Food and Agriculture Organization of the United Nations

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Egypt
Wheat sector review

COUNTRY HIGHLIGHTS

FAO INVESTMENT CENTRE

Egypt

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FOREWORD

Egypt – the most populous country in the Arab World – is also by far the largest importer of wheat globally. For centuries, wheat has been a central component of the typical diet of the country's inhabitants. Per capita consumption of this cereal is amongst the highest in the world. The domestic wheat industry provides an important contribution to employment and value added in the agrifood sector. At the same time, assuring access to this important staple food by all Egyptian citizens, a quarter of whom live under the poverty line, has also been a central aspect of the country's social policies. The strategic importance of the wheat sector has resulted in a strong involvement of the State at all levels of the wheat value chain.

The joint sector review of the Food and Agriculture Organization of the United Nations (FAO) and the European Bank for Reconstruction and Development (EBRD) aims at helping both policy-makers and investors to achieve the goal of more efficient and inclusive agricultural and food systems. This publication was financed by the FAO and EBRD Multi-Donor Account for the Southern and Eastern Mediterranean (SEMED region). Its objective was to identify the main bottlenecks in the wheat supply chain and to enable dialogue between Egyptian public and private sector actors in order to allow for greater private sector investment along the wheat supply chain and ultimately improve the country's food security.

The report provides a general overview of the Egyptian grain sector, followed by an analysis of more specific aspects of the wheat sector such as production, consumption, trade, storage, milling and wheat policy. The analysis lays particular stress on some of the weaknesses of the sector that should be addressed to make it more efficient. In particular, the report underlines the importance of allowing for a more active participation of the private sector in assuring the country's food security. This would allow for an overall rationalization of the sector that could lead to important savings of public funds.

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The main author of the report is Julian McGill from LMC International, United Kingdom. Peter Talks and Boris Sterk, both Economists at the FAO Investment Centre Division, conducted research on wheat consumption and wheat policy and contributed to the drafting of several chapters of the report. Oleksandra Prokopenko, Econometrician, contributed to the analysis and the chapter on wheat consumption in Egypt. The authors used information collected from public and private sector sources in Egypt, as well as from the FAO country office.

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ACRONYMS AND ABBREVIATIONS

CAPMAS	Central Agency for Public Mobilization and Statistics
CAPQ	Central Administration for Plant Quarantine
CBOT	Chicago Board of Trade
EGP	Egyptian pound
EHCSS	Egyptian Holding Company for Silos and Storage
ERSAP	Economic Reform and Structural Adjustment Programme
FAO	Food and Agriculture Organization
FAOSTAT	Food and Agriculture Organization of the United Nations Statistics Division
FIHC	Food Industries Holding Company
GASC	General Authority for Supply Commodities
GCSS	General Company for Silos and Storage
GDP	Gross domestic product
GOEIC	General Authority for Export and Import Control
IRR	Internal rate of return
LHS	Left-hand side
LMC	LMC International
MALR	Ministry of Agriculture and Land Reclamation
MoSIT	Ministry of Supply and Internal Trade
NPV	Net present value
OECD	Organisation for Economic Cooperation and Development
OPEC	Organization of the Petroleum Exporting Countries
PBDAC	Principal Bank of Development and Agricultural Credit
RHS	Right-hand side
USD	United States dollar
WHO	World Health Organization

Arabic expressions

Ardeb	Traditional unit for measuring the volume of crops. One *ardeb* of wheat is meant to weigh 150 kg.
Baladi	Subsidized flat bread made from coarse 82 percent flour.
Berseem	Egyptian clover, a high-yielding legume crop with low input requirements grown during the winter period and used as animal feed.
Feddan	A traditional Egyptian measure of area. One *feddan* is 0.42 hectares.
Fino	Non-subsidized bread from finer 72 percent flour.
Nili	A short second summer crop grown from August until October (named after the period in which the Nile used to flood).
Piastre	One-hundredth of an Egyptian pound.
Shona	Large traditional flat storage system for Egyptian wheat.

EXECUTIVE SUMMARY

Part I. Towards a more active engagement of the private sector in the Egyptian grain sector

The importance of wheat for Egypt

Wheat is the most important grain crop in Egypt and grains are, in turn, the most important crop group. Wheat represents almost 10 percent of the total value of agricultural production and about 20 percent of all agricultural imports. Egypt is also the world's biggest wheat importer and the General Authority for Supply Commodities (GASC) of the Ministry of Supply and Internal Trade of Egypt (MoSIT) alone is the world's biggest wheat purchaser. It is thus understandable that wheat is a product of paramount importance to Egypt and wheat policy is a priority for the government.

The importance of wheat policy is reinforced by Egypt's specific social realities: with over a quarter of the Egyptian population living under the poverty line, assuring the food security of all citizens is a key challenge for the government. A key component of government policy in this regard is the provision of low-priced bread to the population. This is achieved through a number of government subsidies at the various stages of the value chain: from subsidized fertilizers to subsidies of the price of the final product, *baladi* bread. Under the Egyptian ration card system, 65 million Egyptians (around 80 percent of the population) are able to purchase a form of flat bread called *baladi* at a heavily subsidized price of 5 piastres compared to the free market price of 36 piastres. The subsidized price has been fixed since 1989.

The *baladi* bread program is the single most important food subsidy in Egypt, accounting for over half of the total cost of Egypt's extensive ration card system (subsidized vegetable oils, sugar, rice and tea are also available in restricted quantities on the ration card). A growing population, weaker currency and high world wheat prices mean that the cost of the program has escalated over the past decade. In 2010/11, the cost of the *baladi* bread subsidy amounted to an estimated 0.8 percent of Egypt's GDP. In addition, the government has occasionally had difficulties securing foreign exchange to purchase imports of wheat, placing the country's food security at risk. The Minister for Supply, Khaled Hanafi, has also noted that there are leakages and wastage in the program.[1]

1 Rai, Neena and El-Ghobashy, Tamer (14 April 2014). "Egypt to Introduce Smart-Card System for Subsidized Bread" *The Wall Street Journal* [News article]. Retrieved from www.wsj.com/articles/SB10001424052702303887804579501444058323618.

The reform of the *baladi* bread program is therefore a high priority for the Egyptian government which is facing increasing difficulties funding the program. However, there is a strong sense of entitlement to subsidized bread in Egypt and reforms are very politically sensitive. Among the grievances which led to unrest in 2011 were shortages in the availability of *baladi* bread and long queues at bakeries.

A heavy involvement of the Government in the wheat value chain

Reforms are made even more complex by the fact that, in order to provide the subsidized *baladi* bread, the government is heavily invested and deeply involved in the wheat sector. In doing so, the government has skewed the market for wheat in Egypt and distorted incentives for private sector investment.

At present:

- The Egyptian government is the only major purchaser of domestic wheat. The government also provides an artificially high procurement price to encourage farmers to plant wheat. This comes at a high cost and distorts cropping patterns in Egypt away from competing crops such as potatoes, onions and forage crops.
- The Egyptian government is the world's single largest importer of wheat. The tender documents have become increasingly complex in recent years. The proliferation of stricter requirements, the plethora of agencies involved, uneven enforcement and testing delays have made suppliers increasingly wary. Private sector suppliers must factor in all of these risks when supplying to the government. Some suppliers suggest that wheat prices are higher for the government than for private companies by roughly USD 6-7/tonne, plus a further USD 0.50-0.75/tonne for government inspections at the port of loading compared to using private inspection services at a cost of about USD 0.25/tonne. Additionally, the "freedom from ambrosia seeds" rules in force mean that if a shipment is declared to include ambrosia, additional costs of USD 12-15/tonne are incurred. This risk converts into higher prices for Egypt's wheat imports.
- The Egyptian government operates all large-scale inland storage. The majority of government storage consists in a system of traditional flat storage called *shona*. The poor quality of this storage causes significant qualitative and quantitative losses from exposure to weather and pests. In addition, wheat is handled manually in bags, adding further impurities and losses (bags tear apart easily and are easy to steal). While there are no official estimates available of the losses at the shona, they are believed to be in the range of 10-20 percent.
- The Egyptian government operates 6.6 million tonnes of milling capacity directly and uses another 4.3 million tonnes of private sector facilities through tolling contracts. In both cases, it is widely believed that large volumes of flour and wheat are resold on the black market. This is particularly true for public mills which receive the wheat at a subsidized rate (private mills by contrast are paid a fixed tolling fee).

Table E.1: Estimated costs due to tender complexity and *shona* losses

	Cost/tonne	Total Costs, USD million
GASC tender complexity and short notice	6-7	25.8-30.1
GASC port of loading inspection	0.50	2.2
Costs of ambrosia presence	12-15	n.a.
Cost reduction by replacing *shonas* with private silo storage	26.9	43.0

Sources: Egyptian and international grain traders and importers.

Note: Based on GASC imports of 4.3 million tonnes (2011-13 average).
It is assumed that *shona* wheat losses are 10 percent and that 1.6 million tonnes are procured by the government.

Scope for increasing private sector involvement to improve food security

All of this increases the economic cost of the *baladi* bread to the Egyptian government. However, it also means the government could realize significant cost savings by relying on the private sector to a greater extent. By liberalizing its procurement system, the government can reduce the high cost of wheat procurement (both domestic and imported), reduce the level of losses from domestic storage, save on the cost of port storage and reduce losses of wheat and flour during milling, while increasing the quality of the *baladi* bread.

Several obstacles make the involvement of private companies – both local and foreign – in the Egyptian wheat sector difficult at present. In the first place, it is not easy for small and medium Egyptian private sector grain suppliers to compete with state-owned enterprises as they face uncertainties related to unfavourable market conditions, unpredictable actions by the state and the need to borrow capital at financial market rates, amongst others.

In addition, institutional constraints stand in the way of an effective communication between the private and the public sector. The private grain trading and storage enterprises lack representation through existing industry chambers, which limits effective dialogue between the private sector and the government. It is critical to address these barriers to a more active involvement of the private sector if a more sustainable and efficient wheat sector is to emerge in Egypt.

In April 2014, the government launched an ambitious reform to the *baladi* bread programme in order to decrease waste and corruption. Bakers no longer purchase flour at a heavily subsidized price but are compensated by the government based on their sales of *baladi* bread. Consumers have been issued smart cards that can be used to buy up to five loaves of bread per person

per day or, if this allocation is not used, converted into credits to buy other subsidized foods. It is understood that, in January 2015, the smart card system was already rolled out to 19 of the 27 Egyptian governorates.

