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Tomato Paste in Iraq



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SCOPE AND OBJECTIVES

This brief study, *Tomato Paste in Iraq*, is market research for a feasibility study intended to analyze the potential for tomato derivatives – especially paste - in Iraq. Its explicit purpose is to support Provincial Reconstruction Team (PRT) economic development plans at the regional level.



Processing Tomatoes and Table Tomatoes

The specific objectives of this paper are:

- To measure the market for tomato derivatives in Iraq;
- To analyze the current supply in the market, with special focus on imports from Turkey and Iran;
- To analyze the current supply chain in Iraq in terms of processing factories and providers of raw material;
- To assess the potential competitiveness of an Iraqi, locally manufactured tomato paste, benchmarking products imported from Iran and Turkey;
- To develop a viable business model, complemented by a preliminary business plan, assessing the viability for tomato paste factories in Iraq, either with existing production lines or with new, imported machinery;
- Finally, to analyze existing constraints and recommend courses of action for their removal.

The study, or market research, is based on the market data of leading exporters and importers, extensive interviews with consumers in Iraq, and data provided by category associations, suppliers, retailers-distributors, and PRTs.

EXECUTIVE SUMMARY

Tomatoes can be boiled to evaporate the water they contain. Depending on how much water is removed and what other ingredients are mixed into the pulp, it is possible to obtain a large number of products. In the Middle East and Iraq the most important product is tomato paste (26-28 Brix).¹

Tomato paste is already an important market in Iraq, where probably 90,000 tons are consumed annually. Imports account for 65,000 tons, of which 47% come from Iran and 41% from Turkey. Iranian tomato paste is currently the cheapest product in the market (-25% vs. Turkish products) with a wholesaler price in the range of ID 1,600 per kg (\$1.23). Iraqi tomato

¹ Brix is an indicator of product concentration commonly used in the industry. It is the percentage of soluble solids in the product.

paste is mainly homemade or manufactured in small scale, non-industrial factories, with uneven quality and specifications. A price reference for Iraqi tomato paste is difficult to define since generally no Brix value is reported on the labels.

The Iraqi tomato industry is currently skewed toward the production of fresh table tomatoes – as opposed to processing tomatoes. Table tomatoes are sold in the market for as much as ten times higher than processing tomatoes which, in many countries, are residual crops that utilize surplus table tomatoes not absorbed by the market.

The existence of such a surplus is vital for the possible development of a tomato processing industry in Iraq. Reportedly the only area with a significant surplus – although still to be exactly quantified - is Basrah province. Basrah has emerged in recent years as the most efficient tomato cluster in Iraq, with full operating cooperatives showing yields ranging from 70 to 80 tons per hectare.

According to a recent DANIDA study, the tomato production in Basrah province is approximately 500,000MT/year with a surplus of 10%-15% sold at very low price or lost for lack of demand, mainly concentrated in the months of February and March.

Although there are no modern operating tomato paste factories in Iraq, two production lines reportedly lay idle and could allegedly be returned to productive operation in the short to medium term. The first, in the Harir plain of Kurdistan, has a capacity to process 300MT/day of raw material, while the second, in Baghdad, is in reality a set of five small Bulgarian lines with capacity to process 60MT/day of raw material. These lines have a book value of approximately \$450,000 each.

Capacity of only 60MT/day is quite unusual in an industry where the capacity of most top exporters exceeds 1,000MT/day.² In addition, higher capacity reached in a factory aggregating five processing lines of 60MT/day each is not as efficient as a unique line of 300MT/day. Based on Rossi & Catelli data, the economy of scale of a factory with a sole processing line of 250-300MT/day would be in the range of 12-15% per cent.³

The recommended price positioning for an Iraqi tomato paste is approximately at -15% vs. the Turkish imported (+12% vs. the Iranian). After a preliminary competitive analysis and a comprehensive cost benchmark based on that recommended price, the conclusion is that developing a tomato paste industry in Iraq holds promise:

- At the recommended price positioning, the Iraqi, locally made product could realistically achieve 8-10% market share;
- There is an opportunity to absorb significant surplus table tomatoes that may not have a market otherwise. The existence of real surpluses with virtually no market is vital for the viability of the industry. It will be analyzed in detail with respect to the tomato cluster in Basrah currently reporting surplus production estimated in a minimum of 50,000MT/season;

² All the capacities expressed in raw material.

³ An Italian company, worldwide leading manufacturer of tomato processing machinery.

- The industry could generate jobs in the tomato fields. According to Ardi – *The Iraq Marshland Restoration Program*, April 2004 – tomato is the crop with the highest labor requirement (40-50 person/days per donum); ⁴
- The Profit and Loss (P&L) analysis projects a positive operational profit:

Tomato Paste Made in Iraq: Operational Profit Simulation

Scenarios	Price -15% vs. Turkish. Tomatoes at US 7¢ at the farm gate.	Price -15% vs. Turkish. Tomatoes at US 8¢ at the farm gate.	Price -20% vs. Turkish. Tomatoes at US 7¢ at farm gate.	Price -20% vs. Turkish. Tomatoes at US 8¢ at the farm gate.
Net Price/kg - \$	1.388	1.388	1.311	1.311
Raw Material Cost/kg - \$ ⁵	0.487	0.556	0.487	0.556
Full Operating Cost/kg - \$	1.082	1.236	1.082	1.236
Operational Profit/kg - \$	0.306	0.152	0.229	0.075
Operational Profit % on Net Sales	22%	11%	17%	6%

Nevertheless the viability of the scheme depends on:

