

		Sub-value chain			
		Fresh root	Gari	Agbelima	Kokonte
On-farm	Causes of losses	<ul style="list-style-type: none"> <li>• Pests attack (grasscutter, rats and termites)</li> <li>• Diseases</li> <li>• Excessive rains/floods</li> <li>• Excessive heat</li> <li>• Bush fires</li> <li>• Delays in harvesting</li> <li>• Lack of proper storage facilities</li> </ul>	<ul style="list-style-type: none"> <li>• Pests attack (grasscutter, rats and termites)</li> <li>• Diseases</li> <li>• Excessive rains/floods</li> <li>• Excessive heat</li> <li>• Bush fires</li> <li>• Delays in harvesting</li> </ul>	<ul style="list-style-type: none"> <li>• Pests attack (grasscutter, rats and termites)</li> <li>• Diseases</li> <li>• Excessive rains/floods</li> <li>• Excessive heat</li> <li>• Bush fires</li> <li>• Delays in harvesting</li> </ul>	<ul style="list-style-type: none"> <li>• Pests attack (grasscutter, rats and termites)</li> <li>• Diseases</li> <li>• Excessive rains/floods</li> <li>• Excessive heat</li> <li>• Bush fires</li> <li>• Delays in harvesting</li> <li>• Lack of proper storage facilities</li> <li>• Kokonte infested with weevils when stored for very long period</li> </ul>
	Mitigation measures	<ul style="list-style-type: none"> <li>• Root usually harvested by the buyer with no need to store them</li> <li>• Root for own-consumption harvested when needed</li> <li>• Planned planting spreading over the time</li> <li>• Proper planting method (e.g. on ridges)</li> <li>• Careful harvesting</li> <li>• Harvesting mainly on demand</li> <li>• Harvesting preferably with wet soil</li> <li>• Delayed harvest if</li> </ul>	<ul style="list-style-type: none"> <li>• Root harvested by the buyer with no need to store them</li> <li>• Planned planting spreading over the time</li> <li>• Proper planting method (e.g. on ridges)</li> <li>• Careful harvesting</li> <li>• Harvesting mainly on demand</li> <li>• Harvesting preferably with wet soil</li> <li>• Delayed harvest if unavailability or immediate buyer</li> <li>• Hire of experience</li> </ul>	<ul style="list-style-type: none"> <li>• Root harvested by the buyer with no need to store them</li> <li>• Planned planting spreading over the time</li> <li>• Proper planting method (e.g. on ridges)</li> <li>• Careful harvesting</li> <li>• Harvesting mainly on demand</li> <li>• Harvesting preferably with wet soil</li> <li>• Delayed harvest if unavailability or immediate buyer</li> <li>• Hire of experience</li> </ul>	<ul style="list-style-type: none"> <li>• Mostly processed by farmers themselves (dry product easily storable). Thus no need of transport and storage of FCR</li> <li>• Kokonte bagged in jute sacks or polythene sacks</li> </ul>

		<ul style="list-style-type: none"> <li>unavailability or immediate buyer</li> <li>• Hire of experience harvesters</li> <li>• Farmers supervising harvesters</li> <li>• FCR kept under shady trees before transport</li> <li>• Sometimes in-ground storage</li> </ul>	<ul style="list-style-type: none"> <li>harvesters</li> <li>• Farmers supervising harvesters</li> <li>• FCR kept under shady trees before transport</li> <li>• Sometimes in-ground storage</li> </ul>	<ul style="list-style-type: none"> <li>harvesters</li> <li>• Farmers supervising harvesters</li> <li>• FCR kept under shady trees before transport</li> <li>• Sometimes in-ground storage</li> </ul>	
	Extent of losses	<ul style="list-style-type: none"> <li>• 10% found rotten at harvest (pre-harvest losses)</li> <li>• Rotten FCR left on the ground to increase organic matter</li> <li>• Minimal physical losses due to delays in transport when roots are sold harvested (0.5%)</li> <li>• 10% (wet season) – 20% (dry season) breakages at harvest</li> <li>• Broken FCR sold with 20-40% price reduction (Only very small broken FCR processed into kokonte)</li> </ul>	<ul style="list-style-type: none"> <li>• 10% found rotten at harvest (pre-harvest losses)</li> <li>• Rotten FCR left on the ground to increase organic matter</li> <li>• No physical losses due to delays in transport (roots sold unharvested)</li> <li>• 10% (wet season) – 20% (dry season) breakages at harvest</li> <li>• Broken FCR sold with 20-40% price reduction</li> <li>• Only very small broken FCR processed into kokonte</li> </ul>	<ul style="list-style-type: none"> <li>• 10% found rotten at harvest (pre-harvest losses)</li> <li>• Rotten FCR left on the ground to increase organic matter</li> <li>• No physical losses due to delays in transport (roots sold unharvested)</li> <li>• 10% (wet season) – 20% (dry season) breakages at harvest</li> <li>• Broken FCR sold with 20-40% price reduction</li> <li>• Only very small broken FCR processed into kokonte</li> </ul>	<ul style="list-style-type: none"> <li>• 10% found rotten at harvest (pre-harvest losses)</li> <li>• Rotten FCR left on the ground to increase organic matter</li> <li>• No physical losses due to delays in transport (roots are harvested when needed and processed on farm)</li> <li>• Broken FCR do not represent an economic loss since they are good raw material for kokonte</li> </ul>
Trading, transport and handling	Causes of losses	<ul style="list-style-type: none"> <li>• FCR to be sold as fresh transported over longer distances than the ones sold nearby for processing into garri and agbelima.</li> </ul>	<ul style="list-style-type: none"> <li>• Poor state of roads</li> <li>• Delays in transport</li> </ul>	<ul style="list-style-type: none"> <li>• Poor state of roads</li> <li>• Delays in transport</li> </ul>	