Advantages of the new system include that bakeries have an incentive to improve the quality and availability of *baladi* bread, consumer choice is increased and the removal of the flour subsidy reduces the incentive for unscrupulous operators to sell subsidized flour on the black market. It also starts to address the issue of improving the targeting of Egyptian food subsidies to those most in need.

No data on the impact of this programme has been published to date. It is therefore too early to draw conclusions. However, Government and trade sources have indicated that the MoSIT will continue to be vigilant to ensure that the reform fulfils its aims.

Recommendations

Based on the evaluation presented in this report, there is scope for increasing private sector participation in the wheat value chain in order to increase the overall chain efficiency and reduce costs for the government budget while strengthening Egypt's food security.

In this context, it is recommended that private grain supply companies engage in a more active dialogue with the government. The establishment of an association of grain storage and trade companies, representing the interests of the private sector in this dialogue, is strongly encouraged.

It is also recommended that the government:

- Reduce the artificially high domestic procurement price for wheat in the long-run. In 2014, the government paid USD 84 per tonne more on average for domestic wheat compared to imported wheat with a total cost of over USD 350 million. Furthermore, by inflating the cost of domestic wheat the government encourages farmers to plant wheat instead of competing crops such as vegetables and other crops, which could provide opportunities for value added and/or export earnings.
- Reduce the complexity of wheat import tenders. In particular, increasing the delivery time and reducing the excessive number of agencies involved in inspections would improve the bidding process and reduce the price paid by GASC. Launching an effective dialogue between the public and private sector would improve trust between the government and its suppliers. In particular, a more active dialogue between GASC and the private sector could alleviate the currently onerous trade requirements, while ensuring that imported wheat meets GASC specifications. Based on discussions with wheat importers and suppliers, it is estimated that inspections in the port of loading add about USD 0.50/tonne to the cost of imported wheat. Improved public-private dialogue in the sector could address these and other inefficiencies.

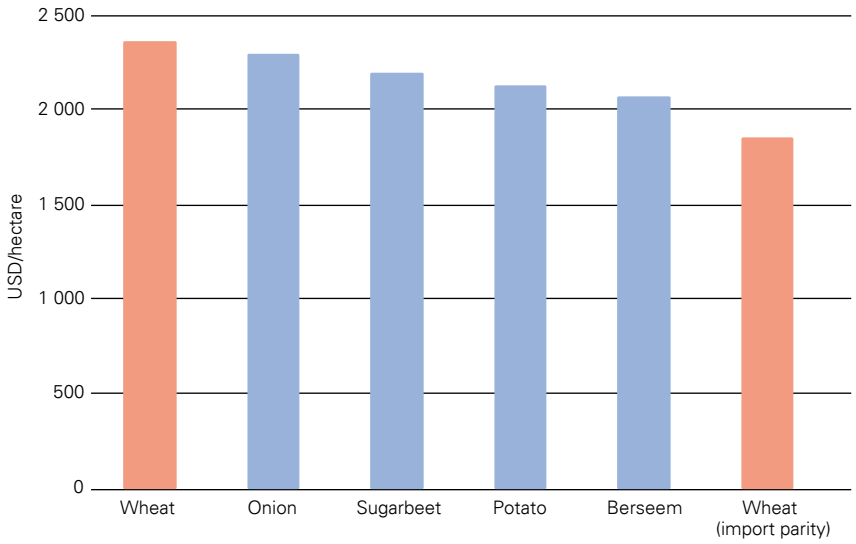
- Review the existing freedom from ambrosia seeds rules and implement a risk-based assessment approach to ambrosia and other invasive species in line with the applicable international phytosanitary standards. According to the private sector suppliers, if a shipment is declared to include ambrosia seeds, this results in additional demurrage, sieving and storage costs totalling between USD 12-15/tonne while no clear tolerance or rejections are often applied in practice.
- Rely on privately built silo storage to store the domestic wheat crop. While silo storage would be more expensive than the current *shona* system, the savings in terms of reduced losses would be significant. Based on the 1.6 million tonnes of wheat stored in the *shona*, it is estimated that using privately run modern storage facilities or silos would save a total of just over USD 43 million per year.
- Rely more on private storage companies in ports. Because private sector storage is used for more than one commodity and run efficiently, it is able to achieve a higher throughput of commodities. As a result, silos in the private sector are able to provide storage at lower costs. In addition, the private sector has shown that it is able to construct storage quickly and up to good standards. Detailed analysis shows that investment in storage in Egypt, depending on the volume of throughput, would provide an Internal Rate of Return (IRR) of between 17-21 percent (compared to a prevailing 12 percent discount rate).
- Rely more on private mills. Private mills have higher efficiency and fewer employees, hence lower costs. In addition, the system of toll milling is clearer and easier to monitor than the system of subsidized wheat used in public mills.
- Improve data transparency, in particular concerning the following: (i) GASC import requirements; (ii) publishing domestic wheat production, procurement and consumption data and forecasts; and (iii) publishing regular information on the operation of the *baladi* bread programme, such as the volume of monthly flour deliveries and bread demand.
- Move ahead with the recent reforms of the *baladi* bread programme, which are strongly welcomed, and their goal of reducing waste, inefficiencies and corruption. It should also pursue, with the fine-tuning necessary, to ensure that the new policies in the area achieve their goals and use the opportunity created to further investigate reducing the role of the state and reducing inefficiencies in the wheat supply chain. Ultimately, a move to a cash-based income transfer system would be a more efficient mechanism than bread subsidies to support those on low incomes.

Part II. The key aspects of the Egyptian wheat supply chain

Domestic wheat production

Land holdings in Egypt are very small, with 89 percent of land holdings smaller than 3 feddan (1.3 hectares). The mild climate, constant irrigation and fertile soil mean that yields are high and farms in Egypt are able to sustain multiple crops. Farmers rotate between cereals and break crops.

Diagram E.1: Gross margins for wheat and competing crops



Source: MALR, field work and authors' calculations.

Grains are the most important crop group in Egypt and wheat is the most important grain. Wheat is grown throughout Egypt, in the Delta region, along the banks of the Nile, as well as in the newly reclaimed areas. In 2012, wheat was grown on 4.3 million farms and it alone accounted for USD 3.7 billion, around 9 percent of the total value of agricultural production and over one-fifth (22 percent) of the total value of field crops (USD 17.3 billion).

Wheat is grown as a winter crop and occupies close to half of the winter crop area. It competes principally with *berseem* (also known as Egyptian clover), as well as with onions, potatoes and sugarbeet. Since 2002, wheat has managed to increase its share of the winter cropped area from around 41 percent to 47 percent.

The government offers a high procurement price for domestic wheat above the import parity price i.e. the world price for wheat adjusted for the cost of delivery

to Egypt. As we can see in Diagram E.1, this has the effect of increasing the gross margins for wheat above those of the other main competing crops, such as: onions, potatoes, sugarbeet and berseem. However, based on import parity prices, wheat would have the lowest gross margins. The high domestic procurement prices therefore biases agricultural production towards wheat. Removing the high procurement price for wheat would make vegetables such as onions and potatoes, which provide opportunities for further value added and have a large and lucrative export market, more competitive.

Wheat trade and storage

The Egyptian government is heavily involved in the wheat supply chain:

- The Egyptian government is the only major purchaser of domestic wheat from farmers. All other domestic wheat is consumed on-farm often in the form of very coarse 100 percent flour. Confusingly, purchases are split between three agencies: the Principal Bank of Development and Agricultural Credit (PBDAC) accounts for half of purchases, with the Egyptian Holding Company for Silos and Storage (EHCSS) and the Food Industries Holding Company (FIHC) purchasing the remainder. Over the past three years the government has purchased 37 percent of domestically grown wheat with the remaining wheat consumed on-farm for food, seeds, feeding and other purposes. The government also encourages the domestic production of wheat by providing high domestic procurement prices for wheat, as well as subsidized fertilizers.
- The Egyptian government is believed to be the world's single largest importer of wheat. According to GASC, it accounted for 43 percent of all of Egypt's wheat imports over the past three years, as shown in Table E.2.

Table E.2: Government and private sector purchases of domestic and imported wheat, average 2011-2013

	Domestic	Imported	Total
Government (thousand tonnes)	3 167	4 335	**7 502**
Private sector (thousand tonnes)	5 501	5 815	**11 316**
Total	**8 668**	**10 150**	**18 818**
Government share of total	*37%*	*43%*	*40%*

Sources: USDA PSD, USDA GAIN, OECD/FAO Agricultural Outlook, Egyptian Ministry of Agriculture and Land Reclamation (MALR) and fieldwork data.

Imports

The government purchases wheat through GASC. The government's share of imports has been declining, partly as a result of increased procurement of domestic wheat.

GASC buys wheat opportunistically through the year though it often ceases to import during May and June when the Egyptian harvest is underway. On average, tenders come out every two to three weeks and are released on Reuters late in the evening in Cairo after the Intercontinental Board of Commodity Exchange (formerly known as the Chicago Board of Trade) has closed.

The shipping time for GASC tenders is on a very short notice, for example a tender set out on 8 July may envisage delivery between 21 and 31 August. This means that suppliers incur additional costs arranging for transportation and some potential supply origins are cut off as they do not have enough time to arrange delivery. On some occasions, when ports are very busy, traders are not able to arrange for delivery.

Inland storage

As a result of its large purchases of wheat, the government is also actively involved in the storage of wheat.

The government has around 3 million tonnes of inland storage capacity, of which 2.1 million tonnes are in a traditional system of flat storage in jute bags called *shona* administered by the PBDAC. The remaining public storage is in silos operated by the EHCSS and the General Company for Silos and Storage (GCSS).

In addition, the government operates 400 000 tonnes of port storage through the GCSS in the ports of Alexandria, Damietta and Safaga.

The government operates almost all inland wheat storage as shown in Table E.3. The GCSS has two silos to serve the greater Cairo area. One has a capacity of 100 000 tonnes and is located in Shubra (a suburb of Cairo). The other has 60 000 tonnes of capacity and is located in Imbaba (a neighbourhood in Giza).

The EHCSS have 25 silos with an average capacity of 30 000 tonnes each, distributed throughout Egypt. These were built as part of a project to build 50 silos in Egypt and, despite the long overrun on the project, there are still plans afoot to complete the remaining 25 silos.

Table E.3: Inland storage capacity by government agency

Agency	Capacity (thousand tonnes of wheat)	Type of storage
GCSS	160	Silo
EHCSS	750	Silo
PBDAC	2 100	Flat storage
Total	3 010	

Sources: Data on PBDAC storage capacity was kindly provided by the agency itself. EHCSS and GCSS numbers are based on information provided from a range of interviews.

Note: In addition the flour mills themselves have capacity to store wheat waiting to be milled.

