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African food tradition revisited by research

Characterization of traditional processing of kitoza, a salted/dried/smoked meat product from Madagascar

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itoza is a meat product made from strips of beef but also pork meat, very popular in Madagascar

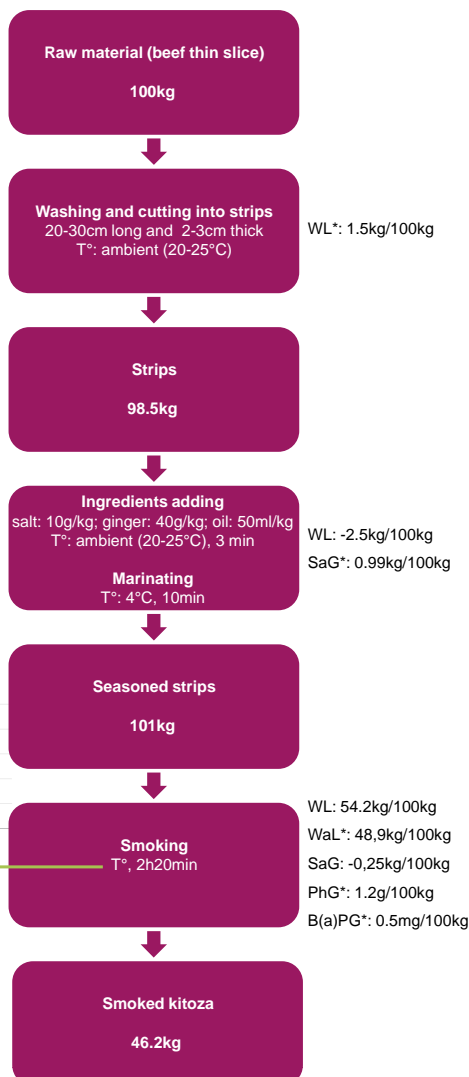
It is produced at familial and artisanal (butchers and a few small firms) levels. Meat strips are salted, sun-dried and/or smoked either above the fire in the kitchen until their consumption, or in smoking units (metal drums or brick built ones). This study describes the process for making smoked beef kitoza in order to define better the unit operations involved and their impact on product quality.



Methodology

The kitoza making process of an artisanal producer (butcher) of Antananarivo was characterized by a systematic description of the different steps and parameters recording (temperatures, time, meat and ingredients weights). Sampling was undertaken at identified critical production steps in order to determine kinetic evolution of physico-chemical and microbiological characteristics of the product during the process. Mass transfers were thus calculated.

Results



*WL: weight loss, Wa: water loss, SaG: salt gain, PhG: phenol gain, B(a)PG: B(a)P gain

	Raw material	Strips	Seasoned strips	Smoked kitoza
Lipids (g/100g)	2.2±0.8 ^a	ND	ND	7.0±0.5 ^b
Proteins (g/100g)	23.5±1.6 ^a	ND	ND	33.1±2.0 ^b
Water (g/100g)	76.1±0.6 ^a	74.8±0.4 ^a	74.3±0.7 ^a	55.6±1.8 ^b
Salt (g/100g)	ND	ND	0.99±0.04 ^a	1.61±0.14 ^b
Aw	0.990±0.001 ^a	0.989±0.001 ^a	0.984±0.003 ^b	0.968±0.003 ^c
Phenols (mg/100g)	ND	ND	ND	2.59±0.39
B(a)P (µg/kg)	ND	ND	ND	11.23±1.63
TAMF (log cfu/g)	5.8±0.0 ^a	5.1±0.0 ^b	5.8±0.1 ^a	2.4±0.1 ^c
LAB (log cfu/g)	5.5±0.1 ^a	5.2±0.3 ^a	5.5±0.2 ^a	2.2±0.2 ^b
E. coli (log cfu/g)	1.3±0.6 ^a	<1 ^a	<1 ^a	<1 ^a
Salmonella	Absent	Absent	Absent	Absent

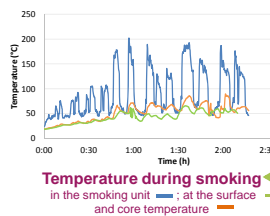
n=3 samples. The intervals shown are standard deviation. Within one line, different letters show significant difference at 95%. ND: not determined. TAMF: Total Aerobic Mesophilic Bacteria. LAB: Lactic Acid Bacteria.

The temperature inside the smoking unit (next to the meat strips, 1m20 above the fire) were most of the times between 50 and 100°C the first 45min of smoking and then between 50 and 200°C. Sudden increases of temperature were due to high combustion of wood and decreases to the opening of the door of the smoking unit by the operator. On the surface of the meat it increases to 45°C the first 45min and then reaches up to 90°C. Maximum internal temperature is about 65°C.

Smoked kitoza making process allows decrease of meat water content particularly during smoking. Salt content increases due to dry salting and due to its concentration because of water loss during smoking. Thus, Aw decreases during dry salting and smoking to reach 0.968 ± 0.003. Smoked kitoza is thus classified in the area of foods with high content water contrary to most of Biltongs (8-44% water, 0.60-0.84 aw¹).

The smoking step allows the combination of unit operations of drying, cooking and smoking. Phenol content of Kitoza is lower compared to Boucané (3.0-7.1 mg/100g)² but higher than for Kundi (0.5-1.4 mg/100g)³ which are respectively pork and beef smoked products from Réunion and Nigeria. But smoking leads to levels of B(a)P higher than French regulation (5µg/kg ; 2µg/kg in 2014).

Considering microbiological parameters, total flora, lactic acid bacteria and E. coli decrease during smoking. Salmonella was not detected in any of the samples.



References

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