Microbial Safety and Drying Efficiency of Solar-Dried Silver Cyprinid (Omena) at Dunga Beach, Lake Victoria, Kenya.

Bonventure Mwangale [1], Sæmundur Elíasson [2], Margrét Geirsdottir [2]
[1] Kenya Fisheries Service, Kenya, [2] Matis, Iceland
Email: bonventuremwangale@gmail.com

Introduction

Silver cyprinid *(Rastrineobola argentea)* dominates Lake Victoria fisheries, contributing over 60% of catches. Despite its high nutritional and economic value, poor processing, social stigma, quality concerns, and inadequate drying contribute to significant post-harvest losses and diversion into animal feed. Improved handling and standards compliance could enhance food security and livelihoods in the region.

Problem statement

Despite high landing volumes, silver cyprinid has low market value due to post-harvest losses from traditional sun drying, reaching 20-50% during rainy seasons due to spoilage, contamination, and pest infestation. Inadequate drying promotes microbial and fungal growth, posing health risks and reducing marketability. This study assesses microbial safety and drying efficiency of different sun-drying techniques to identify the most practical, safe, and efficient method and inform recommendations for the fisheries sector and value chain actors.

Objectives

- To evaluate the effects of temperature and relative humidity on drying performance (drying rate and moisture content) of silver cyprinid using solar tent and traditional open sun-drying methods.
- To compare microbial safety of silver cyprinid dried using solar tent and open sun-drying, focusing on total viable counts and coliforms.
- To assess sensory quality attributes of silver cyprinid produced using both drying methods.

Methodology

- Temperature and relative humidity were recorded on digital loggers. Samples were weighed morning and evening.

Methodology (cont.)

- Sensory evaluation conducted on dried samples by laboratory panellists.
- Lab analyses on samples included microbial and moisture content.

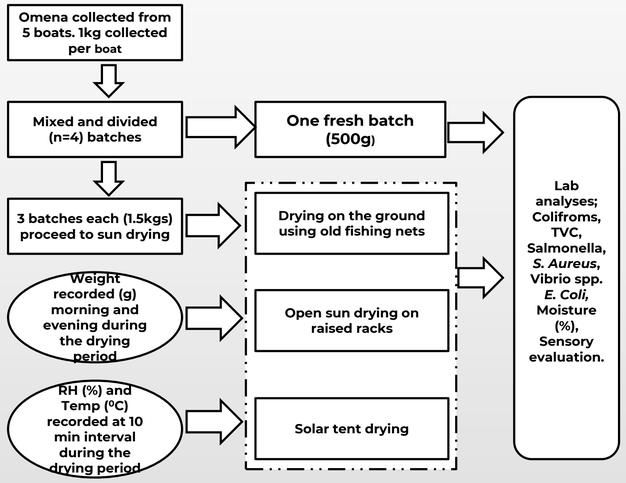

Figure 1. Experimental design

Results

Table 1. Moisture (%) of Silver cyprinid processed under different methods

Treatment	Moisture content (%)	Maximum allowable limit (%)
Fresh sample	76.1	Not specified
Ground drying	5.4	12
Raised rack drying	6.4	
Solar tent drying	4.3	

Table 2. Drying rates (g/h)of Silver cyprinid processed under different methods

Day	Ground drying (g/h)	Raised rack drying (g/h)	Solar tent drying (g/h)
1	138.6	137.7	142.8
2	5.6	5.7	10
3	0.6	0.3	
4	0.5	0.3	

Results

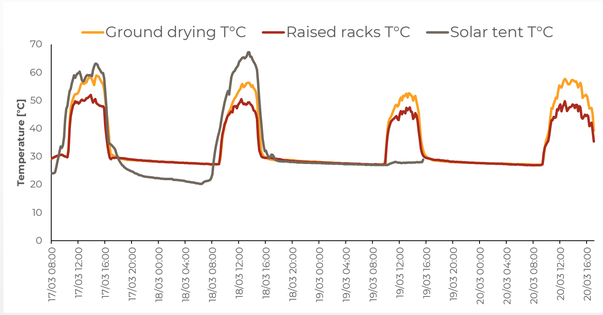

Figure 2. Temperature profiles of different drying methods

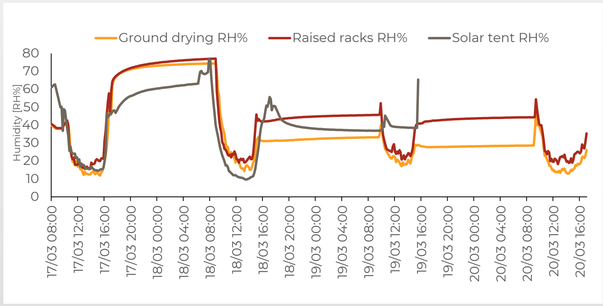

Figure 3. RH (%) profiles of different drying methods

Table 3. Total bacterial counts of fresh dried Silver cyprinid

Variable	Fresh sample	Ground drying	Raised rack drying	Solar tent drying	Maximum allowable limit
Salmonella	Nil	Nil	Nil	Nil	Absent
E.coli (cfu/g)	47	45	37	Nil	Absent
S. aureus (cfu/g)	Nil	Nil	Nil	Nil	3
TVC Log $_{10}$ (cfu/g)	6.2	5.1	5.0	4.9	5
Vibrio spp.	Nil	Nil	Nil	Nil	Absent

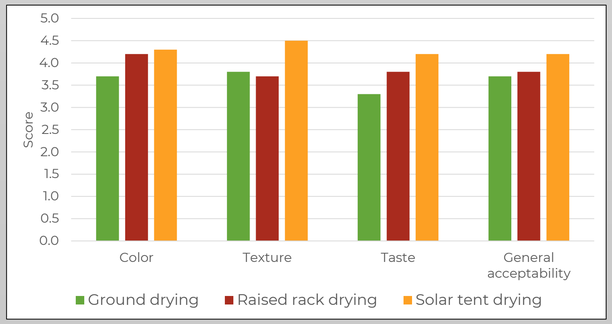

Figure 4. Sensory attributes evaluation of Silver cyprinid processed under different methods

Conclusion

- Solar tent drying proved superior to ground and raised rack sun drying for processing silver cyprinid.
- Solar tent drying achieved greater moisture reduction, although all methods reached acceptable mosture limits.
- Solar tent dried samples produced the lowest microbial loads, including non-detectable *E. coli*, indicating enhanced food safety.
- Findings align with earlier solar dryer studies, reinforcing the value of controlled drying in humid environments.
- Overall, results highlight solar tent drying as a practical solution for improving drying efficiency and food safety, while reducing contamination and weather-related risks, and quality deterioration.

Recommendations

- Promote solar tent drying through training, financing, and inclusion in post-harvest loss reduction strategies.
- Conduct economic comparisons between solar tent and traditional sun drying, focusing on pricing, shelf life, income and return on investment.
- Conduct nutritional assessments across processing methods (open sun drying, solar tent and deep fried products).
- Use intergrated evidence to inform policy, improve food safety, and strengthen livelihoods.

Acknowledgements

KENYA FISHERIES SERVICE