- The existence of enough surplus tomatoes (a minimum of 15,000MT/year).
- Farmers' willingness to accept a farm gate price of US 7-8¢ per kg. – ID 90-100 at the current exchange rate - (a likely assumption if there are surpluses with virtually no value in the market due to overproduction).⁶
- Alternatively, the development of an industry dedicated 100% to processing tomatoes – as opposed to depending on residual crop of table tomatoes. This depends on the capacity of Iraqi tomato growers to be profitable with a farm gate price of US 7¢ per kg, the price compatible with the recommended product price positioning in the market. A final calculation and assessment of tomato production costs among growers is still under way.⁷
- Availability of clean water at a competitive price. A tomato paste factory utilizes on average 5m³ of water for each ton of raw processed material. Water availability is far from a given, particularly in Basrah province, where quality water is already in short supply.
- Availability of electricity. The electricity constraint affects the Kurdistan region where the Harir plant is located and Basrah. Both grid electricity and the availability of diesel for generators present significant problems.
- A plant with a minimum capacity to process 150-200MT/day, with an average 100-105 days of processing/year. (ideally a capacity > to 300MT/day). *Ceteris paribus* the utilization of the five existing Bulgarian lines with capacity of 60MT/day each is not recommended and seems economically unviable for lack of economy of scale. Capital

⁴ Modern tomato processing production lines, with capacity exceeding 5,000/day function with only 4-5 operators.

⁵ Assuming 6.5kg of tomatoes for 1kg of tomato paste (higher than optimal 6.0kg, since tomatoes grown in Iraq are not hybrids specific for processing).

⁶ In months of overproduction farmers currently denounce lack of demand for the product even at the very low price of ID 100/kg.

⁷ By comparison, the cost of production in Turkey ranges from \$3,750 to \$4,250 per hectare.

investment for 150-200MT/day is in the range of \$ 2.7 million, and for capacity of 250-300 MT/day is around \$ 4.5 million.

Another real constraint, potentially undermining the entire project, is the high burden of financing costs in Iraq because of high interest rates.⁸ Under the current circumstances, the operating profit obtained with farmgate price of US 7¢ per kg for fresh tomatoes, would only cover financial expenses leaving no pre-tax profit for the investors:

Tomato Paste Made in Iraq: Pre-Tax Profit Simulation - Financial Expenses Included

Plant Installed Capacity - Tons/day	150	250
Tomato Paste Total Production – Tons/year ⁹	2,431	4,051
Tomatoes Processed – Tons/year	15,802	26,336
Days of Processing ¹⁰	105.3	105.3

Net Sales	\$ 3,375,000	%	\$ 5,625,000	%
Operating Profits US 7¢/kg to Growers	\$ 742,500	22%	\$ 1,237,500	22%
Operating Profits US 8¢/kg to Growers	\$ 573,750	17%	\$ 956,250	17%
Financial Expenses	\$ 756,000	22%	\$ 1,260,000	22%
Pre-Tax Profit at US 7¢/kg	\$ -14,000	-0.4%	\$ -22,500	-0.4%

This constraint could be overcome by:

1. Granting loans to potential investors at a special rate (in the range of 10% in order to maintain levels of profitability attractive to potential investors).
2. Higher operating profits and lower investment as a result of a longer period of processing during the year (assumed to be 105 days in the current model).
3. Developing an integrated scheme with cooperatives of tomato growers owning the processing operation. In this case low profitability would be overcome by the income from utilizing tomato surpluses.
4. Transfer of the existing six lines – Bulgarian technology – of 60MT/day capacity to cooperatives or investors at a price well below the book value. In this case the reduction in financing costs would offset the high production costs due to the lack of the economy of scale in the plant.

1. TOMATO DERIVATIVES - AN OVERVIEW

Tomato derivatives are various products with different characteristics. Tomatoes can be boiled to evaporate the water they contain. Depending on how much water is removed, and

⁸ The current cost of borrowing in Iraq is around 28%.

⁹ Considering a reduction factor 6.5:1, slightly higher than optimal 6:1 due to the fact hybrids used are not specific for processing.

¹⁰ Based on preliminary data provided by Basrah Cooperatives and Danida.

what other ingredients are mixed into the pulp, it is possible to obtain a large number of products. With regard to the purposes of this study, only a few products will be taken into consideration:

- **Tomato paste** is made from whole processing tomatoes generally containing between 4.5 and 5.5 percent tomato solids.¹¹ With regard to solid content, the industry normally refers to NTSS (natural tomato soluble solids), a measure which excludes all insoluble solids. In accordance with generally accepted market standards, tomato paste must contain at least 14 percent NTSS. On average, 6kg of fresh tomatoes are required to make 1kg of tomato paste 26-28 Brix. Most common tomato paste in the market is “concentrate2” or double concentrate with 26-28 Brix, but “concentrate3” or triple concentrate with 36-38 Brix is also in the market;¹²
- **Tomato puree** contains between 11 and 14 percent NTSS, and differs from paste only because of the lower concentration. Tomato puree is particularly popular in countries with high consumption of pasta – like Italy – where it is used as the basic ingredient for all the tomato based sauces.¹³
- **Ketchup** is a popular condiment made using tomato paste as a base, with the addition of vinegar, sugar, salt, allspice, cloves and cinnamon, and frequently onions, celery and other vegetables as well.
- **Tomato sauce** has the lowest concentration among tomato derivatives, and usually contains between 5.5 and 11 percent NTSS. Tomato sauce is frequently mixed with herbs, spices, and other ingredients such as olives, onions or cappers and provides the base for most of the pasta condiments so popular in the Italian cuisine.



Ketchup – Processing Tomatoes – Peeled Tomatoes and Tomato Sauce

Tomatoes for processing and fresh tomatoes are separate markets and industries, with different characteristics, although they frequently overlap. Tomato varieties are bred

¹¹ Commonly expressed in Brix.

¹² Triple concentrate is especially popular in China and exported to the markets where it is diluted and resold.

¹³ Passata is skinned, seedless, unflavored, uncooked tomato pulp, either slightly chunky or smooth. Only products derived from the processing of fresh tomatoes can be labeled as passata. Mixing with dehydrated tomato paste is forbidden.

