



# **PRODUCTION OF PROTEIN BIOMASS FROM WHEY FOR ANIMAL FEED SUPPLEMENTATION**

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# RESEARCH RATIONALE

- Whey is the nutritious, protein-rich liquid expelled from curds during cheese making
- Only 3-5% of whey produced is returned into processing as raw material for other food products
- Some is sold or donated to pig farmers
- The high % of disposed whey and the modes of disposal can have environmental consequences



*Whey dumped  
in a river and  
on land*

# RESEARCH AIM

Whey can be utilized in environmental-friendly and efficient ways through conversion into valuable food products or animal feed.

**This MSc project studies the potential applications of whey in animal feeds**

Focus: producing a **protein-enhanced biomass for feed supplementation**, specifically the amino-acid *lysine*.

**Triple-win:** Enhancement of animal nutrition while increasing dairy revenues and reducing waste



# WHY WHEY?

**Nutritious:** Whey contains valuable nutrients - about 50% of the original nutrients in milk.

**Large volumes:** Global whey production is around 180- 190 million tonnes per year.

**Growth:** Whey production will increase with the increasing global consumption of cheese.

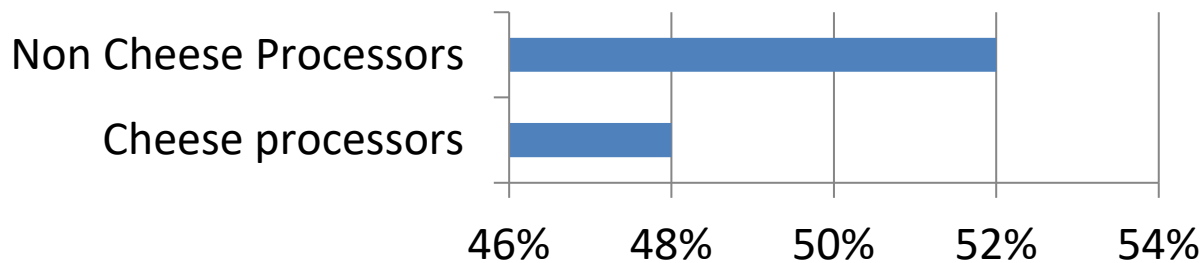




## POTENTIAL FOR WHEY PRODUCT DEVELOPMENT IN KENYA

- Nutritional quality of whey
- Functional properties of whey protein
- Market opportunities
- Advanced processing technologies exist
- Shift from linear production models to circular models
- Address knowledge gaps in dairy sidestream valorization

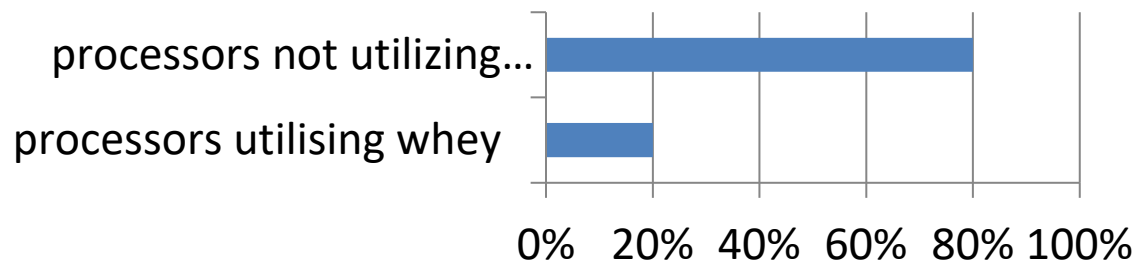
# Whey production, usage and disposal in Kenya



