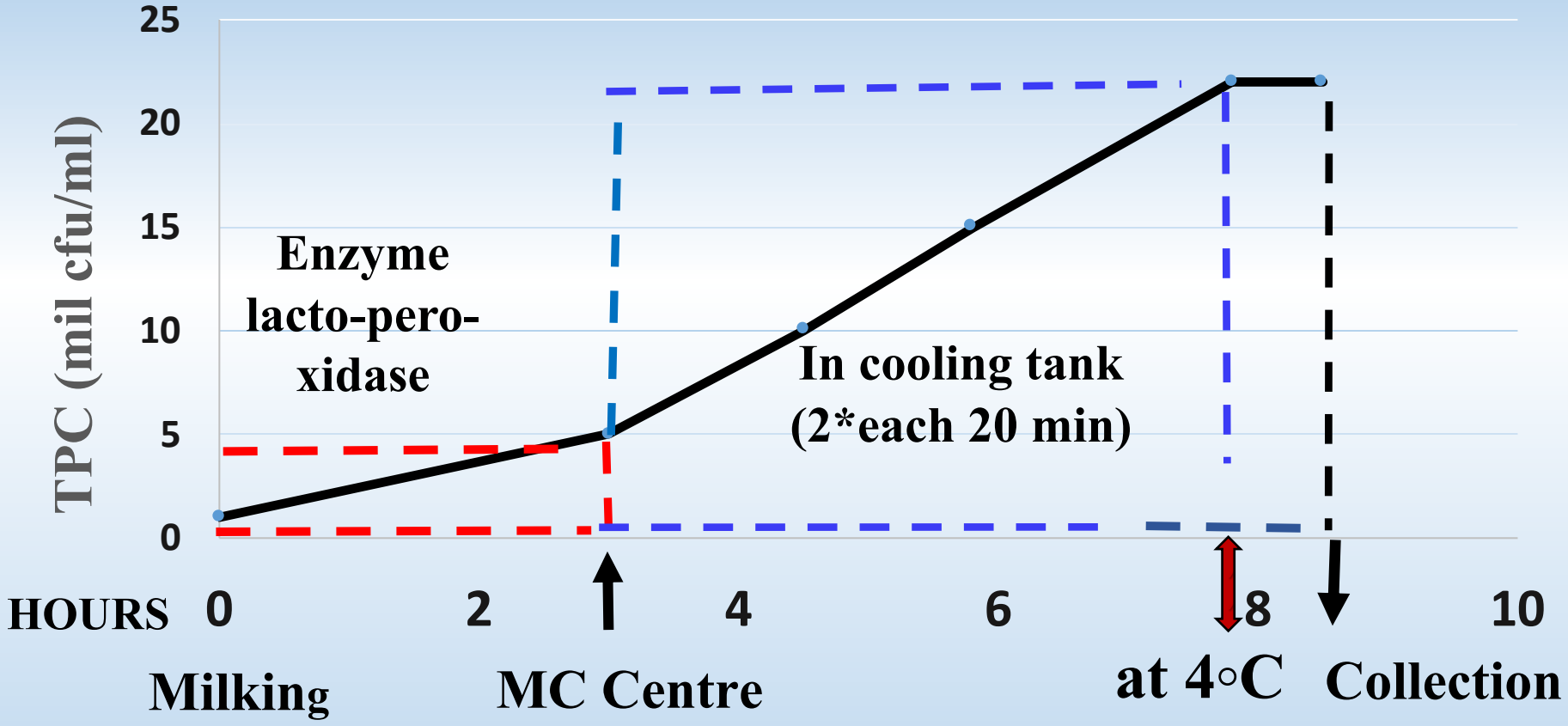
	DATE	CBE	TPC/ML	Resazurin	Antibiotic
	KEBS	**standards**	**< 2,000,000**	**4-6**	**< 4 PPB**
1	7/6/05	Bulk Silo	98,000,000	4	
2	26/9/11	Bulk Silo	160,000,000	4	
3	1/11/14	Coop B	190,000,000	5	POSITIVE
4	19/11/14	Coop A	110,000,000	5	POSITIVE
5	28/01/15	Coop A	160,000,000	4	
6	30/04/15	Coop A	100,000,000	4	

