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GSSP Working Paper # 21

The Case of Tomato in Ghana: Processing

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Ghana Strategy Support Program (GSSP)
GSSP Working Paper No. 21

April 23, 2010

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THE GHANA STRATEGY SUPPORT PROGRAM (GSSP)
WORKING PAPERS

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Introduction

Processing of highly perishable non-storable crops, such as tomato, is typically promoted for two reasons: as a way of absorbing excess supply, particularly during gluts that result from predominantly rainfed cultivation; and to enhance the value chain through a value-added process. For Ghana, improving domestic tomato processing would also reduce the country's dependence on imported tomato paste and so improve foreign exchange reserves, as well as provide employment opportunities and development opportunities in what are poor rural areas of the country.

Many reports simply repeat the mantra that processing offers a way of buying up the glut. Yet the reality is that the "tomato gluts," an annual feature of the local press, occur only for a few weeks of the year, and are almost always a result of large volumes of rainfed local varieties unsuitable for processing entering the fresh market at the same time, not the improved varieties that could be used by the processors. For most of the year, the price of tomatoes suitable for processing is above the breakeven price for tomato processors, given the competition from imports. Improved varieties (such as Pectomech) that are suitable for processing are also preferred by consumers and achieve a premium price over the local varieties.

"Processing to buy up the glut" is neither an appropriate motivation nor a long-term viable strategy for Ghana's tomato processing industry. Adding large-scale processing increases demand for tomato and so puts upward pressure on the price of fresh tomatoes. But processing also converts tomato—a non-tradable good at the regional level—into paste, an internationally traded commodity and so exposes the tomato sector to international competition. At current market prices for tomato, domestically produced paste typically will not be competitive with imported paste from the EU and China. In these working papers we focus on why tomato processing in Ghana has not worked.

Background

Three state run enterprises dominated the food processing industry in Ghana, all built by a Yugoslavian company in 1967 and set up as part of President Nkrumah's government's overall development plan for Ghana (Ablorh-Odjidia, 2003). These were the GIHOC cannery at Nsawam (Eastern Region), Pwalugu Tomato Factory at Pwalugu (Upper East region), and the GIHOC Tomato Cannery -TOMACAN of Wenchi (Brong Ahafo region). By the late 1980s, a combination of structural reforms, promoted by the World Bank and IMF, frequent breakdowns resulting from a lack of spare parts and obsolete machinery, lack of technical competence and financial management, and poor marketing, resulted in the closure of these three factories. The following two decades can be characterized by multiple failed efforts to reopen the factories to process domestically grown tomatoes.

Currently there are three plants, two of which are refurbished old plants and the other is a new investment. The Ministry of Food and Agriculture (MoFA) is planning to set up another plant in Brong Ahafo.

1. Trusty Foods Ltd (renamed Expom) a private company established in 2003 in Tema, Greater Accra, was set up to supply the west African market, including Nigeria, with tomato paste. Although it sources some tomatoes from the Upper East region and more from nearby farms, it has predominantly been importing and repackaging bulk tomato paste. Currently fresh tomato from Ghana comprises 7% of its tomato inputs, the rest coming from bulk paste imports.

2. The Northern Star Company in the Upper East was formerly the Pwalugu tomato company that was closed in the 1980s. It is located in a tomato growing area with a short season of three months (January through March). In 2006, the factory was refurbished by the Ministry of Trade and Investment (MoTI), as part of the District Industrialization Policy which aims to have a factory in each district, and taken over by the local Northern Star Tomato Company Limited, in collaboration with Trusty Foods Company Limited. Northern Star was configured to produce and package in bulk for supply to Trusty Foods in Tema for further processing and retail packaging. Because Northern Star is government owned and there is only one buyer for its products, the price at which it sells to Trusty Foods is to be determined through negotiations between MoTI and Trusty Foods. The processor re-opened in 2007 but closed down again after just one season. With a new agreement between growers and the processor, it reopened in 2010, part way through the 2009-10 season by which time many farmers had already harvested their crop. Its future remains uncertain.
3. Afrique Link Ltd processor, originally called the GIHOC Tomato Cannery (TOMACAN), is located in Wenchi, Brong Ahafo, at the centre of the production areas of Akomadan and Tuobodam, and currently is configured to produce natural tomato pulp and chopped tomatoes, thereby supplying a niche market rather than trying to compete with imported paste. The processor was re-opened through a private-public partnership in the mid-2000s but was not able to source sufficient high quality tomatoes from Ghana at a competitive price and so after a pilot season, Wenchi again ceased processing. It is now exploring sourcing inputs for the factory through its own dedicated high tech farm using, technical expertise from South Africa, and supplemented possibly with contract farmers or tomatoes purchased on the open market.