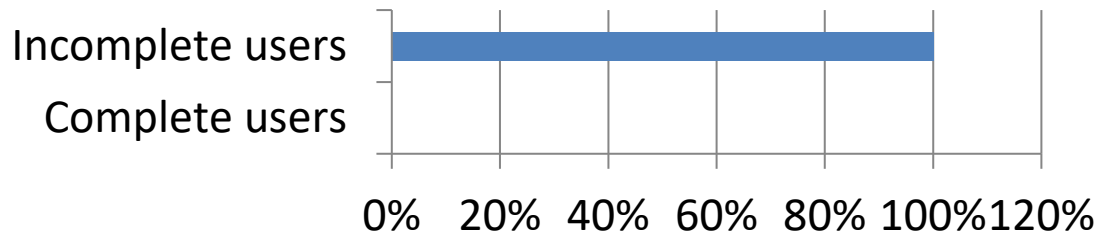
*Source: preliminary results from VALORISE survey of dairy processors in Kenya, 2022-2023*

The number of cheese processors and scale of cheese production is expected to grow with the rising consumer demand - food service and retail

# Whey utilization by processors

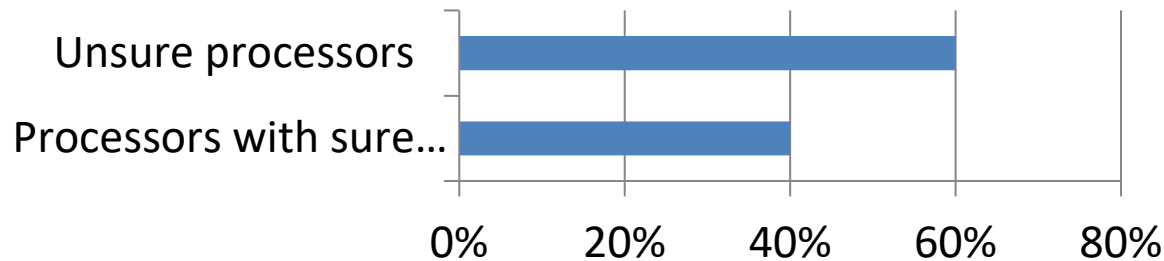


## a. Processors utilizing whey



Source: preliminary results from VALORISE survey of dairy processors in Kenya, 2022-2023

## b. Processors not utilizing whey



- 40% of the processors who have **unutilized whey** are sure that their whey will be used on their own farms or collected by pig and cattle farmers.
- 60% are unsure if the whey will be collected or not, **hence end up disposing it as waste whey if not collected**

**There is need to develop attractive alternatives to disposing of whey as waste**



# LAB RESEARCH ON WHEY QUALITY AND VALORIZATION

**Sampling** of whey from 8 dairy processors in Kenya producing different kinds of cheese

## Analyses performed

- Characterization of the **physio-chemical composition** of whey
- Determine the **nutritive value** of the microbial biomass produced from the whey through the “**sequential lactose fermentation**” technique