Zero Setting: Results mid-2015

- High bacterial loads (TPC)
- High rates of antibiotic residues
- Incidences of mastitis (CMT)
- Adulteration cases (water and preservatives)
- Lack of correlation between Resazurin test and TPC
- Inefficiency of installed milk coolers (**can act as incubators**)



Zero Setting: Breakdown of the cold chain



Interventions to arrest microbial multiplication:

- Enhance hygiene practices
- Fast delivery & cooling (PHE + Chiller) or Thermization

Kenya: Disputable practices in milk collection

- Use of dirty plastic jerry cans and sometimes preservatives
- Milk collection as late as 11.30 am and inefficient milk coolers
- Coops/processors accept rejected raw milk from elsewhere

Kenya: Rural and Safety challenges

Rural Challenges

- 1.5 million small scale farmers, each marketing < 8.0 ltr/day
- Poor roads and no reliable water sources
- Cold chain rules not observed and un-ethical practices
- Thriving informal milk marketing with no quality checks
- Market is volume-based with low awareness on quality

Safety challenges

- H_2O_2 mask bad hygienic practices and has health effects
- Antibiotic residues: allergy/resistance and cultured products
- Adulterants: water/starch/sugar and act as contamination
- High bacterial counts produce harmful heat resistant enzymes

Project interventions: Laboratories

Cooperative lab - Acceptance tests

HC laboratory - QBMPS tests

- Milk needs to pass all acceptance tests before bulking
- Random can samples are taken for QBMPS tests at the HC lab

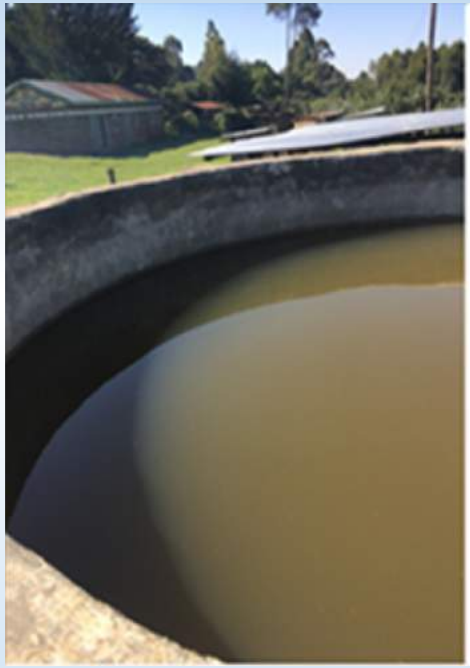
Project: Milk collection points (MCPs)

MCPs are necessary for fast grading and collection of raw milk by combining the use of farmer graders and peer pressure.

Project: Only proper milk cans, no jerry cans

A stubborn practice that is difficult to change

Project: Use of clean water, e.g. for can washing



But…rural conditions present challenges…

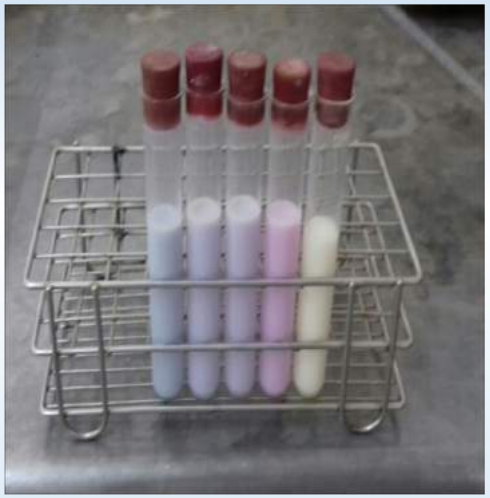
Project: Instant chilling combined with cooler

Economical option: use of same compressor(s)

Project: Training farmers, graders & handlers

Project: Sampling regime in a QBMPS



1. Raw milk needs to pass first all acceptance tests
2. Accepted milk is bulked in a cooling tank and can samples are taken for analysis to HC Lab to define QBMPS payment mode
   - Cans are tested twice/month
   - Analysis results are shared end of month with the Coop

Project: QBMPS Parameters at HC lab

1. Total bacterial count; TBC/TPC
2. Presence of antibiotic residues
3. Adulteration / freezing point
4. Total solids (incl. fat, protein, lactose and ash)
5. Somatic cell count (started 2018)
6. Aflatoxin M1 (started 2018)