		<ul style="list-style-type: none"> <li>• Poor state of roads</li> <li>• Delays in transport</li> </ul>			
	Mitigation measures	<ul style="list-style-type: none"> <li>• Trading in small quantities of FCR</li> <li>• FCR bagged in jute sacks or polythene sacks</li> <li>• Some traders processed damaged roots into kokonte and agbelima</li> </ul>	<ul style="list-style-type: none"> <li>• Processing close to FCR production area</li> <li>• FCR transported over relatively short distances in comparison to processed products</li> <li>• Trading in small quantities of FCR</li> <li>• FCR bagged in jute sacks or polythene sacks</li> <li>• Some processed by farmers themselves with no need of transport and storage</li> </ul>	<ul style="list-style-type: none"> <li>• Processing close to FCR production area</li> <li>• FCR transported over relatively short distances in comparison to processed products</li> <li>• Trading in small quantities of FCR</li> <li>• FCR bagged in jute sacks or polythene sacks</li> </ul>	<ul style="list-style-type: none"> <li>• Basically no transport of FCR</li> <li>• Kokonte bagged in jute sacks or polythene sacks</li> </ul>
	Extent of losses	<ul style="list-style-type: none"> <li>• Some physical losses of FCR (1%)</li> <li>• During transport up to 5% breakage</li> <li>• Broken FCR sold at discounted price</li> <li>• After 2 days wholesale price reduced by 20%</li> </ul>	<ul style="list-style-type: none"> <li>• Minimal physical losses of FCR (0.5%)</li> <li>• During transport up to 2% breakage</li> <li>• Broken FCR sold at discounted price</li> </ul>	<ul style="list-style-type: none"> <li>• Minimal physical losses of FCR (0.5%)</li> <li>• During transport up to 2% breakage</li> <li>• Broken FCR sold at discounted price</li> </ul>	<ul style="list-style-type: none"> <li>• No losses of FCR because they are usually not traded (0%)</li> <li>• Negligible losses during transport of kokonte (0%)</li> </ul>
Processing	Causes of losses		<ul style="list-style-type: none"> <li>• Poor state of roads</li> <li>• Delays in transport</li> <li>• Delays in processing</li> <li>• No storage facilities for FCR</li> </ul>	<ul style="list-style-type: none"> <li>• Poor state of roads</li> <li>• Delays in transport</li> <li>• Delays in processing</li> <li>• No storage facilities for FCR</li> </ul>	<ul style="list-style-type: none"> <li>• Delays in processing</li> <li>• No storage facilities for FCR</li> </ul>
	Mitigation measures		<ul style="list-style-type: none"> <li>• Just in time procurement of FCR</li> </ul>	<ul style="list-style-type: none"> <li>• Just in time procurement of FCR</li> </ul>	<ul style="list-style-type: none"> <li>• Usually roots and breakages are processed</li> </ul>