Price of imported paste limits what processors can pay for tomato

In part as a consequence of structural adjustment, import quotas in Ghana were abolished in 1992 and tariffs for imported agricultural produce have been reduced to 20 percent. The ensuing competition from foreign tomato paste has been blamed in part for the closure of two of the three large tomato processing plants in Ghana.

Tomato paste is a commodity. The market is characterized by a large number of brands available in the market, little differentiation (some brands are recognized as being of higher quality), and little if any consumer pressure to ensure a high quality product (tomato paste is low cost substitute for fresh tomato). Therefore producing a low cost product is key for competitiveness. Here we address the economics of tomato processing, comparing the cost of imported bulk paste from China with the local cost of processing local tomatoes. We choose China as a benchmark because of the dominance of low-cost bulk tomato paste imports from China and our access to detailed data.

Data provided by Afrique Link Ltd suggest that at a cost to the processor of GH¢150 per ton of fresh tomatoes, tomato paste made from local tomatoes can be competitive with imported concentrate from China. GH¢150 per ton is equivalent to GH¢16.5 per 110kg crate (or GH¢0.15 per kg). We summarize the costs of production in Table 1 and Table 2 below. To compare equal items tomato concentrate (36%-38% brix) has been used.

Table 1. Cost of processing one ton of tomato paste in Ghana (36-38% brix)

Item/description	Quantity	Cost GH¢	% of costs
Fresh tomatoes	**8 tons at GH¢150 per ton**	**1,200**	**61%**
Water	70m^3 per ton	168	9%
Fuel	94.5ltrs per ton	480	24%
Labour cost		50	3%
Electricity	6kw per ton	8	0%
Maintenance of equipment		38	2%
Depreciation of equipment		25	1%
Processing overheads		**769**	**39%**
Total processing cost		**1,969**	**100%**

Source: Author calculations using 2009 data.

Table 2. Landed cost of imported tomato concentrate (36-38%) from China (1 ton)

Item/description	Cost
FOB cost of tomato concentrate	US$880
Freight	US$300
Customs duty and clearance (12.5%)	US$148
Landed cost	US$1,328
Landed cost in GH¢ (ex rate 1.50)	**GH¢ 1,991**