The PBDAC accounts for the largest share of inland storage capacity, but also has the most outdated facilities. The PBDAC stores wheat in a traditional system called the *shona*. A *shona* is a simple floor area enclosed by fences, where wheat is stored by stacking it in jute bags. There are 355 *shona* in Egypt, ranging in size from 6 000 to 8 000 tonnes of capacity. Of these *shona*, only 88 have concrete floors.

This basic system of storage in the *shona* is extremely wasteful. The jute bags often tear and leave the wheat vulnerable to weather and pests. This results in important losses of wheat and reduces its quality, impairing its suitability for milling by increasing the share of impurities. Handling is also done manually, which adds further impurities and losses. While there are no official estimates available of the quantitative losses at the *shona*, these are believed to be in the range of 10-20 percent.

In January 2015, it was reported that the MoSIT and Blumberg Grain would launch a programme in 2015 to build grain storage facilities, including the modernization of up to 164 *shonas*. The first part of this USD 28 million programme is aimed at building 93 grain storage facilities with a total storage capacity of 750 000 tonnes.[2]

Port-level storage

As Table E.4 shows, the private sector has much greater port-storage than the government. The latter secured funding for a silo construction program, supported by the United Arab Emirates, aimed at increasing total government storage capacity for wheat (internal and at ports) by almost half - adding 1.5 million tonnes of capacity. Of this additional capacity, 120 000 tonnes will

2 Blumberg Grain official website (January 2015). "Egypt and Blumberg Grain launch world's largest integrated food storage systems". Retrieved from http://www.blumberggrain.com/2015/01/22/egypt-and-blumberg-grain-launch-worlds-largest-integrated-food-storage-system/, accessed 29 January 2015.

be at ports. In addition, it was reported that GCSS has begun work on a further 420 000 tonnes of additional capacity.

While the government has taken steps towards improving their wheat storage capacity, they could also lower costs by drawing on private sector expertise and storage. As private sector storage is used for more than one commodity and run efficiently, it is able to achieve a higher throughput of commodities (more turns per year). As a result, silos in the private sector are able to provide storage at lower costs. In addition, private sector operators have shown they are able to construct storage quickly and up to good standards.

Table E.4: Government and private imports compared to port storage capacity from 2011-2013

	Government	Private
Volume of imports (thousand tonnes)	4 335	15 242
Storage capacity (thousand tonnes)	400	2 933

Sources: GASC imports from USDA GAIN reports, imports of other grains, oilseeds and protein meals in the private sector are from the OECD/FAO Agricultural Outlook. Capacity data is from fieldwork calculations.

Note: Government storage is used only for wheat, while private sector storage is used for wheat, maize, other grains, oilseeds and protein meal.

Wheat milling

The *baladi* bread program uses both imported and domestically grown wheat. In practice, the two types of wheat are blended together before being milled. While local wheat is of a sufficiently good milling quality at harvest, the low quality of storage means that impurities are combined with the wheat and that, eventually, different qualities of wheat are mixed together. As a result, blending with imported wheat is important to achieve the right quality of flour.

The wheat for the *baladi* bread program is milled in both public and private mills. As of Spring 2014, there were 80 public sector mills and 69 private sector mills engaged in producing 82 percent flour. The public sector mills have an average capacity of just over 82 000 tonnes/year (250 tonnes/day), while the private sector mills have a smaller average capacity of just under 62 000 tonnes/year (approximately 190 tonnes/day). Close to two-thirds of the wheat is milled in public sector mills and the remainder in private mills. As a result, the average capacity utilization is higher (72 percent) in the public than in the private sector mills (63 percent).

The wheat purchased by the Egyptian government is distributed to government and private mills to be ground into 82 percent extraction flour for the production of *baladi* bread. Private mills are not allowed to produce 82 percent flour unless they are operating under a government contract (instead they produce finer 72 percent *fino* flour). As Table E.5 reveals, of the 7.5 million tonnes of wheat milled over the previous three years, almost two-thirds were milled in government owned facilities while the remainder was milled in private sector mills on a tolling contract.

Table E.5: Government and private sector wheat milling for *baladi* bread, average 2011-2013

	Number of mills	Capacity of mill (thousand tonnes)	Wheat milled (thousand tonnes)
Government	80	6 601	4 782
Private sector	69	4 259	2 720
Total	**149**	**10 860**	**7 502**

Sources: MOSIT and authors' calculations.

This 82 percent flour is provided to 18 000 *baladi* bakeries, which produce only *baladi* bread. Of these, less than 2 percent are owned by the government. However, government-owned bakeries are on average seven times as large as private bakeries, as a result their share of total baking capacity is higher at around 12 percent.

Traditionally, the government has provided subsidized flour to bakeries to produce *baladi* bread to be sold at the subsidized price of 5 piastres. Under this system, apart from periodic inspections, there was no systematic means of tracing the actual volume of bread produced and consumed, leaving it open to widespread fraud. In addition, the quality of the bread was often poor, particularly in the villages. As a result, it is well-known that the subsidized bread was often used as cheap animal feed rather than for human consumption.

The government has taken a brave step towards reducing these costs by introducing a new system in many cities including, during the writing of this report, in greater Cairo, under which each person is only entitled to 5 loaves of *baladi* bread and an electronic smart card is used to purchase the bread and determine the subsidies to which the baker is entitled, instead of receiving heavily subsidized flour. The new system is far more efficient and, if properly implemented, could significantly reduce wastage.

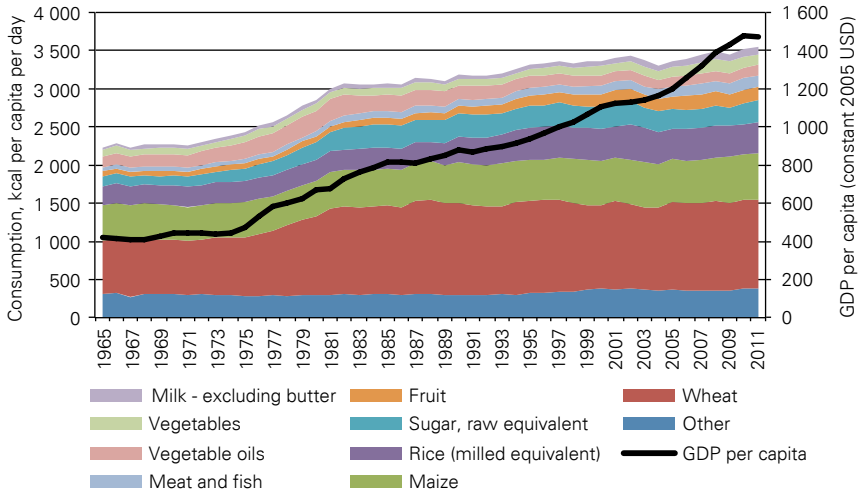
Wheat consumption

In spite of a decrease in the share of cereals as a source of food energy, mostly to the benefit of fat and protein-rich foods, wheat remains the main energy source in terms of daily calorie intake in Egypt and bread remains the main staple food in the typical Egyptian diet.

After a period of sustained growth that coincided with an important increase in daily per capita calorie intake and an overall growth in food consumption between 1960 and 1990, wheat consumption levels stabilized and currently provide about one-third of daily calorie per capita intake. Wheat consumption does not seem to vary considerably across different population groups and having stabilized in terms of per capita consumption, it can be expected that overall consumption will grow as a result of population growth.

Bread consumption remains high in spite of a relative diversification of the average diet over the last few decades and animal protein consumption remains very low. This peculiarity of the typical Egyptian diet has been pointed out as one of the main causes for a wide range of health problems that have affected the population in recent years and that represent an important burden to the country's healthcare system.

Diagram E.2: GDP growth (per capita, constant 2005 USD) and per capita daily calorie intake from food products (kcal)



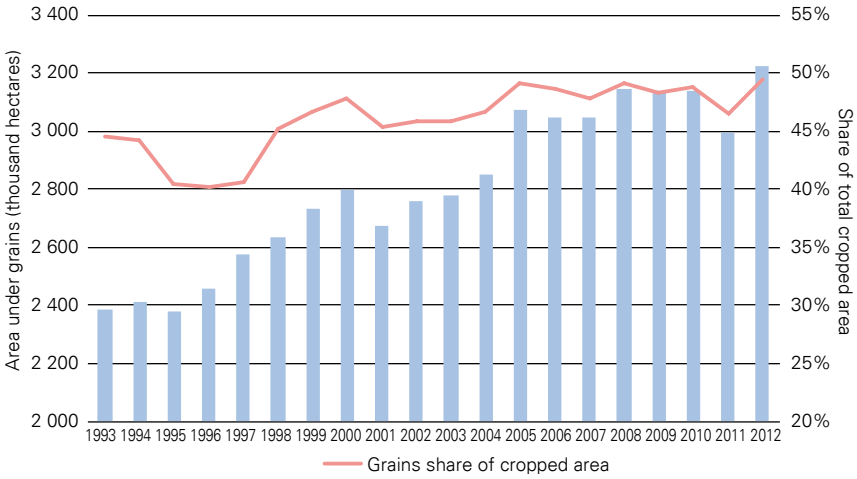
Source: FAOSTAT and World Bank data.

Chapter 1 – Introduction

The grain sector

Grains are the most important crop group in Egypt and wheat is the most important grain. As Diagram 1.1 shows, over the past three decades grains have occupied between two-fifths to half of the cropped area in Egypt. As the cropped area has expanded, both through land reclamation and intensification, the area under grains has grown from around 2.4 million hectares to reach over 3.2 million hectares in 2012.

Diagram 1.1: Area under grains and share of cropped area



Source: Ministry of Agriculture and Land Reclamation (MALR).

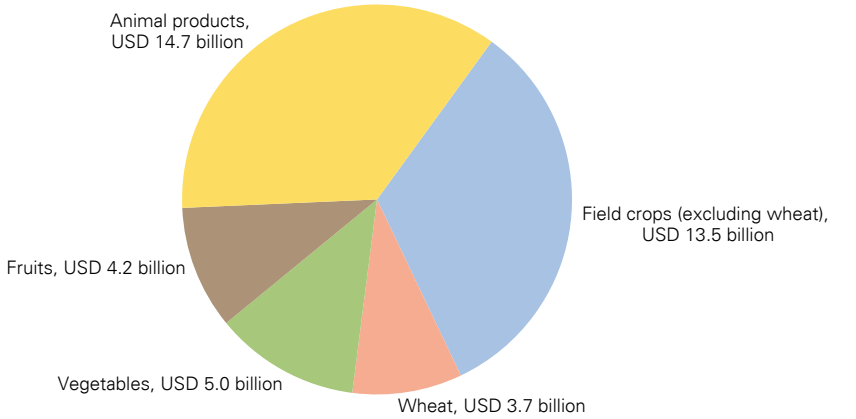
Grains in Egypt are grown predominantly for human consumption. The main source of animal feed is *berseem* a high-yielding legume (*Trifolium Alexandrium* also known as Egyptian clover). The major grains include white maize, rice and wheat. Though there has been some growth in yellow maize planting for animal feed, white maize remains predominant.