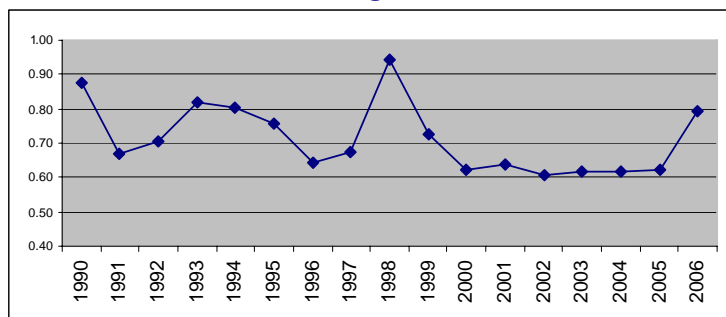
specifically to serve the requirements of either the fresh or the processing sectors. Tomato processing requires varieties that contain a higher percentage of soluble solids (averaging 5 to 9 percent) to make products such as tomato paste efficiently.

Processing tomatoes have lower value per kg (commonly US 7-8¢) than fresh tomatoes (US 55-60¢ per kg). Virtually all processing tomatoes are machine harvested, while all fresh-market tomatoes are hand-picked.

Tomato paste is a competitive global market. The USA is currently the biggest producer of tomato paste in the world at approximately 1.10 million MT in 2005, followed by China with 600,000 MT, and the EU, mainly Italy and Spain. The USA, although a reference market in terms of product quotations, is nevertheless a relatively small exporter in comparison to China, Spain, Italy, Turkey and Iran.

In the last few years prices for tomato paste have been depressed due to oversupply. For 2006, international prices have soared, reaching US 792¢ per kg, thus recovering from levels close to, or below, the cost of production.

Tomato Paste Quotations \$/kg FOB Tomato Paste Council



Source: Morning Star Newsletter, December 2006.

In the period 1998-2005, many processors worldwide have been driven out of business, and the sector has undertaken a process of concentration. In the EU, the industry has managed to survive only because of significant subsidies and the introduction of a production ceiling (8.25 million MT/year). Currently EU farmers receive a subsidy of € 34.5/ton with raw tomato prices at the farm gate being close to € 40.1/ ton.¹⁴

Tomato Paste World: Break-Even Analysis

Break Even Analysis	2006	2000-2005
Tomato Paste Quotation \$/kg	0.792	0.616
Revenue \$/ha Low Range Productivity	10,375	8,069
Revenue \$/ha Medium Range Productivity	11,682	9,055
Revenue \$/ha High Range Productivity	12,989	10,102
Production Costs \$/ha		
Low Cost Processors \$/ha	9,375	9,375

¹⁴ Current price paid at the farm gate for processing tomatoes is around \$48/ton in the USA.

High Cost Processors \$/ha	10,625	10,625
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Source: Tomato World December, 2006.

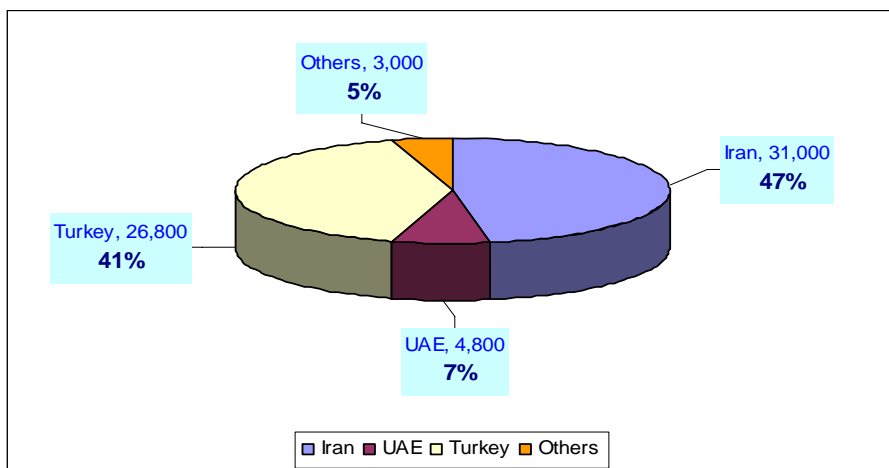
2. THE TOMATO PASTE MARKET IN IRAQ

Market Size

With the exception of Italy, and to smaller extent Spain, the market for tomato derivatives is largely dominated by tomato paste and ketchup. In most developing countries, and all over the Middle East, tomato paste dominates the market for tomato derivatives. In the Middle East, including Iraq, tomato paste is the product category with the highest volumes and consumer penetration among processed vegetables and fruits.¹⁵

The tomato paste market in Iraq has an estimated volume of at least 65,000 tons/year of industrially made product (mainly imported), and perhaps another 30,000 tons of homemade artisan, non-industrial product. Imports of tomato paste in Iraq totaled 65,000 tons in 2005, with Iran the market leader (47%) followed by Turkey (41%), and the UAE (7%).

Iraq: Imports (000 Tons) of Tomato paste, 2005



Source: Statistics of the Exporting Countries and UNCTAD.

The import pattern of Iraq is considerably different from those of the UAE and Saudi Arabia, both of which are characterized by large imports of concentrate paste from China, at 35,000 MT and 20,800 MT in 2005 respectively.¹⁶

¹⁵ Market penetration is expressed as % of the households currently stocking the product.

¹⁶ Triple concentrate product from China is usually reprocessed and diluted in factories in the UAE and Saudi Arabia.

Prices

Iranian tomato paste (26-28 Brix) is sold at a wholesaler price 25% lower than the Turkish products:

Iraq: Wholesaler Market Price

	Turkey	UAE	Iran
Wholesaler Price to Retailer 750g	ID 2000	ID 1800	ID 1500
Wholesaler to Manufacturer 750g	ID 1600	ID 1440	ID 1200
Wholesaler to Manufacturer 1000g	ID 2133	ID 1920	ID 1600
Wholesaler to Manufacturer 1000g	\$ 1.64	\$ 1.48	\$ 1.23
Index Turkey=100	100	90	75

Source: PRT Iraq

A price reference for locally made Iraqi tomato paste is scarcely representative since the production is limited and often - strictly speaking – non-industrial. Quality is uneven and the concentration of the product – or Brix – is not specified on the label.