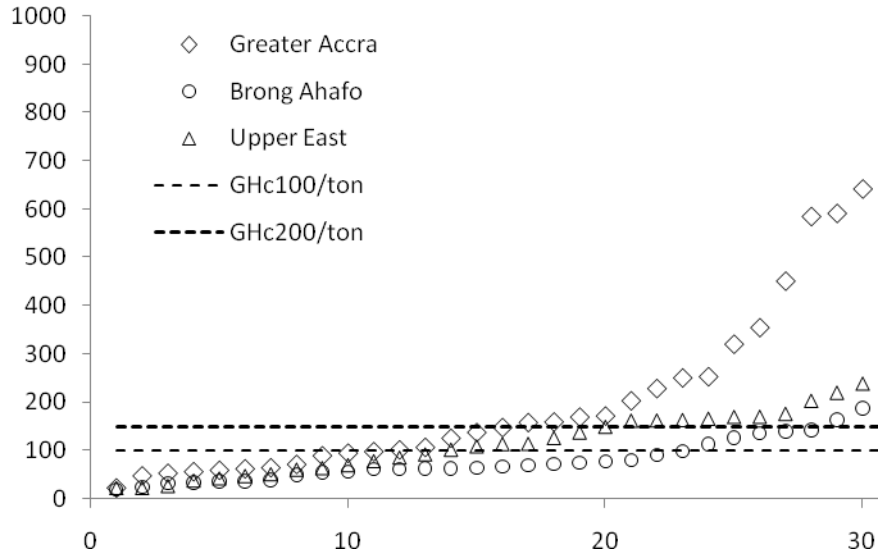
Source: King Food International, China

The tables above indicate that the key cost drivers for tomato paste production are cost of fresh tomatoes, water, and fuel. To match costs of imported Chinese tomato concentrate, processors in Ghana need to be able to source fresh tomatoes at no more than GH¢150.00 per ton. However, all things being equal, to be more price competitive than China, ideally fresh tomato costs should not exceed GH¢100.00 per ton. Although this price is low compared to the fresh market, it is possible for farmers to farm profitably at these prices if their yields are sufficiently high, probably above 30 tons per hectare. This cost is comparable with prices in countries with well established tomato processing. For example, in California, USA, farmers sell tomatoes for processing at US$66 per ton, around GH¢100 per ton (Allen 2008).

Yet currently most farmers' yields are well below ten tons per hectare (Robinson and Kolavalli 2010, 19). To achieve higher yields typically would require irrigation and improved water management in general, improved husbandry, and greater use of hybrids or certified seeds as opposed to self-extracted seeds. Improved management systems would almost certainly be needed for most farmers so as to structure tomato production as a viable commercial enterprise.

Our own survey suggests that at least two-thirds of the farmers we surveyed have per unit production costs above GH¢100 per ton (Figure 1), excluding own labour costs. These findings suggest that it may not make sense for farmers to enter into contracts with the processors at these relatively low prices unless they can be sure that they will be provided with sufficient access to inputs and technical expertise which would allow them to increase their productivity and reduce costs considerably.

Figure 1: Production costs per ton of tomato, excluding own labour, GH¢/ton (Three Region Survey, 2009; farmers ordered on x-axis by input costs)



Source: Three Region Survey (2009)

Farmers have been encouraged to expect higher prices for tomato with processing. For example, the Wenchi public private partnership was promoted in the early 2000s as benefiting tomato farmers by enabling them to achieve consistently higher and stable prices, ignoring the reality that the processing factory could only be viable if paying lower prices than are typically found in the fresh market. Discussions with farmers that we have had over pricing suggest that farmers tend to focus on "cost plus" when negotiating with processors. For example, one group of farmers in the Upper East region told us that the processors should be paying them a price that covered their costs, plus a margin, ignoring whether or not such a price would allow the processor to break even. These negotiations notwithstanding, the Wenchi processor owner felt that it could not acquire tomatoes of the appropriate quality in Ghana, and so price is not necessarily the binding constraint.

Processors lose out in a dual market for tomatoes

Without processing, the tomato value chain is relatively simple. Farmers typically sell to traders at the farmgate or, somewhat less commonly, take their tomatoes to the local market. Traders, the "market queens", take the produce to the large marketing centres around the country, and from there the tomatoes are sold to retailers, institutions, and chopbars and restaurants. There is some regional trade, with traders coming from Cote D'Ivoire and Togo, and Ghanaian traders who bring in tomatoes from Burkina Faso between January and May (Robinson and Kolavalli 2010, 20).