			<ul style="list-style-type: none"> <li>• FCR processed as much as possible immediately after delivery</li> <li>• Unprocessed FCR covered with polyethylene or jute sacks</li> <li>• Processing close to FCR production area</li> <li>• Some processed by farmers themselves with no need of transport and storage</li> <li>• Gari packed in polyethylene sacks</li> <li>• Packed gari stored on pallets and covered with tarpaulin</li> <li>• Gari stored max 2 weeks before selling</li> </ul>	<ul style="list-style-type: none"> <li>• FCR processed as much as possible immediately after delivery</li> <li>• Unprocessed FCR covered with polyethylene or jute sacks</li> <li>• Processing close to FCR production area</li> <li>• Agbelima packed in polyethylene sacks</li> <li>• Agbelima usually transported over shorter distance than gari</li> </ul>	on-farm immediately after harvest
	Extent of losses		<ul style="list-style-type: none"> <li>• Some physical losses due to spoilage and pests (5%)</li> <li>• Negligible losses of processed product</li> </ul>	<ul style="list-style-type: none"> <li>• Some physical losses due to spoilage and pests (5%)</li> <li>• Negligible losses of processed product</li> </ul>	<ul style="list-style-type: none"> <li>• Negligible losses of FCR</li> <li>• Negligible losses of processed product</li> </ul>
Retail and consumption	Causes of losses	<ul style="list-style-type: none"> <li>• Storage of unsold FCR</li> <li>• Delays in utilization of FCR</li> <li>• Excessive heat</li> <li>• FCR already damaged during harvest, handling and transport</li> </ul>	<ul style="list-style-type: none"> <li>• Delays in sales</li> <li>• Pests</li> <li>• Improper handling</li> <li>• Humidity</li> </ul>	<ul style="list-style-type: none"> <li>• Delays in sales</li> <li>• Pests</li> <li>• Improper handling</li> <li>• Humidity</li> </ul>	<ul style="list-style-type: none"> <li>• Delays in sales</li> <li>• Pests</li> <li>• Improper handling</li> <li>• Humidity</li> </ul>
	Mitigation measures	<ul style="list-style-type: none"> <li>• Retailers and consumers buy as fresh as possible FCR</li> </ul>	<ul style="list-style-type: none"> <li>• Packed in polyethylene sacks</li> <li>• Some retailers trade under</li> </ul>	<ul style="list-style-type: none"> <li>• Packed in polyethylene sacks</li> <li>• Some retailers trade under</li> </ul>	<ul style="list-style-type: none"> <li>• Bagged in jute sacks or polyethylene sacks</li> <li>• Bagged kokonte stored on</li> </ul>

	<ul style="list-style-type: none"> <li>• Retailers adopt just in time purchase and store for max 3 days in jute sacks</li> <li>• Some retailers leave unsold cassava under the shed in the open market covered with sacks for maximum 3 days</li> <li>• Some retailers store FCR in water or sprinkle the roots with water</li> <li>• Some retailers process damaged FCR into kokonte and agbelima</li> <li>• At household level sometimes FCR is peeled, cut into pieces, packaged in polyethylene and store in refrigerator</li> <li>• Caterers adopt just in time purchase and store FCR in jute sacks under shady trees for max 3 days</li> <li>• Caterers use small size and damaged FCR first</li> </ul>	<p>shed</p> <ul style="list-style-type: none"> <li>• Often kept in refrigerators in air-tight containers</li> </ul>	<p>shed</p>	<p>pallets and covered with tarpaulin</p> <ul style="list-style-type: none"> <li>• Usually stored for no more than 3 weeks before selling. Only few store up to 3-4 months to fetch higher prices</li> <li>• Sometimes kept in refrigerator at household level</li> </ul>
Extent of losses	<ul style="list-style-type: none"> <li>• Some physical losses at retail level estimated up to 10% (5%)</li> <li>• Physical losses estimated at 10% to 20% at</li> </ul>	<ul style="list-style-type: none"> <li>• Negligible losses for the processed product</li> </ul>	<ul style="list-style-type: none"> <li>• Negligible losses for the processed product</li> </ul>	<ul style="list-style-type: none"> <li>• Negligible losses for the processed product</li> </ul>

		<p>household and catering level (15%)</p> <ul style="list-style-type: none"><li>• Retailer sell older FCR at reduced price to clear out</li><li>• Damaged FCR (up to 20%) can be sold at discounted price (20-40% discount) or processed into kokonte and agbelima</li></ul>			
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### Use of wastes

	Amount	Note	Current use
Stems	83% of FCR weight		A part is used as planting material. The rest as organic fertilizer and animal feeding
Leaves	39% of FCR weight		Organic fertilizer and animal feeding
Peels	25-32% at processing level (peels + chopped off). Gari/Agbelima= 31% (hired) Kokonte=25% (family) Household=30% Around 30% is chopped off  5-6% if mechanical (no chopped off)	For traditional food processing is manual(longitudinal or roll-over, if big size). In the starch factory and in large SMEs producing HQCF and other cassava products mechanical.	Most gari processors use cassava cuts for kokonte. 90% of peels are burnt Peels and cuts sometimes are collected for animal feed (mainly pigs) from processing centres at no cost The industrial starch factory discharge the peel in dumping sites
Waste water	3t every 1 t FCR processed (gari, agbelima, HQCF, starch)		Mainly improperly discharged Few processors (almost exclusively gari producers) extract starch to be used at domestic level for krankro and akyeke Opportunities to be used as weedicide and fertilizer
Pulp	10% (dry pulp)	Starch industry currently almost non-operational.	Pulp sold at GHC20/tonne
Fibrous sifting		In garri and agbelima, sieving is done either manually or mechanically. In HQCF and starch	Most gari processors use cassava sifting for kokonte Some agbelima processors use cassava sifting for kokonte

mechanically.