Egyptian grains are almost exclusively grown for domestic consumption. The only grain that is exported in any great volume is rice. Rice is grown as a summer crop, while wheat is a winter crop; therefore, the two do not compete

with each other for area. Egyptian rice is considered high-quality and fetches high prices on the world market. However, due to its heavy consumption of limited water resources, the government is trying to discourage farmers from planting rice. The export of rice is therefore controlled and sometimes banned entirely. However, the illicit export of rice is known to be widespread.

Almost all Egyptian meals are accompanied by bread and per capita consumption of cereals is high. The government assists in this by making a form of flat bread called *baladi* available at a heavily subsidised price of 5 *piastres*. (This price has been fixed since 1989; the free market price for *baladi* bread is 36 *piastres*). With rapid population growth, the volume of wheat for the *baladi* subsidized bread has grown greatly, as has its cost.

Diagram 1.2: Value of agricultural production, 2012

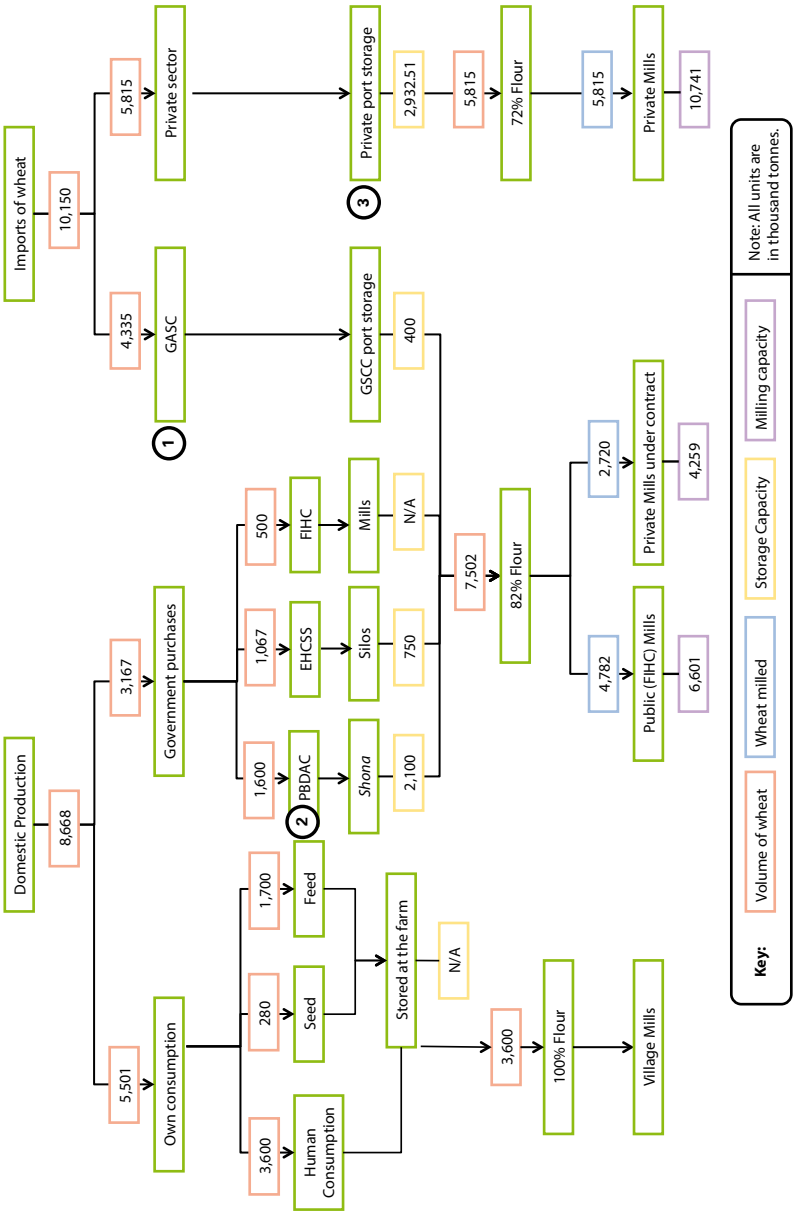


Source: MALR.

Note: The World Bank estimates that total agricultural value added is slightly lower at USD 36.4 billion.

Diagram 1.2 shows the distribution of the value of agricultural production. In total, in 2012, agricultural production, both from plants and animals, accounted for USD 44.1 billion. This equates to around 17 percent of the gross domestic product (GDP). There were 4.3 million farmers who grew wheat, which alone accounted for USD 3.7 billion or around 9 percent of the total value of agricultural production. In addition, wheat accounted for over one-fifth (22 percent) of the total value of field crops (USD 17.3 billion).

Diagram 1.3: Wheat value chain flow chart, average from 2010-2013 (volumes in thousand metric tonnes)



Source: LMC International, 2015.

Despite the fact that a large proportion of Egypt's cropped area is sown with wheat with high yields and the country's high share of agricultural production, Egypt is heavily dependent on imports to meet its consumption needs. Limits to the cultivated area, as well as water supply, coupled with rapid population growth, mean that Egypt will remain dependent on imports. Table 1.1 shows the production, domestic utilization and imports of all cereals, wheat and maize. Wheat accounts for just above two-fifths of total cereal production and over half of domestic utilization. Wheat imports account for over 60 percent of imported grains. The remaining imports are maize. However, imports of maize are of yellow maize used as animal feed rather than for human consumption.

Wheat value chain

Diagram 1.3 schematically shows the flow of wheat in Egypt. The chart outlines the volumes, storage capacity and milling capacity of wheat at each stage of the value chain using a three-year average, from 2010/11-2012/13.

As a result of the *baladi* bread subsidy, the government is heavily involved in the wheat sector both as the only major purchaser of domestic wheat and as a major importer of wheat. The government consumes 45 percent of Egyptian wheat, owns 30 percent of milling capacity and employs a further 20 percent of milling capacity in tolling contracts.

As we have seen, domestic production of wheat is in the region of 8.7 million tonnes with a further 10.2 million tonnes imported annually. Of the 8.7 million tonnes of wheat grown in Egypt, on-farm consumption of wheat accounts for 5.5 million tonnes.

Table 1.1: Cereals, wheat and maize production, use and imports

Cereals (million tonnes)	2008/09	2009/10	2011/12	2012/13	2013/14	*Three-year average*
Production	21.4	20.9	20.0	20.7	19.5	*20.1*
Imports	15.1	15.7	18.7	14.2	17.9	*16.9*
Domestic utilization	33.7	34.9	36.1	36.5	36.7	*36.4*
Feed	9.5	10.4	11.0	11.0	11.0	*11.0*
Food	22.1	22.5	23.0	23.5	23.8	*23.4*
Of which:						
Wheat						
Production	7.97	8.52	8.37	8.79	8.8	*8.7*
Imports	9.93	10.05	11.5	8.1	10.5	*10.0*
Domestic utilization	16.5	16.97	18.17	18.69	19.05	*18.6*
Feed	0.7	0.8	1.5	1.6	1.9	*1.7*
Food	14.8	15.17	15.57	15.89	16.15	*15.9*
Maize						
Production	7.4	7.68	6.78	7	5.7	*6.5*
Imports	5.15	5.5	6.7	5.7	7	*6.5*
Domestic utilization	12.15	13.08	13.08	12.9	12.7	*12.9*
Feed	8.1	8.98	8.88	8.85	8.6	*8.8*
Food	3.55	3.6	3.7	3.75	3.8	*3.8*

Source: FAO Country Cereal Balance Sheets.

Notes: For the flow chart and later calculations, we used other data sources, though the difference is minimal. There are some additional uses (such as for seeds) and losses, which means that the sum of feed and food utilization do not exactly equal domestic utilization.

In Table 1.2, we derive the per capita consumption of wheat by farmers. Of the 5.5 million tonnes of wheat consumed on-farm, 1.7 million tonnes are used as feed wheat and a further 280 000 tonnes are used for seed. This leaves 3.6 million tonnes for food consumption. According to MALR, wheat is grown on 4.3 million farms. At an average family size of six people, this means that there are 25.8 million people who consume their own wheat, equating to 138 kg per person. This is slightly lower than the average per capita consumption of wheat in Egypt, which is around 150 kg.

Table 1.2: Estimated per capita consumption of wheat on farm

	Location	Unit	Quantity
a	Consumed on farm	million tonnes	**5.5**
b	as feed	million tonnes	1.7
c	as seed	million tonnes	0.3
d = a - (b + c)	**Consumed as food**	**million tonnes**	**3.6**
e	Number of wheat farmers	million people	4.3
f	Average family size	people/family	6.0
g = e * f	**Total number**	**million people**	**25.8**
h = d/g	Per capita wheat consumption	kg/person	138

Source: Diagram 1.3, Table 1.1 and MALR.

Wheat consumed on-farm is stored at the farm-level and milled in small-scale village mills into very coarse 100 percent extraction flour for a fee. The flour is baked into bread at the farmers' houses. With growing domestic production and consumption of wheat, there have been increased imports of milling equipment. From 2005 to 2007, Egypt imported around USD 3.7 million of milling equipment. By contrast, from 2008 to 2012, the value of imported milling equipment averaged around USD 12.6 million (varying from USD 9-14 million).

On average, government purchases of domestically produced wheat are around 3.2 million tonnes. These purchases are divided between three agencies:

- The Principal Bank of Development and Agricultural Credit (PBDAC) is the single largest buyer of domestic wheat, accounting for approximately half of government purchases. This wheat is stored in the 355 *shona* in Egypt, ranging in size from 6 000 to 8 000 tonnes of capacity. Overall, PBDAC has 2.1 million tonnes of storage capacity.

- The Egyptian Holding Company for Silos and Storage (EHCSS) is the second largest buyer of domestic wheat and has 25 silos with an average capacity of 30 000 tonnes each, distributed throughout Egypt. Total capacity is therefore 750 000 tonnes.
- Finally, the Food Industries Holding Company (FIHC) purchases around 0.5 million tonnes of wheat annually, which is sent directly to government controlled mills. FIHC were also previously in charge of purchasing domestic maize to be milled and blended with wheat flour. However, this has been abandoned due to difficulties in drying the maize.