Cans that pass these parameters receive a bonus

HC Project: Track and Trace and IT program

Olenguruone Dairy Farmers Co-Op Society LABORATORY reference to the sampling Plan and Procedures

LABORATORY REPORT

Serial Number: **GTLJ - 287**

Date Generated: 03-Sep-2017

QBMPS Report from 01-Aug-2017 to 31-Aug-2017

No	Sample	TPC_Count_(cfu/ml)	Total_Solids (InfraRed)	Freezing_Point_Depression (InfraRed)	Z_Value (DELVO SPNT)	Lactoscope_Comments	Bacterial_Comments	Delvo_Comments
5.	021OLE	2,375,000	12.28	512.60	-12.68	Above Limit	GRADE B	Negative
6.	022OLE	4,850,000	12.19	514.75	-12.68	Above Limit	GRADE B	Negative
7.	023OLE	10,900,000	12.07	510.90	-12.53	Above Limit	GRADE C	Negative
12.	043OLE	1,625,000	12.50	515.25	-14.46	Above Limit	GRADE A	Negative

A computer program was developed to link:

1) Individual farmers to a certain milk can or MCP
2) Random testing of cans on quality parameters (at HC lab)
3) Payment to farmers include quality results (feedback to coop)

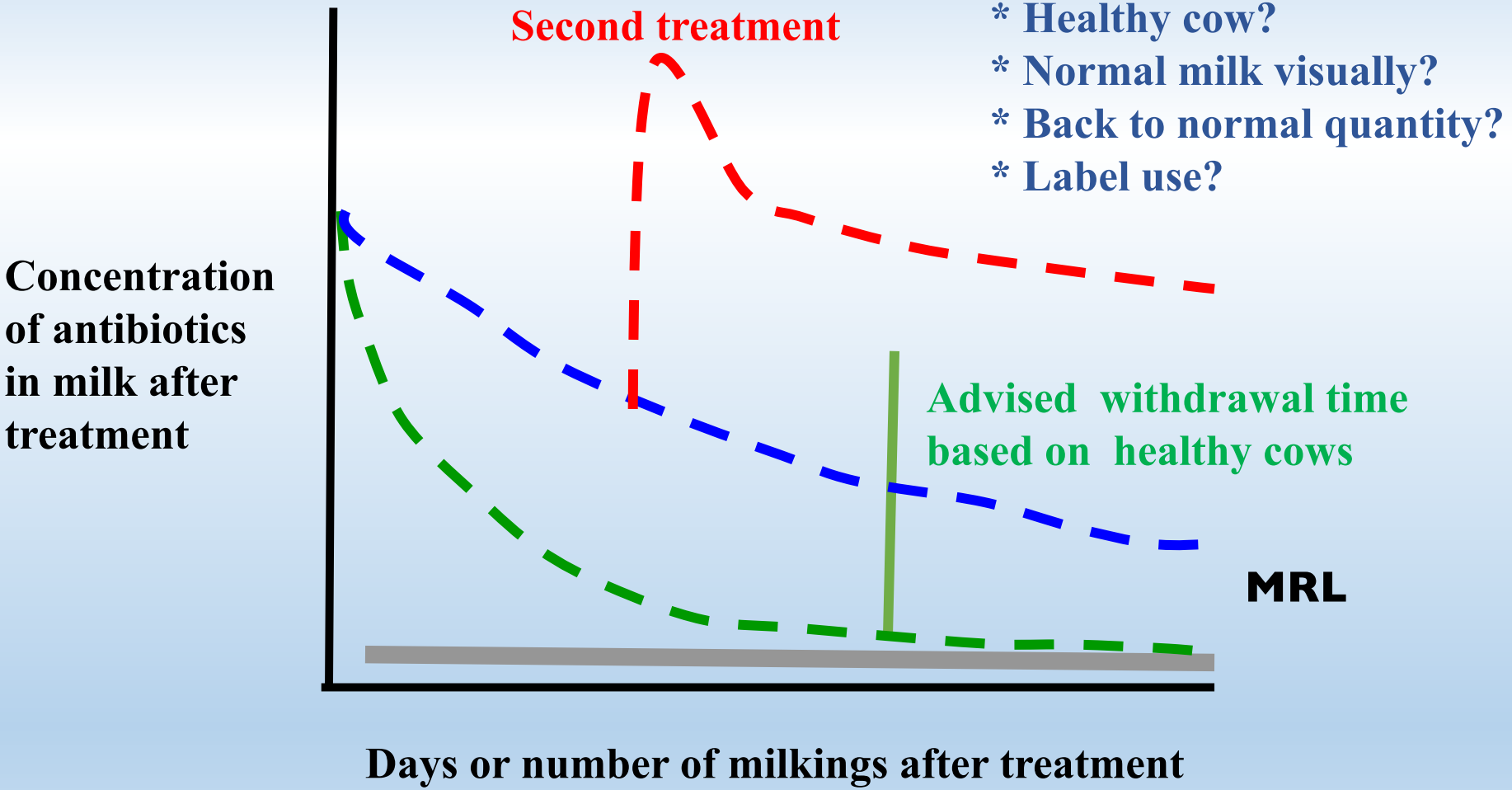
HC Project: HC parameters and payment

Test	TPC Grade A	TPC Grade B	TPC Grade C	Antibiotics	Adulteration	Total solids
% score	+50	0	-50	+15	+20	+15

GRADE	% PAYMENT RANGES	PAYMENT	AMOUNT (KSH)
A	70-100	Premium	+2
B	40-69	Standards	+1
C	<40	Penalty	0

It is difficult to have in Kenya a price neutral payment system (where penalties raised are used to pay for bonuses) since farmers switch easily to another buyer.

General: Antibiotics and withdrawal period, even when adhered to, often not enough



General: Aflatoxin (M1) & Somatic Cell Count SCC)

M1 MRL (bulk milk):

- EU = 0.050 ppb
- Codex/USA/KE: 0.5 ppb
- HC so-far: < 0.4 ppb

SCC Max (per can):

- KE/EAS: 300,000 per ml
- EU: 400,000 per ml
- USA: 750,000 per ml (changed?)
- HC so-far: < 270,000 per ml

General: QBMPS financial and health benefits for private and public good

See 3R presentation, but:

General:

- Export/trade market expanded
- Prolonged product shelf life
- Improved product quality
- Guaranteed food safety for better health

Processors: Reduced processing costs and losses (<market returns)

Farmers:

- Improved income through bonus and reduced losses (<rejection)