The Supply Side of Tomato Paste in Iraq

There are no fully operating tomato paste factories in Iraq. Production is limited to small scale, semi-artisan processing units producing tomato paste of uneven quality and concentration that have little consumer acceptance.¹⁷

Reportedly there are two idle production lines in Iraq:

The first is the Harir Tomato Paste and Fruit Juice Factory located, on a fertile plain about 60-km to the northeast of Erbil city center.¹⁸ While refurbishment and technological upgrades will eventually be needed, Harir appears to be a plant that could be returned to productive operation in short order. As recently as 2003, the facility was producing seven metric tons per hour of concentrated tomato paste through a three-shift, seven day-per-week operation. A recent visit by U.S. Embassy staff revealed that the 140,000 square meter factory has been carefully mothballed.

The original factory structures were completed under Saddam in 1978, and originally outfitted with Bulgarian (Technix) machines. There is 630 KVA generator on site, as well as a steam generator and water pump station. Rehabilitation projects took place in 1999 and 2001 when the FAO spent some \$6 million on Italian (Betusi), Dutch and Belgian equipment, as well as certain civil works. The retrofitting of 13 of the 16 lines was completed in 2003 when the FAO terminated production ahead of the war, and operations have never been re-started. A new

¹⁷ Almost the entire consumer sample utilized in the study *The Potential for Food Processing in Iraq* declares to be user of imported tomato paste from Turkey and Iran.

¹⁸ Harir factory data are based on information provided by US Embassy officials who visited the factory in 2006.

Tetra Pak machine for the juice line arrived too late to be used. The hot break processing lines reportedly incorporate electronic controls and low-heat, vacuum technologies which yield a superior product. It is said that the Harir brand had attracted a loyal following for the density, quality and consistency of the paste, which allowed it to compete favorably with Turkish and Iranian products which tried to copy the Iraqi brand. There are also juice lines that include enzyme and modern filtration processes. Product was pasteurized, sanitized or homogenized, as appropriate

At its peak, the facility was run – reportedly - by over 150 technicians and laborers.¹⁹ The tomatoes were sourced on contract from some 235 farmers in Khabat, Ainkawa and Qushtapa, with industrial seed (one variety) and fertilizer provided to the farmers by the plant. About 6,000 metric tons of tomatoes were collected in 2003, sufficient for about 1,000 tons of paste, marketed in 1.2 million 840-gram cans.

View of the Harir Plane in the Kurdistan Region



The second production line reportedly available in Iraq is a set of five lines made in Bulgaria with a capacity of processing 60 MT/day each. Their book value is approximately \$ 450,000 each. A capacity of only 60MT/day is quite unusual in an industry where most of the top exporters have capacities exceeding 1,000MT/day. On the other hand, a higher capacity reached in a factory aggregating five processing lines of 60MT/day each is not as efficient as a unique line of 250-300MT/day. For instance the Bulgarian lines of 60MT/day would need a minimum of 5-6 laborers each, while plants with capacity of 5,000-6,000MT/day can function with three or four workers. Based on Rossi & Catelli data, the economy of scale of factory with a sole processing line of 250-300MT/day would be in the range of 12-15% per cent.

With regard to the vital supply of processing tomatoes, Basrah (and in particular five cooperatives beneficiaries of a recent Danida program focused on yield improvement) is the only area reporting competitive yield/ha (on average 70MT/ha) and a surplus in production.²⁰ During the season 2003/2004 the tomato production in Basrah province was around

¹⁹ Data apparently inconsistent with modern tomato paste factories, where lines processing as much as 5,000t/day can function with 3 or 4 workers – Source: Star Group Impralsa Italy.

²⁰ The cooperatives grow table tomatoes but reportedly have a surplus suitable for processing. The quantification of the annual surplus is already under assessment, jointly with Danida and the cooperatives representatives. The five cooperatives are: Al-Zubair, Safwan, Um Qasr, Khur al Zubair, Al Lehaise.

150,000MT/year. This was primarily with the *Super marimonde* variety with direct planting. Planting season takes place during July to September.

Since 2005 farmers adopted new high-yielding hybrids - such as *Speedy and Hatouf* - and transplant technology - considerably improving quality and yields. During the 2005/2006 season production reached a peak of 1 million MT generating significant overproduction leading to losses and low prices. Production for 2006/2007 is expected to be in the range of 500,000MT, with an estimated surplus possibly around 10 -15%.

3. COMPETITION - COMPETITIVE ANALYSIS AND BENCHMARK

Due to their very significant exports to Iraq, tomato paste from Iran and Turkey are the competitors against which possible Iraqi domestic production should be benchmarked. Turkey has been for decades a competitive regional supplier of tomato paste, but exports have declined over the last two years because of rising costs and an over-valued currency. Iran is widely regarded by top EU buyers in the industry (from Spain and Italy) as one of the most competitive tomato paste producers in the world.²¹

Iran

Main Tomato Growing Areas in Iran



Source: Amitom²²

In Iran tomatoes can be cultivated outside year-around because very different climates exist in the north and the south of country. However, the winter crop in southern Iran is not suitable for paste and peeled tomato processing because of poor color, so 95% are consumed fresh. From 2003 to 2006 average tomato production was 4,289,000 MT. Modern, export oriented processing tomato farms exceed yields of 110 MT/ha, one of the highest productivity in the world.²³

The volume of tomatoes processed in 2005 was 2,124,000 MT. Of 180 tomato processing factories, only seven are equipped with very modern, high performance technology. Their processing capacity represents 27% of total processed tomatoes. Meanwhile, only five companies can produce high quality paste using both cold and hot-break technology. The

²¹ China is the cheapest producer of tomato paste in the world, mainly because of an under-valued currency rather than real productivity.