Of the total 10.2 million tonnes of wheat imports, government imports account for 4.3 million tonnes. Government imports are purchased through tenders issued by the General Authority for Supply Commodities (GASC). The port level storage is dealt with the by the General Company for Silos and Storage (GCSS), who have 400 000 tonnes of storage facilities in the ports of Alexandria, Damietta and Safaga.

Overall, therefore, the government purchases 7.5 million tonnes (40 percent of Egyptian wheat): 3.2 million tonnes are bought from domestic production by three agencies (PBDAC, EHCSS and FIHC), while 4.3 million tonnes are imported by GASC and stored by the GCSS. This wheat is milled to produce 82 percent extraction flour for the subsidised *baladi* bread program.

The wheat is milled both by mills controlled by the government (through the FIHC) and by private mills operating under tolling contracts.

- There are 80 public sector mills with a total capacity of 6.6 million tonnes. Almost two-thirds of all wheat is milled in public sector mills, giving them a capacity utilization per year of around 72 percent. As of Spring 2014, public mills received wheat at a subsidized price and then sold the flour and bran back to the government at fixed prices.
- There are 69 private sector mills engaged in producing 82 percent of the flour for the government. Their total capacity is around 4.3 million tonnes. Private sector capacity utilization is therefore slightly lower than that in the public sector at 63 percent. Private sector mills receive a flat milling fee of between 500–600 Egyptian Pounds (EGP) per tonne.

The 82 percent extraction flour is sold to around 18 000 *baladi* bakeries. Of these, less than 2 percent are owned by the government. However, government-owned bakeries are on average seven times as large as private bakeries; as a result, their share of total baking capacity is higher at around 12 percent.

The private sector imports 5.8 million tonnes of wheat and has a storage capacity of just over 2.9 million tonnes spread across all of the main ports. However, in contrast to the government sector, this storage is used not only for wheat, but also for other grains, as well as oilseeds and meals. The private sector ports and storage facilities operate efficiently, considering vessel line-up and inspection delays.

Wheat imported by the private sector moves directly to the mills; the private sector, therefore, has no inland storage. There are a vast number of private sector mills and no accurate figures of their total capacity. Informed estimates suggest that capacity is in the region of 15–20 million tonnes. We have used a conservative estimate of 15 million tonnes. Of this total capacity, 4.3 million tonnes are in mills operating under government contracts, leaving 10.7 million tonnes of capacity. Capacity utilization in the private sector is therefore very low.

Potential for public private partnership

In Diagram 1.3, we have highlighted a number of areas that could benefit from an exchange of expertise between the public and private sectors as well as private investment. The bottlenecks relate to the system of purchasing both domestic and imported wheat, problems with the quality and efficiency of storage and the underutilization of private sector milling capacity.

① The proliferation of stricter requirements, uneven enforcement, testing delays and high inspection costs have made suppliers increasingly wary of GASC tenders. GASC has partly been forced into this position in order to ensure that wheat from the Black Sea region, on which Egypt increasingly relies, meets their specifications. However, there is room for a closer interaction between GASC and the private sector to alleviate the more onerous requirements, while ensuring that the wheat meets GASC specifications. In particular, the shipping time for GASC tenders are set on a very short notice, which increases the cost of transportation. (For example, a recent tender was set out on 8 July for delivery between 21 and 31 August.) In addition, it has been estimated that replacing the current government inspections at the port of loading with inspections by private companies offering such services could potentially lower inspection costs by USD 0.5 per tonne (the cost of government inspections is currently estimated at USD 0.7 per tonne). A dialogue between the public and private sector could help reduce such costs.

② PBDAC accounts for the largest share of inland storage capacity, which is also the most outdated. The *shona* storage system causes both qualitative and quantitative losses. In addition, the system of handling is poor, adding further impurities and losses. While, there are no official estimates available for the losses at the *shona*, they are believed to be in the range of

10–20 percent. While a silo storage system is marginally more expensive than the basic *shona* system, the savings from reduced losses would be several times the additional cost. Through a programme of silo construction supported by the United Arab Emirates, PBDAC will receive 11 silos with a total capacity of 660 000 tonnes. This should alleviate some of the problems with domestic storage, but is insufficient to replace all *shona* storage. There may therefore be scope for further investment.

③ Government storage at the ports would be sufficient if it were operating with a quick throughput (a large number of turns). However, it is understood that government storage facilities are not operated efficiently and that, as a result, there are long delays in port. At present, there is some investment occurring to expand government port storage and the capacity is set to more than double. However, alongside higher capacity the government should look at using both private sector storage and expertise to lower costs.

Given that private sector storage is used for more than one commodity and runs efficiently, it is able to achieve a higher throughput of commodities (more turns per year). As a result, silos in the private sector are able to provide storage at lower costs. In addition, the private sector has proven to be able to construct storage quickly and at a good standard. Instead of operating its own storage, the government could replace its outdated storage facilities quickly and at a lower cost through a public private partnership with the private sector.

Chapter 2 – Wheat production

Overview

Wheat is both the most important grain and the single largest crop by area in Egypt. It is well suited to the Egyptian climate where it is grown as a winter crop, often followed by rice or maize in the summer. It competes principally with *berseem* (Egyptian clover), sugarbeet and vegetables. In an attempt to encourage wheat production, the government's procurement price for wheat is above the world price. Partly as a result, the area under wheat has expanded, while that of *berseem* has shrunk. While wheat currently has better gross margins than the major competing crops, this would not be the case under import parity prices. If the government were to remove its support for the domestic wheat price, it would open up the possibility for greater production of vegetables (potatoes and onions).

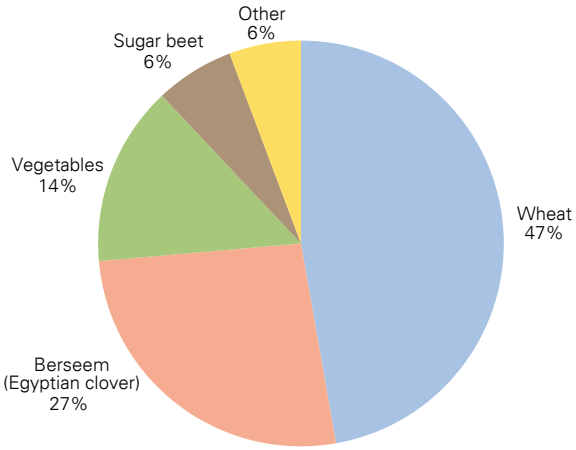
Egyptian agriculture

The mild climate, constant irrigation and fertile soils mean that Egypt is able to sustain multiple crops. Practically all of the water in the old lands comes from the Nile, with rainfed agriculture restricted to the narrow strip along the Mediterranean coast. As a result, the cultivated area is limited to the narrow strip along the Nile Valley, in the south and the plains of the Delta in the north. Attempts have been made to expand the cultivated area in Egypt by reclaiming new lands using irrigation. Around one-third of the cultivated area in Egypt (1.2 million hectares) is in the new lands.

The cropped area is divided between three seasons:

- The winter crop runs from November to May.
- The summer crop for the main crops runs from May until October.
- However, summer vegetable crops can be harvested by August, which allows some areas to plant a third *nili* crop from August until October.

Diagram 2.1: Winter cropped area, 2011/12



Source: MALR.

Diagram 2.1 shows the distribution of crops planted during the winter season. Wheat is by far the most important crop, accounting for almost half of the winter season area. Wheat competes during the winter principally with *berseem*, which is planted as a green manure and is used as animal feed. Wheat also competes for land with winter vegetables and sugarbeet. During the summer months, farmers can grow maize, rice, soybeans, sunflower and vegetables. Some farmers grow a *nili* crop of maize, rice or vegetables.

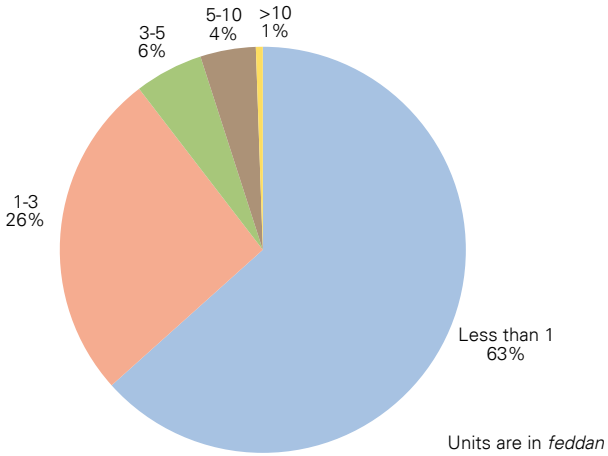
Most farms are small; farmers divide their land holdings into thirds, rotating between cereals and break crops. Popular winter-summer rotations, include the following: wheat followed by rice and wheat or *berseem* followed by maize.

Diagram 2.2 shows the distribution of farm holdings based on their size in *feddan*. The *feddan* is one of the few traditional units which Egypt retained after moving to the metric system. One *feddan* is around an acre at 0.42 hectares. Land holdings in Egypt are very small: 63 percent of farm holdings are less than one *feddan* in size. A further 23 percent are between one to three *feddan*, with 86 percent of land holdings therefore below three *feddan* in size.

Diagram 2.3 shows the number of holdings and cultivated area in Egypt by region. In total, there are 4.6 million land holdings in Egypt, of which 2.8 million, over 60 percent, are in the delta. The diagram also shows the cultivated area in each region (measured on the right-hand axis). In general, the average farm size does not vary greatly by region.

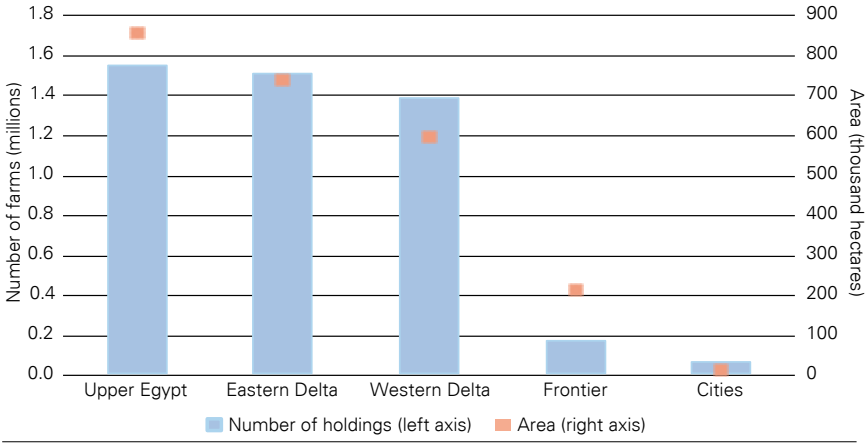
The main outlier is the frontier region, which refers to the area outside of the Delta and Nile Valley. As we can see, the frontier region has a much greater cultivated area than the number of holdings would imply. As a result, the average farm size is greatest in the frontier areas. This is because the frontier region relies on reclaimed land on which larger farms owned by investors are more common.