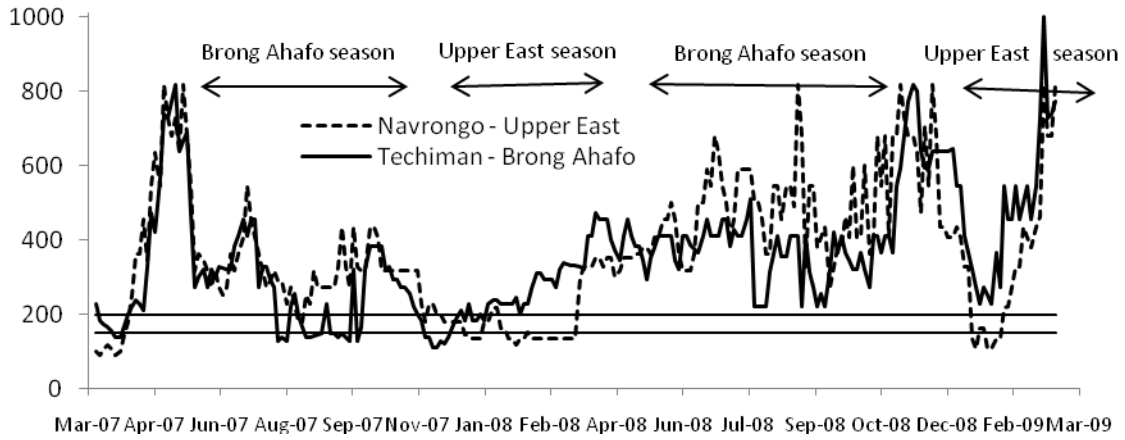
In countries with successful domestic tomato processing, the fresh and processed markets may be fully integrated or fully or partially separate. In the US, the fresh and processed markets are completely separate and so tomatoes for each can be considered as separate commodities (Allen 2008). Tomatoes for processing typically have a higher percentage of soluble solids and are grown under contract between growers and processors. This market can be characterised by extremely high yields and low prices. In contrast, fresh tomatoes are sold on the open market and prices are higher (USDA 2009). For example, in 2007, farmers in California were paid as little as 3 cents per pound of processing tomatoes, while nearby heirloom tomatoes were selling for $2.50 per pound at the farmgate (Allen 2008).

However, in most developed tomato sectors, tomatoes for processing and the fresh market are somewhat integrated (USDA 2009). For example, in Turkey, tomatoes for processing tend to be grown on small farms with 80% involving contracts between the farmer and the processor prior to planting (WPTC date). In Mexico, most of the country's processing tomato production is in Sinaloa and so is spatially separated. However, product moves between fresh and processed markets according to relative prices (Cook, R and Calvin, L. 2005).

Tomato processing in Ghana has been introduced ostensibly to "buy up the glut" and to add value to fresh tomatoes. However, for the processors this strategy has been complicated because of two issues. First, if large-scale processing is introduced, demand for tomatoes increases and farmers have an additional choice of who to sell their tomatoes to: the trader, the nearby market, or the processor. Adding processing increases demand for tomatoes and so puts upwards pressure on the equilibrium price of tomatoes, compared with a no-processing scenario. This potential for greater prices has been promoted in the press and by government officials as a positive change for tomato farmers, but such statements ignore the reality that the processors must compete with low-cost imported tomato paste. Despite the highly publicized "annual glut", the price at which the fresh tomato market clears for most of the year is too high for domestic tomato paste production to be competitive with imported tomato paste. Second, there are, broadly speaking, two types of tomatoes – "improved" varieties that are suitable for processing and are also preferred in the fresh market, and local varieties that are only suitable for the fresh market and that farmers often prefer to grow because they are more resilient to local conditions. The glut is typically made up of the latter local varieties that the processors will not purchase.

In Ghana, tomato prices fluctuate over the year, reflecting weather and cropping patterns. Although farmgate prices have not been collected systematically over multiple seasons, markets at Navrongo (Upper East) and Techiman (Brong Ahafo) can be used as a proxy for the prices that farmers can get for their tomatoes because farmers bring their tomatoes to these markets, in contrast to the larger markets in Accra and Kumasi which are controlled by the market queens (Robinson and Kolavalli 2010). We can see from Figure 2 that, between March 2008 and March 2009 (the most recent data that we have), the price for fresh tomato dropped below GH¢150 for only one month, and only in Navrongo, and did not drop below GH¢200 at all. Between March 2007 and March 2008, prices in Navrongo dropped below GH¢150 for three months, as well as in Techiman for approximately three months. As a point of comparison, recent negotiations between farmers and the Pwalugu factory resulted in an agreed price of GH¢5.40 per 40kg crate, or GH¢135 per ton.