²² Mediterranean International Association of Tomato Processing.

²³ According to Morning Star Newsletter December, 2006 – California.

biggest processor is the Kamnoosh Co. in northern Iran.²⁴ Four factories have daily capacity > 1000 MT of fresh tomatoes, 12 factories have capacity > 500 MT/day, and the others have a capacity between 100-200 MT/day. Iran exports 21% of its processed tomatoes, notably to Russia, the Arab countries including Iraq, Afghanistan, and some former Soviet Republics.

Turkey

Production of table and industrial tomatoes in 2006 was projected at 9.5 MMT. Tomato Paste production was expected to be 260,000 MT. In 2005, Turkey processed 1,626,000 MT of fresh tomatoes, out of which 260,000 were turned into paste, 11,000 into diced tomatoes, and 8,000 into sun dried tomatoes. Tomato paste exports, however, are expected to decline to 165,000 MT in 2005 due to Turkey's loss of competitiveness in international markets. Main export countries for Turkish tomato paste are Iraq (26,000 MT), Saudi Arabia (12,000 MT), Russia (13,000 MT), and Japan. Processing tomatoes are grown mainly in the Marmara and Aegean regions. For 2006, industrial tomato processors paid an average of TRY 1.0/kg delivered to the factory and the price offered to farmers has remained the same for the last two years despite inflation. Canned tomato paste currently retails for about TRY 2.20/kg.²⁵

Main Tomato Growing Areas in Turkey



Source: Amitom

There are about 45 firms in the industry. Seven or eight large firms each have a daily processing capacity of 2,000 – 3,000 MT (annual capacity around 20,000 MT). The industry product yield (tomato to paste) is estimated at 6.0 kg of tomatoes for 1.0 of tomato paste and the factories are equipped with very modern, high performance technology. Tomato processing capacity is estimated at close to 500,000 MT/year of paste, with a short season of only 60 days when factories operate around the clock.

United Arab Emirates

The tomato industry in the UAE consists of two factories only, located in Al Ain and Abu Dhabi. The new factory in Abu Dhabi, with Italian Catelli & Rossi technology, was inaugurated in 2006. It has the capacity of producing 20,000 MT/year of paste processing 120,000 MT of fresh tomatoes. The Al Ain factory process only 60,000 MT/year of fresh tomatoes. Both factories actively target the Saudi tomato paste market, and import a considerable amount of tomato paste 3 (brix 32-36%) from China to mix with locally made paste.

²⁴ Kamnoosh Company is located in the city of Gorgan, capital of Golestan province in Iran.

²⁵ Exchange rate: 1 New Turkish Lira = \$0.628, average 2006.

Main Tomato Factory Location in UAE



Source: Amitom

Jordan and Syria

On average only 50,000 MT/year of fresh tomatoes are processed in Jordan, for a final production of 8,000 MT of tomato paste. There are currently three factories equipped to produce tomato paste:

- The AMPCO factory, with a capacity of 1,550 MT of fresh tomatoes day, using both cold and hot break technology. The company was privatized in 2004 after suffering operational losses in the years 2002 and 2003.
- The SHAFa factory with a daily capacity of 750 MT of fresh tomatoes.
- The MAFICO with only 150 MT of fresh tomatoes/day capacity.

According to Amitom, the Jordan tomato processing industry is neither particularly efficient nor does it utilize state-of-the-art technology. Processing costs are reportedly higher than Turkey (+12%) and Iran (+38%).²⁶

Main Tomato Factory Location in Jordan and Syria



Source: Amitom

Syria processes an average of 130,000 MT/year of fresh tomatoes. There are almost 20 factories, all with low capacity ranging from 120 to 250 MT/day. Despite a long harvesting season, from July to October, the Syrian processing industry is scarcely competitive in the

²⁶ Mediterranean International Association of Tomato Processing.

regional Middle East market.

Based on a competitiveness analysis conducted by Italian Parma Cluster Tomato Producers, Iran and China are most competitive countries in the world in tomato production. Chinese competitiveness stems mainly from a weak currency, while Iranian competitiveness is due mainly to high yields and low energy costs.

In order to conduct a thorough competitive analysis and develop a cost benchmark between Iraq and neighboring Iran and Turkey, it is useful to consider the typical production cost breakdown of the industry, focusing primarily on two relevant costs: Raw materials (tomatoes) and energy.²⁷ The universally accepted reference cost for the industry is California tomato paste.

Tomato Paste Industry: Average Industry Production Cost Breakdown - Deviations vs. California

Tomato Paste Cost Comparative Analysis	California	Estimated Deviation vs. California Benchmark		
		Turkey	Iran	Iraq Est. ²⁸
Tomatoes (farm gate price)	46%	+5	-5	+3
Energy and Electricity	13%	+2	-9	=
Packaging	9%	=	=	+2
Depreciation and Amortization	6%	+1	+1	+3
Direct Manpower	2%	=	=	=
Transportation	7%	+9	+8	-3
Selling and Marketing Costs	5%	=	=	=
Administrative overheads	8%	+2	+2	+3
Operating Interest ²⁹	4%	=	=	=
Total Cost	100%	+19	-3	+8
Cost Index	100	119	97	108

Source: Tomatoland and Star Italia³⁰

Tomato Raw Material Costs

RMC= f (yield)

The cost of tomatoes depends essentially on yields, since inputs such as fertilizer, pesticides, and insecticides are global commodities with similar prices.

Tomatoes: Country Average Yields/ha

Tomato	USA	Iran	Turkey	Iraq
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²⁷The evaporation process consumes large amounts of energy.

²⁸Izdihar Investment Promotion, Senior Competitiveness estimate based on market analysis in Iraq and Danida data.

²⁹Interest costs related to product seasonality (stock only).

³⁰Star Italia is the leading tomato processing in Italy, using raw material from Spain, Italy, Portugal, Greece, Egypt, Turkey, Morocco, and Iran. The current benchmark is based on data from a Star Italia study in 2005.