Diagram 2.2: Distribution of number of farms by size, 2011



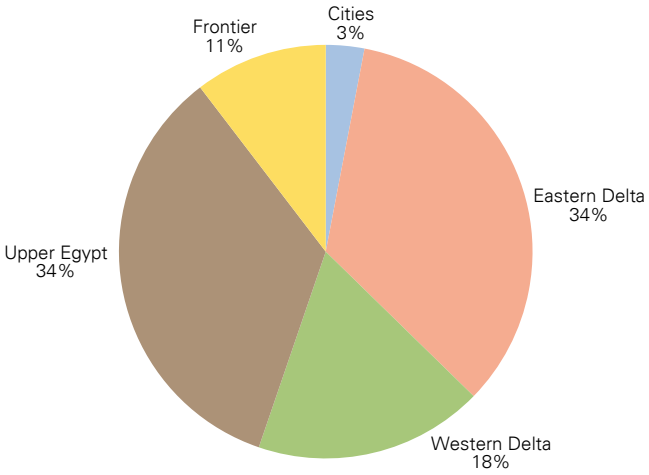
Source: MALR.

Diagram 2.3: Distribution of number of holdings and area by region



Source: Central Agency for Public Mobilization and Statistics (CAPMAS).

Diagram 2.4: Distribution of wheat area by region, 2012

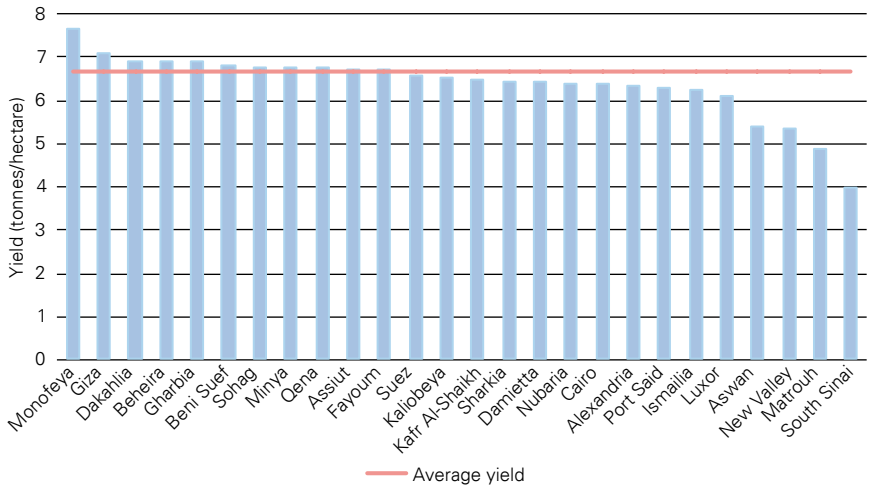


Source: CAPMAS.

As Diagram 2.4 illustrates, wheat is grown throughout Egypt, in the Delta region, along the banks of the Nile in Middle Egypt, as well as in the frontier. About one-fifth of the wheat area is located in newly reclaimed areas. The distribution of the maize area is very similar to that of wheat, which reflects the popularity of the wheat-summer maize cropping pattern. By contrast, rice is almost exclusively cropped in the Nile Delta.

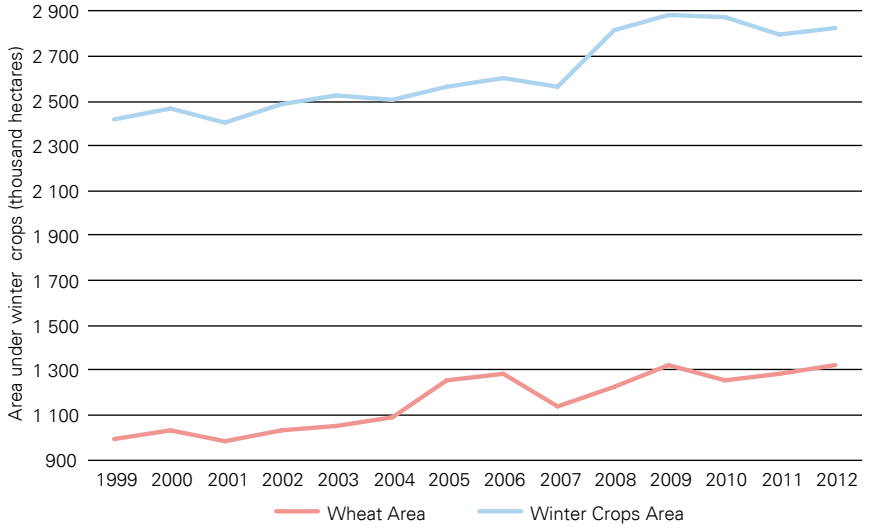
Wheat is well suited to the climate. It has a low water requirement and average wheat yields, shown in Diagram 2.5, are high at around 6.6 tonnes per hectare (compared with a world average of 3.1 tonnes per hectare). Variation between regions is generally low.

Diagram 2.5: Distribution of wheat yields by governorate, 2012



Source: CAPMAS.

Diagram 2.6: Area under winter crops and area under wheat

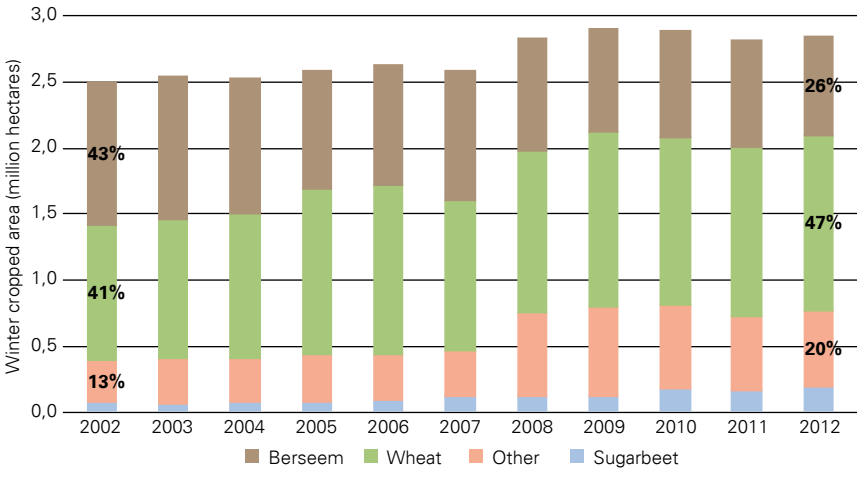


Source: MALR.

Shifts in crops

As Diagram 2.6 shows, the area under wheat has grown since 1993 from around 900 000 hectares to just above 1.3 million hectares. During the same period the winter cropped area expanded from 2.4 million to above 2.8 million hectares. As a result, wheat managed to increase its share of the winter cropped area from around 41 percent to 47 percent as shown in Diagram 2.7. By contrast, *berseem* has seen its area decline from 43 percent of the winter crop to 26 percent. This shift has been encouraged by a government policy of providing higher procurement prices for wheat, which has increased its profitability relative to competing crops such as *berseem*.

Diagram 2.7: Share of winter cropped area by main crops



Source: CAPMAS.

Notes: Other comprises mainly winter vegetables and barley.

Wheat production costs

As we have seen, the principal winter cash crop in Egypt is wheat. It competes with *berseem*, which is the second largest winter crop. Though winter vegetables such as potatoes and onions occupy a much smaller share of the winter crop area, they also compete with wheat.[1] Within the Delta, wheat also competes with sugarbeet.

1 From 2005 to 2013, the value of Egyptian onion exports increased from over USD 50 million to over USD 200 million and the value of potato exports increased from about USD 90 million to almost USD 300 million.

Diagram 2.8 and Table 2.1 show the cost of producing potatoes, onions, sugarbeet and *berseem* alongside wheat in USD per hectare.

Overall, potatoes have by far the highest costs. The largest single cost is the cost of seeds. There are two main factors behind the high seed cost. The first is that almost all seed potatoes in Egypt are imported. As they are bulky and perishable, this means the seed costs are high. In addition, potatoes have a low multiplication rate, which means there is a large requirement of seeds per hectare. Potatoes also have higher fertilizer costs than the main competing crops requiring 11 bags of 50 kg nitrogen fertilizer per *feddan*, compared with only three for wheat. Finally, crop protection costs are also much higher, driven particularly by the threat of the tuber moth.

Wheat has the second highest costs. The vast majority of farm activities for growing wheat are carried out manually. However, harvesting and threshing are mechanized and as a result machinery costs are the single largest cost component. We have also included an estimate of the costs for a large wheat farm of 60 hectares or above. We estimate that for these farms the costs per hectare are around 20 percent lower than for a regular farm. While machinery costs are slightly higher, labour costs are around half of that in a regular wheat farm.

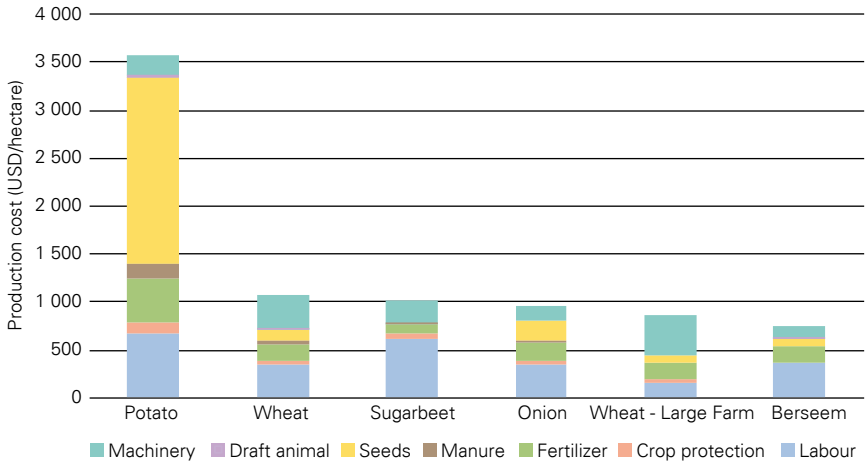
For sugarbeet**,** almost all farm activities are carried out manually, including harvesting. In addition, because multigerm seeds are used, about 70 hours of labour are required per feddan for thinning. As a result, labour is by far the highest single cost accounting for close to 60 percent of total costs. The only major use of tractors is in land preparation (which is usually contracted out) and the use of an irrigation pump.

