

Bacterial risk assessment in informally produced milk consumption in Côte d'Ivoire

S.M. Kouamé-Sina, B.A. Yobouet, A. Dadié, K. Makita, D.Grace, M.Dje & B. Bonfoh



Introduction

❖ Food-borne disease is an important public health and economic problem but in D.C. (Côte d'Ivoire), it is difficult to obtain accurate estimates of the incidence

(WHO, 2002).

❖ Milk & milk products contain *L. monocytogenes*, *E. coli*, *Salmonella*, *S. aureus*

(Johnson et al., 1990).

❖ The local dairy production chain is **totally informal** (Abidjan) and producers & vendors contribute to dissemination and multiplication of pathogens.

❖ Some consumers believe that raw milk products are better quality than pasteurized dairy products (cultural, food, taste & economic reasons)=> **zoonoses**

(Hegarty et al., 2002; Desenclos et al., 1996, Headrick et al., 1997)

❖ Risk to human health linked to unpasteurized milk ingestion should not be underestimated.

❖ **What is the risk linked to ingestion of raw milk contaminated by this group of pathogens (*S. aureus*, *E. coli*, *Enterococcus*) in Abidjan?**

Material and methods

❖ **Study area:** Data collection was conducted from Oct 2008 to Dec 2010 in 5 sites