Yields				
tons/ha	90	110	75	75
index USA=100	100	122	83	83

Source: Tomatoland and Star Italia

With regard to yields, Iran has a considerable competitive edge over both Turkey and Iraq. The other important factor in tomato production is raw material availability throughout the year to avoid overwhelming the factories with production demands concentrated at one time, and the high cost of stocking.

Assuming production in Basrah, where tomatoes could probably be available throughout the year, Iraq should have slim advantage over Iran and Turkey. The labor force in the fields is not a relevant factor since the picking for big exporters in Turkey (where salaries are higher than in Iran and Iraq) is almost completely mechanized. Turkey is also suffering from an over-valued Turkish Lira, preventing Turkish processors from effectively competing in international markets.³¹

Energy and Electricity

EC= f (cost of energy and fuels) + (subsidies) + (plant capacity)

Energy and electricity costs are important in tomato processing because of the evaporation process used to concentrate the product. Energy and electricity are a big source of competitive advantage for Iran because of the combination of cheap fuel and significant subsidies. In Iraq, the energy produced by generators would have costs similar to those in Turkey, but considerably higher than in Iran. The other factor indirectly affecting energy cost is plant capacity. Big plants usually have economies of scale with regard to energy consumption.

Packaging

Standard packaging for tomato paste is the tin can. Iraq could be at a significant disadvantage, at least in the early stages of the industry, because there are no related and supporting industries. Both Iran and Turkey have in-factory can production.

Depreciation & Amortizations

Depreciation and amortization depend largely on the volume processed. Volumes processed depend on plant capacity, availability of raw material throughout the year, and the typology of products processed in the same plant. (Big Iranian and Turkish tomato paste exporters are usually major processors of juice, also). *Ceteris paribus*, Iraq should have a disadvantage vs. Iran and Turkey, where huge processors already exist. In principle, a processing plant in Iraq – for lack of economies of scale - should have higher relative values of amortization and depreciation than in Iran and Turkey.

³¹ Gain Report – TU6026.

Top Processors Average Plant Capacity MT per Day

Plant Capacity	USA	Turkey	Iran	Italy	Est.Iraq
Processed MT/day	15,000-20,000	2,000-3,000	500-1,000	5,000-6,000	200

Source: Chamber of Commerce of Parma

Transportation

Tomato paste imported from Iran and, especially, Turkey currently faces a very high overland transportation cost. Based on data provided by Iraqi importers, transportation amounts to 13% of the value of the product vs. 6-7% for the Iraqi product, assuming distribution on a national scale. The advantage for Iraqi producers vs. Turkish imports would be even greater in the case of an Iraqi producer based and focused (distribution-wise) in central and southern Iraq. Needless to say, Turkish products would be more competitive in Kurdistan, or northern Iraq.

Selling and Marketing Costs

Notwithstanding specific marketing campaigns, selling and marketing costs should be similar to the benchmarked countries.

Administrative Overheads

Administrative overheads are a fixed cost whose incidence decreases with volume (critical mass). Iraq – because of probable lower processing volumes in the early stage of the industry – would have a significant disadvantage in comparison to Turkey and Iran.

Operating Interest³²

Tomato paste is a product with potentially high stocking costs because of seasonal manufacturing. Iraq should not be at a disadvantage vs. Iran and Turkey because it can supply raw tomatoes year-around, and because interest rates in Turkey and Iran are high as well.

Cost benchmark Conclusions

Realistically, it is probably correct to assume that Iraq could produce tomato paste of 26-28 Brix at a cost 11% higher than imported Iranian paste, and 10% lower than imports from Turkey, once the transportation costs of imports are taken into account. This conclusion is based on a thorough benchmark analysis, considering the data of five tomato growers' cooperatives in Basrah province, and a production cost analysis provided by the leading Italian processor Star Italia, which procures raw material in Turkey, Iran, Spain, Italy, Egypt and Greece.

³² Financial expenses related to seasonality and stocking of the product.

Tomato Paste Cost Benchmarking: Final Result

Tomato Paste Cost Comparative Analysis	California	Turkey	Iran	Iraq Est.
Cost Index	100	119	97	108

Source: Star Italia, Tomato Land, Danida, USDA, Importers-Exporters.

In order to assess the sustainability of an Iraqi tomato paste industry, the following additional steps are required:

- Definition of price positioning for Iraqi tomato paste in relation to Turkish and Iranian imports;
- Definition of minimum factory scale (capacity) for an Iraqi plant in order to comply with the assumptions of the benchmarking analysis;
- Definition of the maximum price payable to farmers for raw material compatible with price positioning and estimated processing costs;
- Definition of the capital investment required and associated financial costs;
- Definition of the business model: dual purpose tomatoes (table and processing) or only processing; product portfolio (eventually other products processed in the same plant).
- Final estimate of a Profit & Loss statement assessing profitability, at the operational and pre-tax level to assess attractiveness to potential investors.

4. TOMATO PASTE FACTORY FEASIBILITY STUDY

Assumptions:

- The proposed price positioning for Iraqi tomato paste is approximately -15% vs. the Turkish product and +12-13% vs. the Iranian tomato paste. A price differential of -20% vs. the Turkish tomato paste would lead to low operational profits, but could be viable at regional level in specific areas close to the plants because transportation costs are lower.
- The minimum economical capacity of a processing plant is 150-200MT/day, the optimum being higher than 300MT/day.
- Capital investment for 150-200MT/day is in the range of \$ 2.7 million, and for capacity of 250-300 MT/day is around \$ 4.5 million.
- The business model for Iraq assumes a plant entirely dedicated to tomato paste with a surplus of raw material from table tomatoes.
- The price paid to the tomato farmers probably cannot be higher than US 7-8¢ per kg.