Sugarbeet farmers receive some incentives from the beet mills. They are paid USD 53 per hectare for seeds, which covers their seed costs and receive another USD 79 per hectare towards crop protection and fertilizer costs. In addition, they are paid USD 12 per hectare to defray the cost of mechanical planting. Without these incentive payments, the cost of sugarbeet would be USD 144 per hectare higher, exceeding that of wheat.

Onions have much lower costs than potatoes. Once again, the cost of seedlings is the highest cost, driven by the relatively high cost of branded seedlings.

Berseem has the lowest costs, primarily because it requires few inputs. Fertilizer costs are low. While nitrogen needs to be provided early on, overall, *berseem* is nitrogen fixing. In addition, some manure is applied during land preparation. Machinery costs are also much lower than for the competing crops as only land preparation and limited irrigation are required. By contrast, labour costs are high as *berseem* is harvested in six cuts a season.

Diagram 2.8: Cost of production of wheat and competing crops



Source: MALR and authors' calculations.

Table 2.1: Cost of production for wheat and competing crops

	Direct Costs					Indirect Costs		
	Crop protection	Fertilizer	Manure	Seeds	Draft animal	Labour	Machinery	Total cost
Potato	113	465	143	1 952	32	660	210	3 575
Wheat	39	174	43	103	4	336	373	1 073
Sugarbeet	53	105	7	0	0	603	247	1 015
Onion	40	179	13	223	0	346	148	950
Wheat - large farm	39	174	0	82	0	146	413	854
Berseem	0	157	0	82	7	366	135	748

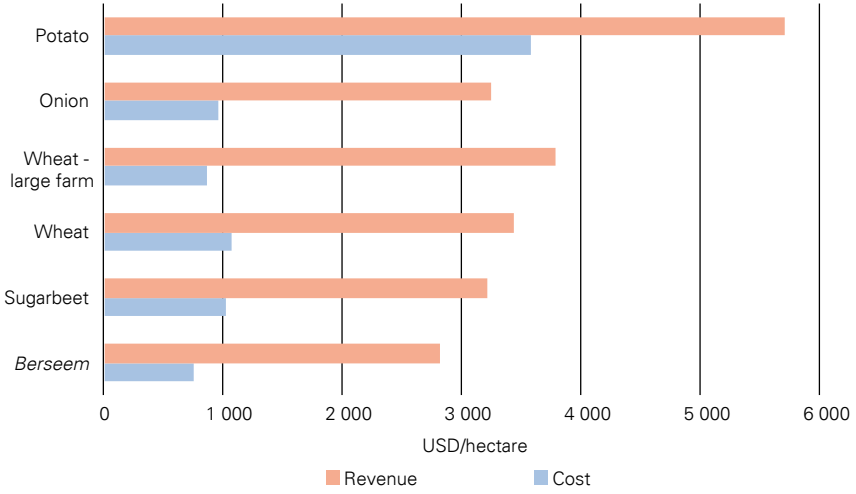
Source: MALR and LMC calculations.

Gross margins

In Diagram 2.9, we compare the costs of producing potatoes, onions, wheat, sugarbeet and *berseem* with the revenue from selling both the main product and, where applicable, its by-product. Table 2.2 shows the calculations in more detail.

Both wheat and sugarbeet benefit from producing a coproduct of beet pulp and straw, respectively. For large wheat farms (greater than 60 hectares) the yield was 10 percent higher than for normal wheat farms. Potatoes, onions and *berseem* don't produce any coproducts, but have much higher yields. *Berseem* is grown for almost eight months from October to May and is harvested (cut), on average, four times over that period. Each harvest yields around 12 tonnes per hectare, giving a total yield of just under 48 tonnes per hectare. Potatoes and onions both yield 30 and 34 tonnes per hectare, respectively.

Diagram 2.9: Revenue and cost for wheat and competing crops, 2012/13



Source: MALR and LMC calculations.

Table 2.2: Gross margins for wheat and competing crops, 2012/13

		Main crop		Coproducts			
	Total cost *USD/ha*	Yield *Tonnes/ha*	Price *USD/ ha*	Yield *Tonnes/ha*	Price *USD/ Tonne*	Total revenue *USD/ha*	Gross margin *USD/ha*
Sugarbeet	1 015	45	64	39	8	3 199	2 184
Wheat	1 073	7	418	4	167	3 429	2 357
Wheat - large farm	854	7	418	4	167	3 772	2 918
Berseem	748	48	59	0	0	2 807	2 059
Onion	950	34	95	0	0	3 238	2 287
Potato	3 575	30	192	0	0	5 692	2 117

Source: MALR and LMC calculations.

Diagram 2.10: Gross margins for wheat and competing crops, 2012/13

Source: MALR, field work and authors'calculations.

Diagram 2.10 shows the gross margins for wheat, onions, sugarbeet, potatoes and *berseem*. These are not the actual profits made by farms, as they do not include fixed costs such as rent or the cost of transportation and marketing. Instead, they are designed to illustrate the choice between different crops.

- With the high procurement prices set by the Egyptian government, wheat has the highest margins. The lower costs and higher yields on large farms, mean that the gross margin is about 25 percent higher than for average wheat farms.
- Onion has the highest and *berseem* has the lowest gross margins, though the spread is relatively small.

Gross margins under scenarios

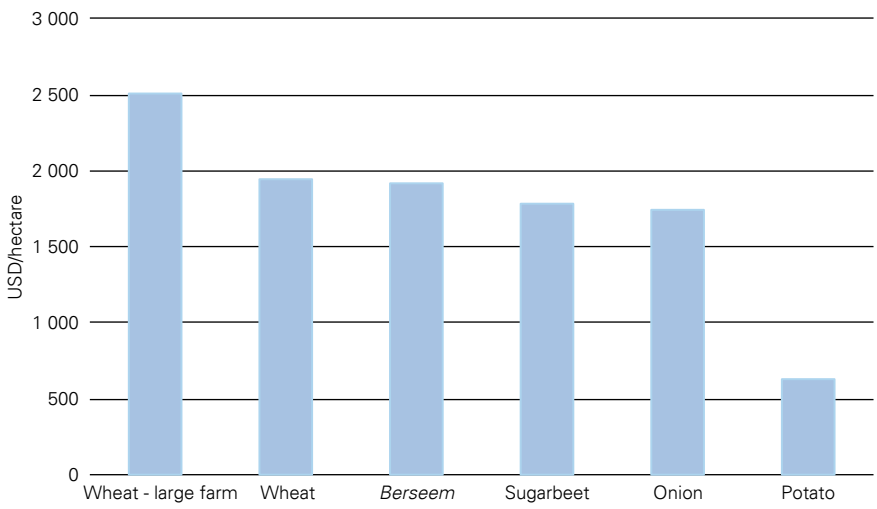
There are two means through which the government supports the wheat sector. The first, and by far more important, is through the procurement price for wheat. The government's procurement price follows the international wheat price at a premium in an attempt by the government to encourage domestic wheat production.

Diagram 2.10 also shows the gross margin for wheat under import parity prices. In 2012/13, the domestic price for wheat in Egypt was USD 418 per tonne. Taking the world wheat price and adjusting for transportation and other costs of importing into Egypt, the import parity price was much lower at USD 340 per tonne. The higher procurement price has therefore provided support to wheat margins. Diagram 2.10 shows that under import parity prices, gross margins would be between USD 510 to USD 560 per hectare lower for normal and large farms respectively. As a result, under import parity prices, wheat would have the lowest gross margins. This calculation implies that the high procurement prices have encouraged wheat to be planted in preference to either vegetables, sugarbeet or *berseem*. As we have seen in Diagram 2.7, the area under *berseem*, in particular, has declined as a result of the high procurement price for wheat. If the government were to no longer offer such an attractive price for wheat, it is likely that the area under *berseem* and vegetables would increase.

In addition, the government subsidizes nitrogen fertilizers. At present, the price for fertilizer is EGP 75 per 50 kg bag. On the free market, the price is around EGP 132 per 50 kg bag. Both wheat and sugarbeet use around three bags of nitrogen fertilizer per *feddan*. Growing onions requires four bags and potatoes require an impressive 11 bags per *feddan. Berseem*, on the contrary, only needs one bag of nitrogen fertilizer very early on. As a result, the fertilizer subsidy benefits potatoes most strongly, followed by onions, wheat, sugarbeet and *berseem*. As we illustrate in Diagram 2.11, removing the fertilizer subsidy would therefore reduce the gross margins for wheat to the level of *berseem*. It would also reduce the gross margins of onions and those of potatoes. (It would have

no effect on the relative gross margins between wheat, large wheat farms and sugarbeet, as they require the same application of nitrogen fertilizer).

Diagram 2.11: Gross margins for wheat and competing crops without fertilizer subsidies



Source: MALR, field work and authors' calculations.

Chapter 3 – Wheat consumption

Overview

Cereals are an essential component of the Egyptian diet accounting for 62.3 percent of daily calorie intake (Table 3.1). Per capita consumption of wheat – the main food staple in the country – is around 146 kg per person per year, corresponding to 52.4 percent of calorie intake from cereals. Thus, almost one-third of the total daily calorie intake per person in Egypt is from wheat.

Table 3.1: Consumption of main food products in Egypt by category

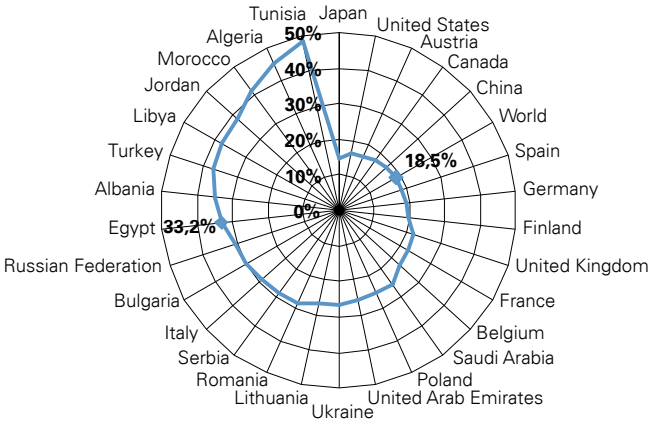
Product	Food supply (kcal/capita/day)	Share, %
Cereals excluding beer	2 217	62.3
Animal products	336	9.4
Sugar & sweeteners	304	8.5
Vegetable oils	147	4.1
Vegetables	133	3.7
Grand total	**3 557**	**100**

Source: FAOSTAT, 2011.