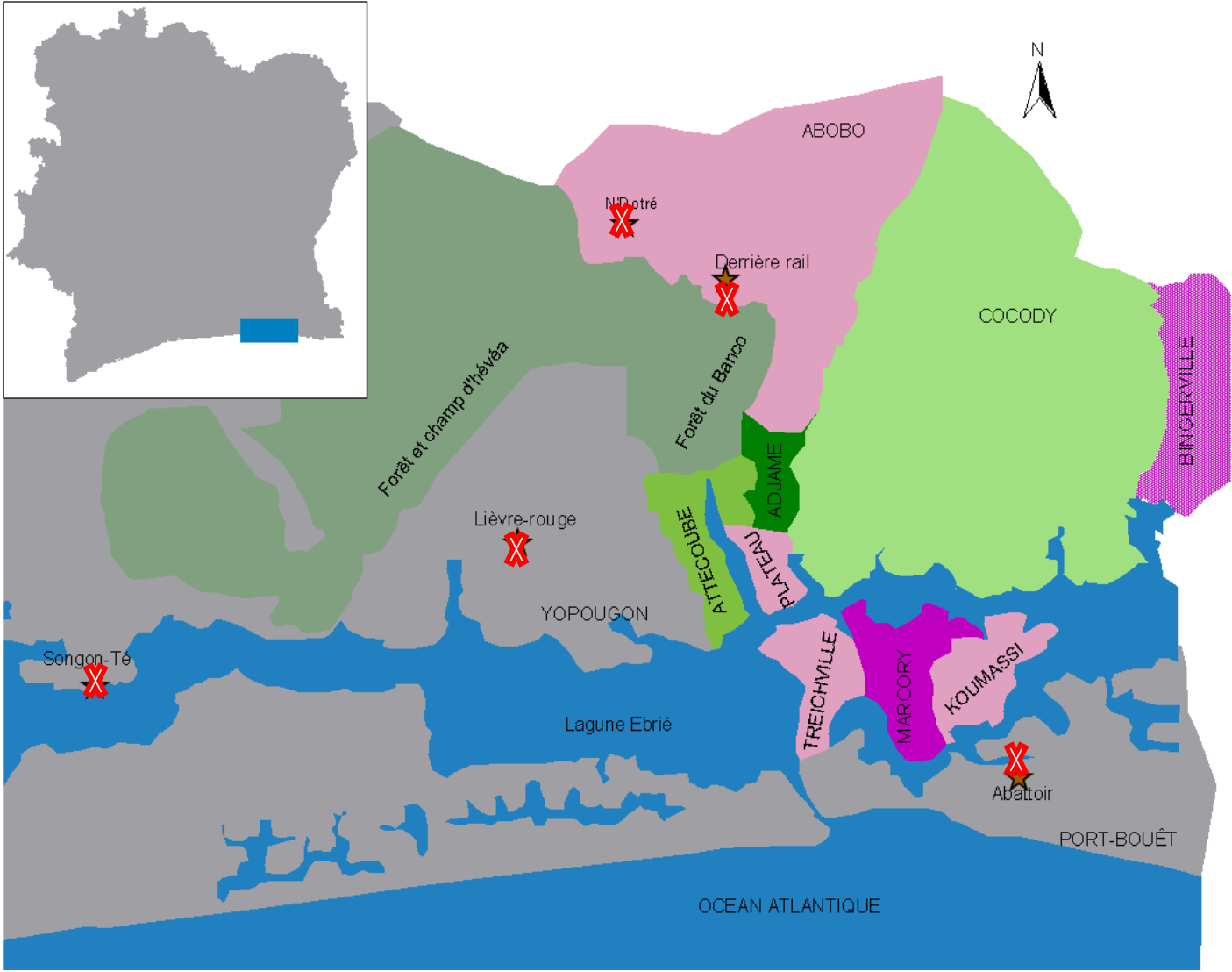


Fig. 1: Study area.