Figure 2: Prices in Navrongo and Techiman



Source: Adapted from Ihle and Amikuzuno (2009).

As processors cannot obtain their supplies of acceptable quality at competitive prices, they have looked to other approaches: contract farming, captive farming, and relying on bulk imports as the raw material.

Contract farming

In contract farming, contracts are introduced between farmers and processors at the start of the season that fix the price at which farmers will commit to selling their tomatoes to the processor. Pwalugu, Wenchi, and Trusty Foods have attempted to do this. Typically both farmers and processors benefit from the contract. The processor gets a guaranteed supply of fresh tomato (weather and pest conditions not withstanding) at a price that allows it to be competitive with imports. Farmers are offered a fixed price that reduces their uncertainty, which enables them to make production decisions based on the price. The farmer also is guaranteed a buyer, which is important given the difficulty many farmers have expressed in selling all their harvest. Another benefit for the farmer in Ghana has been access to inputs on credit from the processors and improved seeds that they might not otherwise be able to find in the country. With the ability to source inputs on credit, farmers have the potential to increase their yields.

All three processors have entered into such contracts with farmers but have failed to obtain tomatoes at economical prices. The three processors have offered prices of between GH¢4 and GH¢6 per 40kg crate of fresh tomatoes equivalent to between GH¢100 and GH¢150 per ton. They also typically provide crates and collect the tomatoes from the farmers' fields (as is the case for market traders). The processors also typically offered farmers inputs on credit, including improved seed and fertilizer, the objective being to enable farmers to grow varieties preferred by the processors and to increase their yields.

The benefits for farmers entering these contracts, given the low prices, are mixed. A sizeable number of farmers in the Upper East who rely on public irrigation schemes reported to us that they could not find buyers for all their tomatoes (typically because the traders who usually bought from their farmers are increasingly bypassing the Upper East region to buy fresh tomatoes from Burkina Faso), and so Pwalugu or the other processors in this case would provide the needed demand, despite low prices. But in general prices on the fresh market tend to be considerably higher than the prices offered by the traders. Farmers could benefit significantly from not honoring the contracts. From our Three Region survey, we find that the average selling price in Greater Accra was over GH¢400 per ton on the fresh market but under

GH¢140 for farmers selling to Trusty Foods. In the Upper East, two farmers in our sample sold to Trusty Foods at GH¢100 per ton, whereas on the fresh market farmers averaged over GH¢200 per ton. In Brong Ahafo, none of our sampled farmers sold to a processor, but here average prices were over GH¢500 per ton.

Indeed, the processors found that farmers were likely to break their contracts and sell their tomatoes to the fresh market, sometimes not repaying processor-provided input loans. Further, although farmers may be better off contracting with the processors, even at a low price, because they can access inputs and so potentially increase their yields, in a particular season they are even better off taking the inputs, increasing their yields, and reneging on the contract and selling at a higher price to the fresh market.

At Wenchi it became clear to the owners that farmers are unwilling to sell their entire crop to the processors, even when they are contractually obligated, if the fresh market price is much higher. A compromise approach has been proposed, in which farmers contract to sell only a proportion of their produce to the factory, with the remainder being sold wherever the price is best, which is often but not always the fresh market. Such an approach may also encourage the farmers to sort and grade their tomatoes, as the processor would be willing to accept, for example, tomatoes with lower visual appeal (smaller size) that fetch lower prices on the fresh market. In general, using such grading and price mix could sustain a more price-competitive Ghana-made tomato paste.

All the blame does not lie with the farmers however. Recently, when the farmers in the Upper East were ready to deliver on their contracts, Pwalugu factory was plagued with problems including insufficient crates for collecting tomatoes, insufficient transport network to go to the farmgates, and lack of credit to pay the farmers. Not surprisingly, there is little trust between farmers and processors, based on experiences thus far.

Captive farming

The approach that is currently being pursued at Wenchi is captive farming, using large plots of tens of hectares that are owned by the factory with considerable control over the production process. At Wenchi, expertise from South Africa is being employed to produce tomatoes at high yield and low per-unit cost. This approach is being tried after the company failed to source tomatoes of sufficiently high processing quality at a sufficiently low price to be competitive.