Tomato Paste Made: Operational Profit Simulation per \$/kg – Plant with Capacity 200MT/day

Scenarios	Price -15% vs. Turkish. Tomatoes at US 7¢ at the farm gate.	Price -15% vs. Turkish. Tomatoes at US 8¢ at the farm gate.	Price -20% vs. Turkish. Tomatoes at US 7¢ at farm gate.	Price -20% vs. Turkish. Tomatoes at US 8¢ at the farm gate.
Net Price/kg - \$	1.388	1.388	1.311	1.311
Raw Material Cost/kg - \$ ³³	0.487	0.556	0.487	0.556
Full Operating Cost/kg - \$	1.082	1.236	1.082	1.236
Operational Profit/kg - \$	0.306	0.152	0.229	0.075
Operational Profit % on Net Sales	22%	11%	17%	6%

Source: Izdihar Investment Promotion Component

Plant Capacity

Plant capacity depends ultimately on available tomato surpluses during the year. The minimum scale for economical production viability is a plant of 150-200MT/day, ideally 250-300MT/day, based on data provided by the leading Italian manufacturer of tomato processing equipment, Rossi & Catelli. In a preliminary analysis, a realistic assumption would be a processing period of 100-110 days/year.³⁴

Plant with processing capacity < than 150MT/day have almost disappeared and are considered by experts in the industry to be economically unviable. A realistic target would be a plant with production ranging from 2,500 to 5,000 tons/year of tomato paste, requiring respectively 16,000 and 26,000MT of raw material or, in other words, 230 and 371 hectares of tomatoes respectively, entirely devoted to processing.

The recommended technology is hot break. There are two different technologies in tomato processing-concentration: hot break and cold break. Hot-break and cold-break tomato pastes possess different attributes, which allow them to be used for different applications. The major difference between hot-break and cold-break tomato paste is the amount of pectin present in the finished product. Pectin contributes to the firmness of the tomato. Enzymes are deactivated in the hot-break process by means of high temperature processing (about 93°C). Precise control of the break temperature is necessary to minimize scorching or browning the product, and to minimize the flavor changes which take place during heating. Properly broken hot-break tomato paste possesses acceptable colour and thickness, and no residual enzyme activity, thereby making it stable for storage. Buyers of hot-break tomato paste are interested in the relative thickness of the paste. The pectin present in hot-break tomato paste is

³³ Assuming 6.5kg of tomatoes for 1kg of tomato paste.

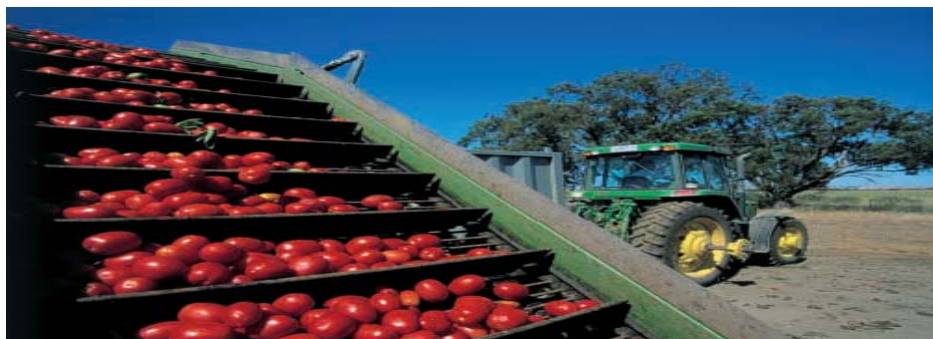
³⁴ The final processing days/year will be recalculated when the data from the cooperatives in Basrah are finalized. Considering Basrah's favorable climate and conditions for tomato growing, there could be as many as 150-200 days of processing. Current data is based on Danida data for the Basrah cooperatives.

responsible for the thickness, or water-holding ability, of the finished product. For buyers of hot-break tomato paste, colour and flavor are considered less important.

Cold-break tomato paste is subjected to lower temperatures (about 60°C) during processing. As a result, the colour and flavor changes are less severe than they are during the hot-break process. However, cold-break tomato paste contains residual enzymes which contribute to product separation during storage. This separation is caused by the breakdown of the pectin in the tomato paste. On the other hand buyers of cold-break tomato paste, consider colour and flavor of primary importance. Cold-break tomato paste is a thinner product, and is used to produce pasta and tomato sauce products, soup, and vegetable cocktail drinks.

Italy is currently the worldwide leader in machinery for tomato processing in the Middle East Africa, the EU, Eastern Europe, and Latin America, led by Rossi & Catelli and FMC Food Tech. Competitive machinery is also available in Turkey. It is on average 15% cheaper than Italian equipment and reportedly has similar performance. Indian and Iranian manufacturers are 35-40% cheaper than Italian equipment, but with admittedly lower quality and performance.

Tomato Sorting in Extremadura - Spain



Typical process flow in a tomato paste line:

Receiving of fresh tomatoes Tomatoes are received in containers. They are tested visually for quality. If accepted they are dumped into a washing basin.

Washing of fresh tomatoes Tomatoes are washed using clean water and water from the secondary wash. Air/steam is introduced to improve mixing. Tomatoes are transported by belt conveyors to a secondary wash zone that uses sprays of clean water for the final wash. Wash water is recycled (Clean In Place, CIP system), after allowing the sedimentation of dirt, and settleable and suspended impurities. Floating material is removed manually with a net. Some facilities use rotary filters for removing both types of impurities.

Manual sorting Workers seated on both sides of the moving belt conduct visual inspection. They sort and discard rotten tomatoes. Solid waste from this step is a potential pollution source.

Preparation of tomato juice Tomatoes are then fed to a large, jacketed vessel where they are heated with indirect steam (in the jacket) and squeezed. A sieve

separates the juice, which is fed to the evaporators for concentration, after the addition of salt.

Concentration of tomato juice Concentration must be performed under vacuum so that vaporization can be achieved at low temperatures (about 65°C). The vaporization temperature is an important quality control parameter. A higher temperature will cause overcooking (brown color). Vacuum is produced by barometric leg condensers, which use large amounts of cooling water. The waste cooling water is hot (60°C), and will be contaminated with organic matter, since it comes in direct contact with the water vapors from the tomato juice.