Con't

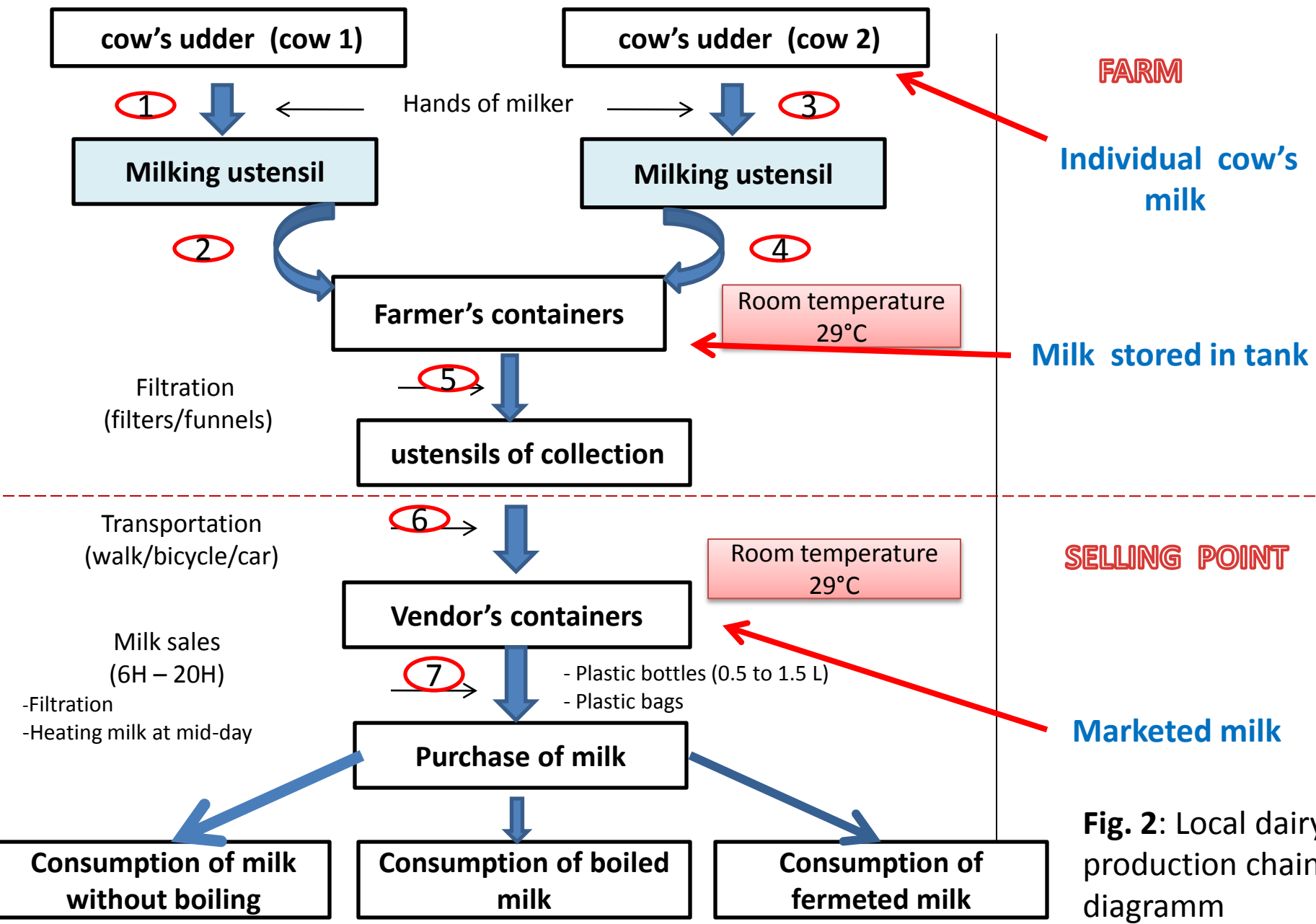
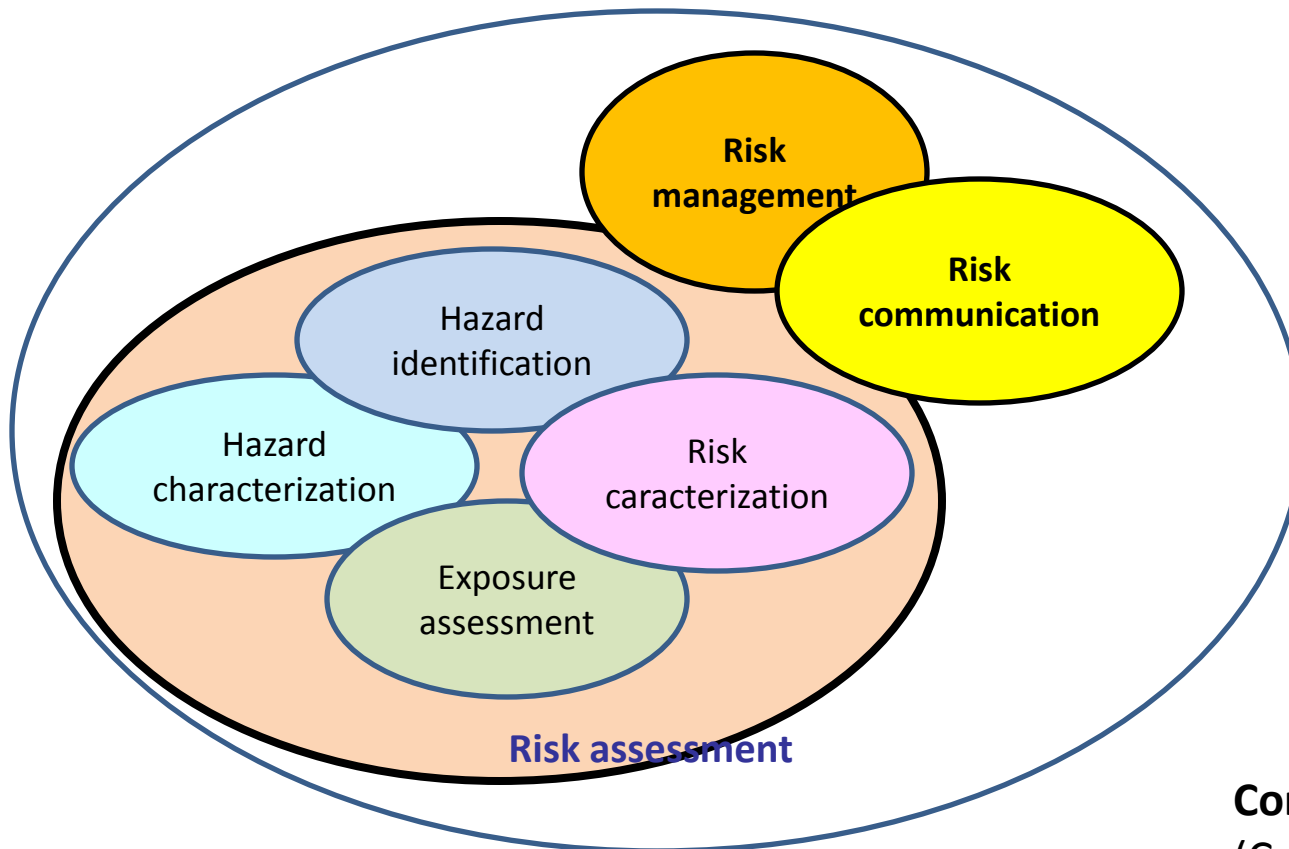


Fig. 2: Local dairy production chain diagramm

Con't

- ❖ **Before laboratory analysis:** A questionnaire and focus groups
- ❖ **Bacterial enumeration:** Total Coliforms, *E. coli* (AFNOR NF V 08-017), *S. aureus* (AFNOR NF V 08-057), fecal *Enterococci* (SFM,2000).