Importing the raw material

Trusty Foods relies heavily on bulk imports of tomato paste which the company dilutes and packages into small retail size containers. Trusty Foods has attempted to involve local farmers, as can be seen from our survey in which 9 of the 98 farmers that we sampled sold at least some if not all of their output to Trusty Foods, but as discussed above, typically farmers are not willing to accept the lower prices offered by the processors.

Similarities with cassava and general problems with contract enforcement

A similar story can be found for cassava in Ghana. Parallel marketing routes, such as for tomato and cassava (Essegby 2008), are in general likely to cause complications with respect to contract enforcement. Essegby (2008) found that duality in cassava marketing in Ghana (as for tomato, cassava farmers can choose to sell to the processing factory or to the local food market) caused problems on the supply and demand side. Farmers were found to divert their harvest to the local food market when prices were higher than those they had contracted with the factory. When the factory closed, in part as a consequence of the factory not being able to guarantee that farmers would deliver the promised output, the local market could not absorb all

the produce and farmers were left with cassava rotting in the fields. Not surprisingly, the processors are reluctant to deal with a large number of small-scale farmers who have easy access to the fresh market.

Protecting tomato processors through increased tariff on paste imports would likely result in consumers paying more for both tomatoes and tomato paste

We have demonstrated above that contract farming for tomato processing in Ghana is unlikely to work because of a combination of high prices in the fresh market, relatively cheap imports of tomato paste, and the difficulty in enforcing contracts between farmers and processors.

Because calls for bans on all imported tomato paste, or at the least trade restrictions, are a regular feature of newspaper articles and discussions we have had with processors and farmers, we address this option in more detail in this section. Typically these calls are made without consideration of the welfare implications for consumers or the likelihood that Ghana has neither sufficient quantities of fresh tomatoes, nor sufficient processing capacity, to be self sufficient in fresh tomatoes and in tomato paste in the short to medium term. However, international agreements notwithstanding, increasing tariffs on imported tomato paste would allow tomato processors to source tomatoes at a higher price whilst still remaining competitive with imported paste.

Building on the detailed information above, we do a simple partial analysis to demonstrate how changes in the price of imported bulk paste would influence the price domestic processors could pay for fresh tomatoes whilst remaining competitive (Table 3).

Table 3: Processing costs of one ton of tomato paste (36-38% brix) and additional tariffs required to be competitive with imported paste

Item/description	Cost of tomatoes (GH¢ per ton)					
Cost per ton	150	200	250	300	350	400
Cost per 110kg crate	16.5	22.0	27.5	33.0	38.5	44.0
Fresh tomatoes (8 tons)	1,200	1,600	2,000	2,400	2,800	3,200
Other costs	769	769	769	769	769	769
Total processing cost	1,969	2,591	3,047	3,502	3,958	4,413
Landed cost of import	1,991	1,991	1,991	1,991	1,991	1,991
Additional import tariff required	Current situation	30%	53%	76%	99%	122%

Source: Adapted from King Food International, China, and personal discussions with Wenchi processor

We can see from Table 3 that even with an import tariff of almost 100%, the processor would still need to source improved variety tomatoes at GH¢350 per ton, which is under GH¢40 per 110kg crate. This price is competitive with the lower-bound prices received by farmers in our survey in Greater Accra and the Upper East, but not with typical prices in Brong Ahafo.

Although import tariffs would enable Ghana's tomato processors to be more competitive with imported paste, Ghana is constrained by WTO, the Economic Partnership Agreement (EPA), and its membership of ECOWAS. Ghana could impose higher tariffs on imported tomato paste than the 20 percent it currently does without violating WTO rules. However, Ghana is constrained by ECOWAS, which aims to have a "common external tariff" throughout the area (although the ECOWAS treaty is based on the removal of duties and equivalent taxes, this has not yet occurred, and countries within ECOWAS continue to impose such duties on other

ECOWAS countries). Ghana is also likely to be affected by the EPA, an agreement between ECOWAS and the EU, which removes Ghana's option of using tariff adjustments (permitted by the WTO) to mitigate trade problems (such as dealing with subsidized EU tomato paste imports) with respect to trading with the EU (Asuming-Brempong and Asuming Boakye 2008). Therefore, in the current climate, Ghana is unlikely to be able to implement tariffs to protect domestic tomato production.