Canning and sterilization The tomato paste is then canned, sealed, and sterilized using successive heating and cooling.

Tomato juice production Sometimes the same line is used to prepare tomato juice by adding salt to the cooked juice. The juice is packed, sterilized, and stored.

Lever Company Tomato Paste Production Lines in Goiania - Brasil



The projected Profit & Loss for such operation would be as following;

Tomato Paste Made in Iraq: Pre-Tax Profit Simulation - Financial Expenses Included

Plant Installed Capacity - Tons/day	150	250
Tomato Paste Total Production – Tons/year	2,431	4,051
Tomatoes Processed – Tons/year	15,802	26,336
Days of Processing	105.3	105.3

Net Sales	\$ 3,375,000	%	\$ 5,625,000	%
Operating Profits US 7¢/kg to Growers	\$ 742,500	22%	\$ 1,237,500	22%
Operating Profits US 8¢/kg to Growers	\$ 573,750	17%	\$ 956,250	17%
Financial Expenses	\$ 756,000	22%	\$ 1,260,000	22%
Pre-Tax Profit at US 7¢/kg	\$ -14,000	-0.4%	\$ -22,500	-0.4%

Operating profit is satisfactory, but pre-tax profit is negative because of high financing expenses (interest for a loan covering the capital investment is calculated on the basis of 28%/year).

5. CONCLUSIONS

A preliminary competitive analysis suggests that the development of a tomato paste industry in Iraq is promising:

- At the recommended price positioning, the Iraqi, locally made product could realistically achieve 8-10% market share;³⁵
- There is an opportunity to absorb significant surplus of table tomatoes that may not have a market otherwise. The existence of real surpluses with virtually no market is vital for the viability of the industry. It must be analyzed in detail with respect to the tomato cluster in Basrah currently reporting surplus production. Currently Basrah province produces an estimated 500,000MT/year with a surplus around 10 -15% being lost or sold at a price < than ID 100/kg;
- The industry could generate jobs in the tomato fields. According to Ardi – *The Iraq Marshland Restoration Program*, April 2004 – tomato is the crop with the highest labor requirement (40-50 person/days per donum).
- The Profit and Loss (P&L) analysis projects a positive operating profit but a negative pre-tax profit:

Nevertheless the viability of the scheme depends on:

- The existence of enough surplus tomatoes (a minimum of 15,000MT/year).
- Farmers' willingness to accept a farm gate price of US 7-8¢ per kg – ID 90-100, at the current exchange rate. (A likely assumption if there are surpluses with virtually no value in the market due to overproduction).
- Alternatively, the development of an industry dedicated 100% to processing tomatoes – as opposed to depending on residual crop of table tomatoes. This depends on the capacity of Iraqi tomato growers to be profitable with a farm gate price of US 7¢ per kg, the price compatible with the recommended product price positioning in the market. A final calculation and assessment of tomato production costs among growers is still under way.³⁶
- Availability of sufficient supplies of clean water at a competitive price. A tomato paste factory utilizes on average 5m³ of water for each ton of raw processed material. Water

³⁵ Taking away 25% of current market share of the Turkish tomato paste, because of lower prices and distribution.

³⁶ By comparison, the cost of production in Turkey ranges from \$3,750 to \$4,250 per hectare.

availability is far from a given, particularly in Basrah province, where quality water is already in short supply.

- Availability of electricity. The electricity constraint affects the Kurdistan region where the Harir plant is located and Basrah. Both grid electricity and the availability of diesel for generators present significant problems.
- A plant with a minimum capacity to process 150-200MT/day, with an average 100-105 days of processing/year. (Ideally a capacity > to 300MT/day). *Ceteris paribus* the utilization of the five existing Bulgarian lines with capacity of 60MT/day each is not recommended and seems economically unviable for lack of economy of scale. Capital investment for 150-200MT/day is in the range of \$ 2.7 million, and for capacity of 250-300 MT/day is around \$ 4.5 million.

Another real constraint, potentially undermining the entire project, is the high burden of financing costs in Iraq because of high interest rates.³⁷ Under the current circumstances, the operating profit obtained with farm gate price of US 7¢ per kg for fresh tomatoes, would only cover financial expenses leaving no pre-tax profit for the investors.

This constraint could overcome by:

1. Granting loans at a special rate (in the range of 10% to maintain profitability attractive to potential investors).
2. Higher operating profits and lower investment as a result of a longer period of processing during the year (assumed to be 105 days in the current model).
3. Developing an integrated scheme with cooperatives of tomato growers owning the processing operation. In this case low profitability would be overcome by the income from utilizing tomato surpluses.
4. Transfer of the existing six lines – Bulgarian technology – of 60MT/day capacity to cooperatives or investors at a price well below the book value. In this case the reduction in financial costs would offset the high production costs due to the lack of the economy of scale in the plant.³⁸

6. NEXT STEPS

1. To finalize (along with the PRTs) an evaluation of current levels of surplus of fresh tomatoes (planted for table consumption but unsold for lack of demand). A preliminary analysis highlighted the strategic importance of Basrah province, which has already turned into a promising tomato production cluster, where five cooperatives have yields ranging from 70 to 80MT/ha.
2. To confirm with tomato growers in Basrah and Kurdistan the actual tomato production cost in order to assess whether the venture is practical with prices at US 7-8¢ per kg at the farm gate.

³⁷ The current cost of borrowing in Iraq is around 28%.

³⁸ No more than 40-50% of the book value in order to maintain financial expenditures on capital investment at a level of 7-8%, compatible with the operational profit of the industry.

3. An assessment of the five Bulgarian production lines with capacity of 60MT/day, although their utilization is not recommended for lack of economies of scale.
4. An assessment of water availability and cost in the Basrah province assuming a processing capacity at 250-300MT/day.
5. An assessment of water and electricity availability both in Basrah and in the Harir plain of Kurdistan.