Components of risk analysis
(Codex Alimentarius , 2007)

Results

❖ Critical points and presence of raw milk contaminants

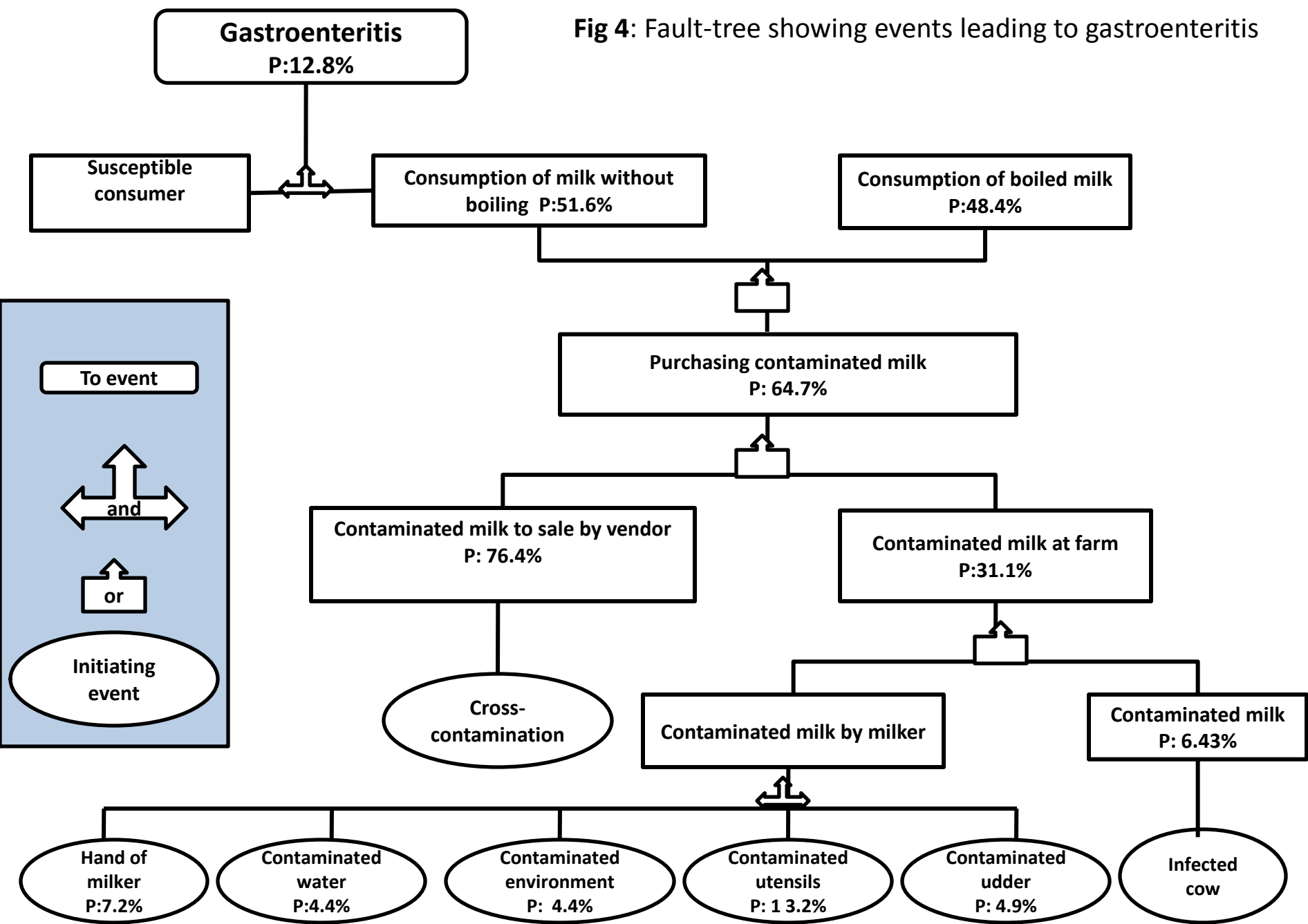
Table I: Prevalence of microbial contaminants at different critical points

	<i>Coliforms</i>	<i>E. coli</i>	<i>S. aureus</i>	<i>Enterococcus</i>
Milk from cow's udder	27/118 (22.8%)	10/118 (8.4%)	8/118 (6.7%)	5/118 (4.2%)
Milk stored in tank	12/15 (80.0%)	6/15 (40.0%)	3/15 (20.0%)	5/15 (33.3%)
Marketed milk	16/17 (94.1%)	12/17 (70.5%)	3/17 (17.6%)	10/17 (58.8%)

Table 2: Geometric mean of germs of contamination

	Milk from cow's udder (cfu/ml)	Milk stored in tank (cfu/ml)	Marketed milk (cfu/ml)
<i>Coliforms</i>	8.7x10 ³	3.2x10 ⁵	9.9x10⁵
<i>E. coli</i>	5.5x10²	1.5x10 ³	1.0x10 ⁵
<i>S. aureus</i>	2.1x10 ³	7.1x10 ³	1.7x10 ⁴
<i>Enterococcus</i>	6.7x10 ²	3.1x10 ³	3.1x10 ⁴

Fig 4: Fault-tree showing events leading to gastroenteritis



Results con't

❖ Milk value chain

Quantity of raw milk available per day is 1050 L in Abidjan :
59.4% in urban and 40.6% in the peri-urban areas.