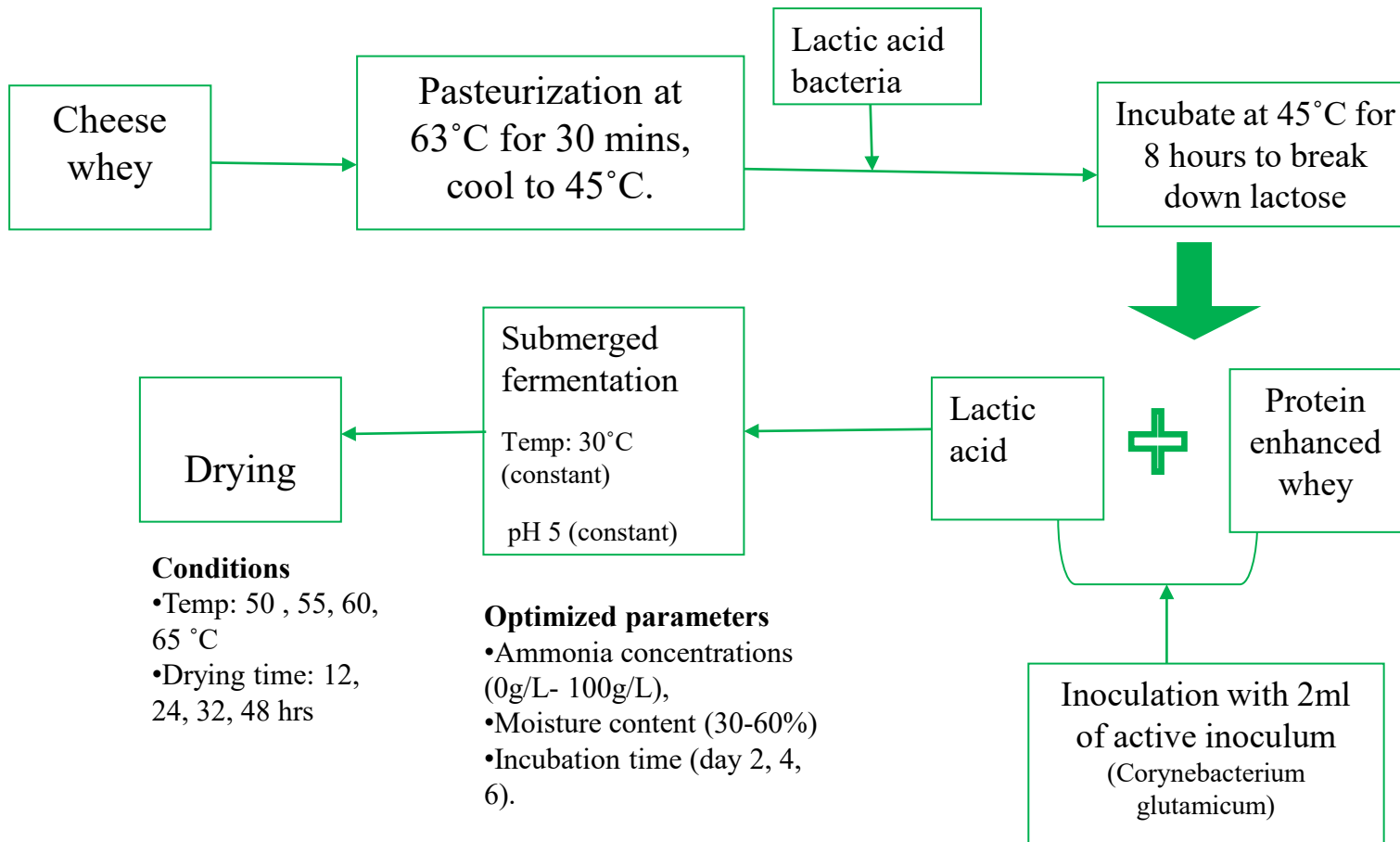
# PRELIMINARY RESULTS

## (1) Characterization of physio-chemical composition (results from 8 processing plants)

Parameter	Percent (range) (wet weight)	Method #
Chloride content	<b>0.06 – 0.08</b>	32.034
Total solids	<b>5.57 – 5.86</b>	15.114
Crude protein	<b>0.80 – 0.84</b>	978.04
Fat content	<b>0.12 – 0.30</b>	930.09
Lactose content	<b>3.60 – 4.00</b>	Fehling's test
Ash content	<b>0.76 – 0.84</b>	930.05
Moisture content	<b>92.36 – 94.86</b>	967.19

Notes: Pasteurized sample. Reference: AOAC, 2005

## (2) Sequential lactose fermentation by *Lactobacillus plantarum* and *Corynebacterium glutamicum*



# NEXT STEPS

- Last round of sampling
- Determine the **microbiological quality, nutritional value, and safety** of the whey-based biomass (after fermentation)
  - Total Plate Count, Coliform Count, etc.
  - Yeast and Molds
  - Nutritional quality
- Evaluate potential of whey for producing protein-enhanced feed additives



THANK YOU  
FOR  
LISTENING



“Whey, the future nutritional  
powerhouse”