- Payment based on composition (fat & protein) thus encouraging proper breeding with higher TS per liter

Project: Main achievements

1) Pilot project has put QBMP high on agenda e.g. in Strategic Plans of KDB & KDPAs.
2) Many forums agreed that Kenya cannot afford paying only for milk volumes due to a range of reasons.
3) Total Solids and Adulteration are within standards. But incidences of AB residues are very high and TPC very much above standards. But, AB testing can have false positives and still being inhibitory.
4) HC dairy laboratory attained KENAS accreditation on ISO/IEC 17025:2005, prompted by QBMP to produce credible results.
5) HC-QBMP manual is complete and HC-IT program has been enhanced e.g. to cater for outside services (KDB?).

Matters that hampered progress

Project implementation

- Can ownership: compromised during transport, reducing chances for farmers to access bonus
- T&T per can and 4 QBMP parameters at HC lab: tedious and expensive
- Bonus for farmers: no incentives for transporters & coop management
- Problematic: availability of clean water and fast cooling equipment
- Hardly applied: use of MCPs, timely delivery and separation of milk

"Un-level Playing Field"

- KDB presence not well being felt in enforcing dairy regulations
- Processors not well proactive about quality and accept any milk
- Informal market undercutting unfairly on quality and price

Practices for scaling-up a QBMPS

- Availability clean water, electricity, alu/ss cans
- Time phased collection completed by 10.00 am
- Sizable & effective sampling for T&T: >150 ltr
- Coop lab: a) per can use of milk analyzers for fat/density & rejection tests, b) per cooling tank testing on AB residues
- HC lab: a) testing Lacto-Scope (infra-red), Gerber fat, AB scanning, SCC counter, Aflatoxin M1, etc. b) calibrating milk analyzers
- HC lab: Bonus for best preforming MCP on TPC, but conditional that cooperative uses milk analyzers effectively (rejection).
- Support from KDB and County reps are essential in enforcing dairy regulations (e.g. only licensed vendors procuring from coops)

Taste Happiness!

Food safety has no boundaries!!!

Thanks for listening