❖ Quantity of rejected milk (2073/2005/EC)

=> **679 liters /day** ⇔ 247,963 liters/year are to be rejected

=>The estimated potential loss is 673€/day (studied zone)

⇔ a loss of **6.40 €/day/producer** (min: 2.60 €; max: 19.22 €)

❖ Probability of contaminated milk ingestion

33% ==> 693 consumers/day ingest contaminated raw milk

❖ Mode of consumption

- Daily consumption was 28.2% with an average of 0.5 liters / day / person.
- Estimated Number of consumers per day is **2,100**

Results con't

❖ Characteristics of population at risk (consumers)

- Mean age was 35 ± 13.8 years (min = 16, max = 90)
- 23.9% did not go to school
- Dominant sex was male (79.3%)
- The majority was Muslim (96.3%)

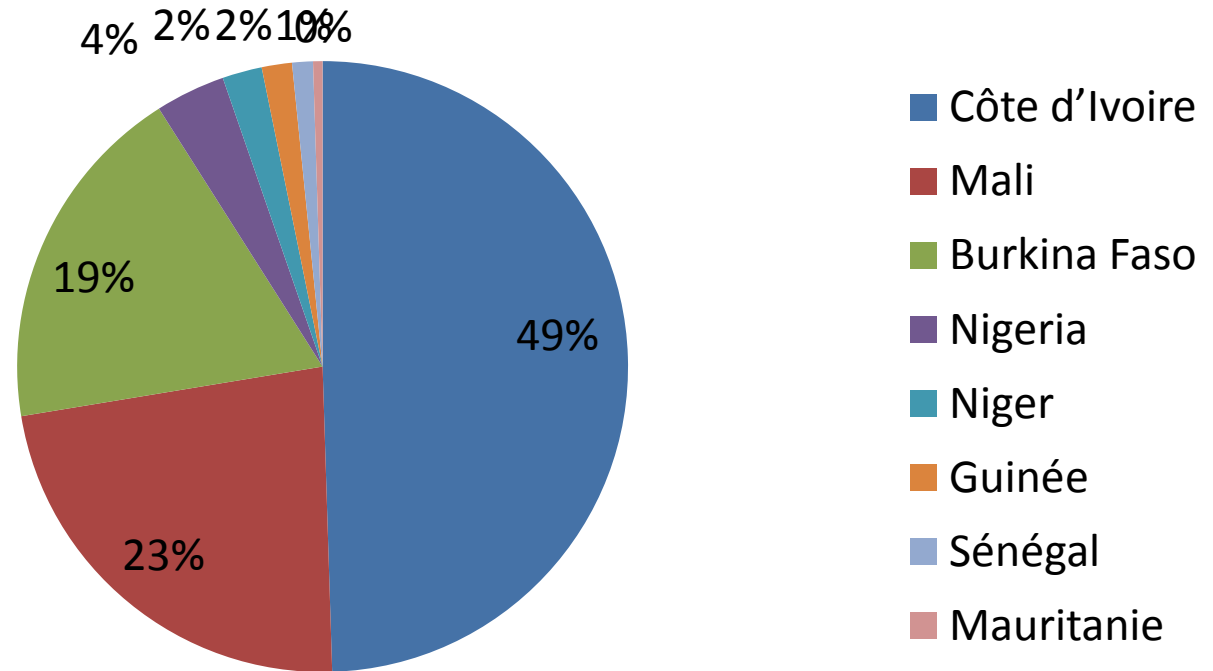
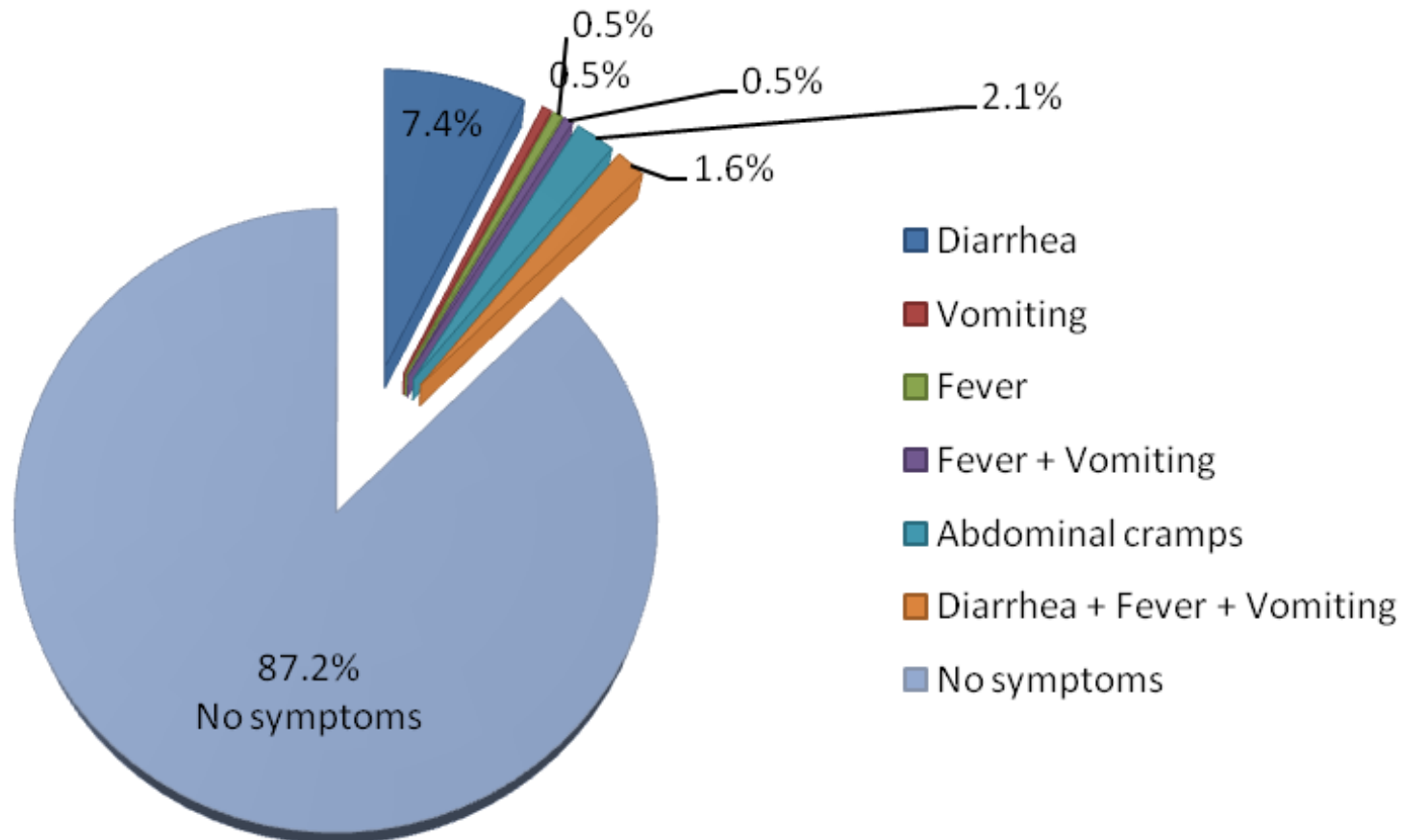


Fig 5: Nationality of consumers

Results con't

❖ Risk of gastroenteritis

- 12.8% of consumers have been **ill** after raw milk consumption.
- 268 of milk consumers could contract a gastroenteritis per day (Abidjan).
- The occurrence of **gastroenteritis** was significantly related to milk processing (not heated or fermented) ($P < 0.05$) $RR = 2.81$



Conclusion

- ❖ The milk taken from cow's udder is good quality, but this quality alters quickly when samples are mixed for selling.
 - ❖ This milk contains different species of pathogens to be taken into account globally in risk analysis process.
 - ❖ Fermentation using Bifidobacteria isolated from dairy production chain in Abidjan (Kouamé-Sina et al., 2011), is a good way to reduce initial bacterial load of milk.
- That which must be coupled with measures adequate hygiene related to cleanliness of animals and their environment as well as sanitation of the milking process (milker's hands, milking utensils).

Knowlegments

giz

ILRI
International Livestock Research Institute

CSRS
Centre Suisse de Recherches
Scientifiques en Côte d'Ivoire

