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Improving Livelihoods by increasing the shelflife of 'wagashi', a West African soft cheese using *Xylopia aethipica*, boiling and brine

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Introduction Fulani herdsmen manage most of the cattle herds in Ghana. As part of their remuneration, the herdsmen milk the cows for domestic consumption and sale. Wives of the Fulani herdsmen often convert the surplus milk into *wagashi* (a soft cheese) using the vegetable rennet extract of *Calotropis procera*. The *wagashi* is produced daily and stored till sold to market agents who visit on weekly market days. The cheese is then transported and sold in the urban areas where there is the market for such a product, particularly among people of Northern Ghana, Burkina Faso and Niger origin. In between production and sale, the women boil and sun dry the *wagashi* daily to prevent spoilage within three days if not treated. The boiling reduces the quality of the cheese as well as the process being hard work for the women. The development of a simple technology to help prolong the shelf life of the cheese would help improve the livelihoods of the *wagashi* producers as well as improve on income of processors and market agents. The use of local herbs *Xylopia aethiopica* and *Piper nigrum* and salt were investigated to test their potency in prolonging the shelf life of the *wagashi*.

Materials and Methods The *wagashi* was prepared by using extract of the stem *Calotropis procera*. 100 g of macerated the stem was weighed into a clean beaker and 500ml of fresh, strained milk added and stirred to effect the extraction of sap. The solution was allowed to stand for at 10 minutes and filtration was carried out by means of cheesecloth and the filtrate saved as a stock solution for milk coagulation. Six litres of fresh milk was measured into an aluminium cook pot, similar to that used by Fulani women processors, and slowly heated to a temperature of 55^{0}C when 300ml of the stock solution was added. The milk was further heated till 70^{0}C when the heat was lowered. Coagulation was attained within 20 minutes of applying heat. The heat was sustained for some 10 minutes to allow for further separation of whey and curd. The heat source was switched off and the whey collected and the curds scooped into perforated calabashes (12 holes per calabash) lined with cheesecloth. The *wagashi* was allowed to settle in the calabash and after an hour turned over. Five treatment regimes were applied as follows: Three brine solutions, comprising 5[5%], 10[10%] and 15[15%] (w/w) was made. 20 g of *Xylopia aethiopia* and 40 g *Piper nigrum* [Xylopia] were blended and added to a litre of fresh clean water. The extract was sieved and cleared of seed and contaminants. A one-kilogram sample of the cheese was weighed and submerged in four solutions and left to stand overnight, after which the cheese was removed. The fifth treatment [Boiled] was stored at room temperature overnight without soaking but was boiled for 20 min on alternate days and dried at room temperature. Dry matter of the samples was determined by weighing 1 g sample of the cheese and placing it in an oven at 105^{0}C overnight 24 hours after preparation, Coliform count of each treatment was determined by procedures outlined by Prescott *et al.*, 1996. A sterile preparation of 99ml of peptone water was made in a 100ml flat bottom flash. A wagashi specimen was macerated and mixed thoroughly and 11g of the mixed specimen was aseptically weighted and transferred into the 99ml of the sterile peptone. Serial dilutions of 10^{-1}, 10^{-2}, 10^{-3} and 10^{-4} were prepared. Plating was done by the pouring method. The samples were incubated for 24 hours at 37^{0}C. Coliform colonies were counted using a digital colony counter and the values recorded. The brine treatments were soaked over at days 3, and 7 and DM and coliform counts determined. The data were analysed as a Randomised complete block design with three replicate blocks. Log-transformed coliform count per gram was used for statistical analysis.

Results The results of the treatments on wagashi over twelve days are shown in Table 1. Treatment did not affect the moisture content of wagashi, but moisture content was significantly ($P<0.001$) reduced by 12 days in storage. There was no difference in moisture content of the Day 1 and Day 8 wagashi, suggesting that the physical form of the product had not changed for a week, which was enough time to transport the product to the consumer. The reduction in the moisture content of the brine treated wagashi with time is indicative of the dehydrating property of high concentrations fo salt (Prescott *et al.*, 1996). Treatment and days in storage both had a significant ($P<0.001$) effect on the log-transformed coliform count. The results showed that 15% and 10% brine treated wagashi had log-transformed coliform counts of 3.72 and 4.47 compared to 6.12 (Boiled) and 5.51 (Xylopia) treated. The reduction in the log-transformed coliform counts with time may be due to the inhibition of lactic acid bacteria as well as spoilage microorganisms (O'Connor, 1994).

Table 1 Treatmem effects on shelf life of wagashi

	Days stored				
	1	4	8	12	s.e.m
DM, %	59.1	54.8	53.6	47.0	1.86
ln(Coliform count)	5.76	4.68	5.11	5.24	0.009

Conclusions Wagashi production is primarily a means to preserve surplus milk produced and *Xylopia aethiopica* and *Piper nigrum* herbs had limited impact in preservation. However, 10 and 15% brine concentrations significantly improved shelf live up to 12 days compared to only 3 days in obtained in the traditional system of preservation.

References

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