The analysis above simply looks at the relationship between tariffs and domestic fresh tomato prices that allow Ghana's tomato processors to be competitive. However, with significant import tariffs, prices for tomato paste would increase, dampening demand, and total demand for fresh tomatoes would increase due to new demand from domestic processors, resulting in upward pressure on domestic prices for fresh tomato. Consumers would be unambiguously worse off, particularly as tomato is a particularly important vegetable in Ghana (Table 4). Moreover, there would be little incentive for the tomato sector to transform from low-yield-high-prices sector to high-yield-low-prices.

Table 4: Importance of tomato in households' expenditure on all vegetables

	GLSS3 (1995)			GLSS4 (1999)		
	Urban	*Rural*	*Ghana*	*Urban*	*Rural*	*Ghana*
Fresh tomato	38%	26%	31%	37%	29%	33%
Tomato paste	2%	1%	1%	9%	5%	7%
Other vegetables	60%	72%	68%	54%	66%	60%

Source: GLSS3 and GLSS4

Some individuals have gone so far as to suggest that Ghana ban all imports of tomato paste. And indeed the government attempted to do so in 2007. However, Ghana has neither sufficient supply of fresh tomatoes, nor sufficient processing capacity even if production of fresh tomato increased, to supply the market at current demand. Ghana has a total processing capacity of 1200 tons of fresh tomato per day (500 tons at Trusty Foods and Northern Star, and 200 tons at Afrique Link Ltd in Wenchi). Each factory is capable of working 24 hours per day. If we assume that these three processors were operational 365 days per year, 24 hours per day, they would be able to process 438,000 tons of fresh tomato, equivalent to 54,750 tons of tomato paste each year (assuming a paste of 36-38% brix, requiring 8 tons of fresh tomato per ton of paste). Tomato paste imports into Ghana currently amount to over 78,000 tons of paste per year of which 12,000 tons are exported after being repackaged (FAOSTAT), suggesting a domestic tomato paste consumption in Ghana of around 66,000 tons in 2007. So even if each of the three processors were operating continuously, Ghana would not be able to produce locally all the tomato paste that is currently imported for domestic consumption, using the three existing large processors.

Processing capacity can be increased incrementally relatively easily, and so current capacity need not dictate the ability of Ghana to produce all its tomato paste requirements in the future. However, we also need to consider whether Ghana currently grows sufficient tomatoes for processing to replace the imported paste. 66,000 tons of imported tomato paste is equivalent to 528,000 tons of fresh tomato. Accurate estimates of current tomato production in Ghana are difficult to come by. However, most estimates of domestic production are around 200,000 tons per year, well below half the tonnage required to meet current demands for tomato paste. Even taking into account imports from Burkina Faso, the total availability of fresh tomato is currently around 300,000 tons, well under 528,000 tons, not including the demand for fresh tomatoes.

These data therefore suggest that Ghana will, in the short to medium term, still need to rely on imported bulk tomato paste to meet a considerable share of market demand, notwithstanding the increase in fresh imports from Burkina Faso. Moreover, whereas scaling up processing capacity is relatively easy, scaling up production of tomatoes that producers want to purchase has proven more tricky. Naturally, if tomato paste imports were banned, prices for fresh and processed tomato would adjust to re-equilibriate supply and demand. Banning imports of tomato paste would increase the price at which processors could buy tomatoes from farmers without concerns over having to be competitive with imported tomato paste. There would likely be a supply response from farmers, but this might well be in terms of expanding planted area for tomato, rather than increasing productivity. And consumer prices for fresh and processed tomato would increase dramatically. Although we have not calculated them, the welfare costs of a ban on imported paste would likely be considerable, given the importance of tomato in the diet of most Ghanaians.

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