The preponderance of wheat in Egyptian dietary habits is partly due to cultural factors and partly to a government policy of subsidizing the price of its traditionally most consumed *baladi* bread. As a result, per capita wheat consumption remains relatively high in spite of growth in per capita GDP and in spite of Egypt having a high overall daily dietary energy intake of about 3 160 kcal (a level comparable to developed countries such as Finland, Australia or New Zealand). In developed countries, the level of wheat consumption is significantly lower, with higher incomes encouraging protein-rich diets.

Nevertheless, this specificity is hardly unique to Egypt: it is common to most countries in the Middle East and North Africa that exhibit higher levels of calorie intake from cereals – wheat in particular – than their per capita GDP level would suggest. Against this regional background, Egyptians, in fact, appear to be consuming less wheat than could potentially be expected. As can be seen from Diagram 3.1 below, wheat consumption accounts for a smaller proportion of daily calorie intake in Egypt than in countries with higher GDP per capita such as Tunisia, Jordan or even Turkey.

Diagram 3.1: Wheat share in total consumption, by country, average for 2009-2011

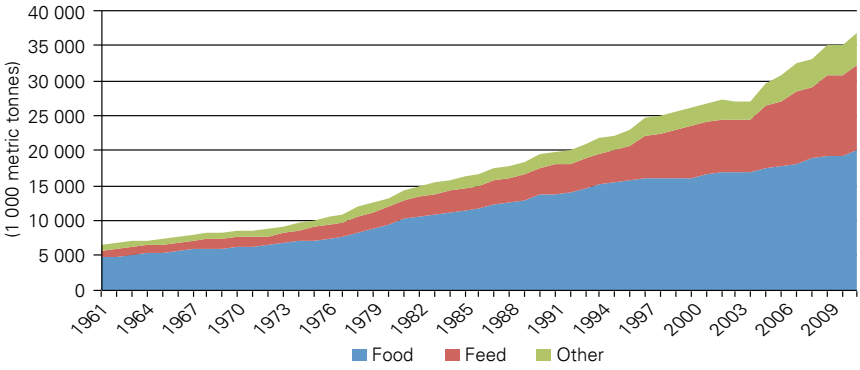


Source: FAOSTAT.

Major trends

The consumption of cereals in general and of wheat, in particular, has been characterized by an important growth. Over fifty years (1961-2011), the increase in cereals consumption in Egypt was six-fold: the consumption of cereals as food increased four times and consumption as feed increased twelve times, which can largely be attributed to increasing meat consumption and production (Diagram 3.2). [2]

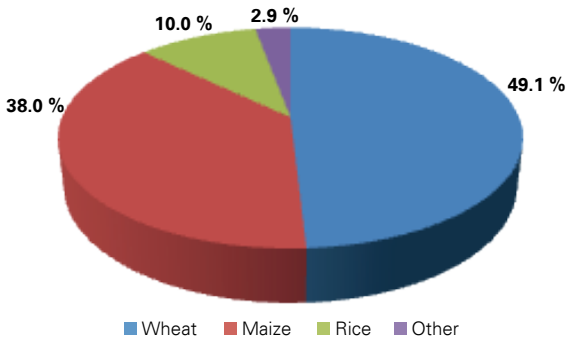
Diagram 3.2: Cereals consumption in Egypt, 1961-2011



Source: FAOSTAT.

2 There was a ten-fold increase in livestock production in Egypt in the same period, according to the FAO livestock agricultural production national index (base period 2004-2006).

Diagram 3.3: Cereals consumption, 2011



Source: FAOSTAT.

As of 2011, wheat constituted half of total cereal consumption (both human and animal) in Egypt, followed by maize, which represented 38 percent of consumption. Rice remained of lesser importance with a share of 10 percent (Diagram 3.3). Wheat constituted 58 percent of cereal consumption as food and one-third of cereal consumption as feed in terms of quantity (Table 3.1), the major feed cereal being maize.

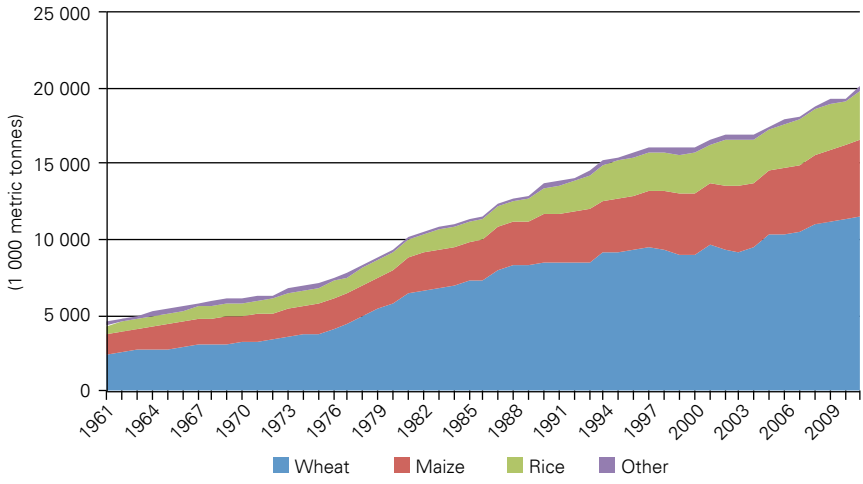
The composition of human and animal consumption of cereals has evolved quite differently. While wheat, maize and rice have retained relatively similar shares in human consumption with wheat staying at the top (Diagram 3.3), the consumption of cereals as feed has evolved quite dynamically and increased at a much higher pace, especially in the last ten years. In the 1970s, maize replaced sorghum as the main feed cereal, and in the last ten years, wheat has become a major competitor to maize (Diagram 3.4). In fact, in the period 2005-2011, wheat consumed as feed increased by 159 percent, while maize consumption increased by a mere 12 percent. The former increase may signal wheat production issues affecting local wheat. In 2005-2006 alone, animal consumption of wheat increased by 125 percent.

Table 3.2: Food and feed consumption from cereals

Crop	Feed supply	Food supply
Barley and products	0.50%	0.11%
Cereals, other	0.02%	0.00%
Maize and products	60.23%	25.07%
Millet and products	0.00%	0.00%
Oats	0.00%	0.01%
Rice (milled equivalent)	0.92%	15.66%
Rye and products	0.02%	0.00%
Sorghum and products	4.36%	1.27%
Wheat and products	33.96%	57.88%
Total	**100.00%**	**100.00%**

Source: FAOSTAT, 2011.

Diagram 3.4: Composition of cereal consumption as food, 1961-2011



Source: FAOSTAT.

The sharp increase in wheat consumption observed in the 2000s is in fact mostly due to the increasing use of wheat as animal feed. The 2015

Organisation for Economic Cooperation and Development (OECD)-FAO Agricultural Outlook forecasts that wheat and maize will retain roughly the same shares as present over the medium-term.

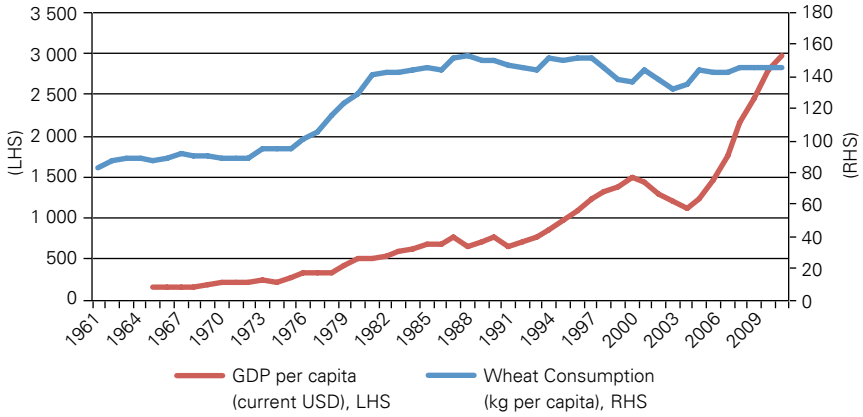
As can be observed from Diagram 3.5, per capita wheat consumption registered important growth in the 1970s, after which stabilization was observed. Such growth after a few years of consumption levels under 100 kg per capita per year and overall low consumption levels, may be attributed to growing GDP per capita levels and certain policy measures adopted by the government. Until the 1970s, the price of wheat in Egypt exceeded world prices and only in the early 1970s were some wheat subsidies included in the government food security policy. In 1972, the subsidies started to grow (from the previous EGP 661 million to EGP 730 million)[3]. As per FAOSTAT data, starting in 1974, a sharp increase in per capita wheat consumption can be observed.

Recently, wheat consumption has decreased, in spite of an accelerated growth in per capita GDP. Wheat consumption increased until a GDP level of nearly USD 800 per capita was reached, after which wheat consumption fell and stabilized with a slight decreasing trend. This development is quite logical and can be explained by the fact that economic access to previously less affordable products has grown as a result of increasing incomes and cereals have become less attractive compared with other products such as meat, milk and others.

Wheat consumption in Egypt is thus seen as being fairly stable and independent from income growth. Given the almost three-fold growth in income levels over the last decade, one would have expected there to have been a greater impact in terms of increasing meat consumption and decreasing wheat consumption, which suggests that there has been little dietary diversification since the 1970s. Overall, it would seem that in the mid-term, wheat will remain the basis of per capita calorie intake in Egypt by a large margin.

3 In order to compare – price of *baladi* – 0.01 *piastres*.

Diagram 3.5: GDP per capita and per capita wheat consumption, 1961-2011



Source: FAOSTAT and the World Bank.

While rice consumption is subject to variation, an increasing trend has been generally observed. Deviations in consumption may be explained by changes in domestic production (due to Egypt's self-sufficiency in rice, its consumption is highly correlated to its production with a rate of 0.9387).

The following general trends in total consumption can be identified.

Amongst the top five products for Egypt and other countries in the region (Jordan, Morocco and Tunisia), wheat has the highest consumption level. It is then followed by sugar and milk. The next products, in order of importance, are maize, soybean oil and olive oil.

Although Egypt has a lower GDP per capita than the aforementioned countries, its daily per capita calorie intake is higher than that of Tunisia or Morocco. The structure of total consumption also indicates that wheat has the lowest consumption share of the latter countries. The difference with Morocco may be explained by the inequality of purchasing power at similar levels of income[4]. An important reason that might explain why 33 percent of Egypt's consumption is composed of wheat, compared with Morocco (41 percent) and Tunisia (49 percent)[5], is the availability of an even lower priced grain in Egypt: maize[6].

4 GDP per capita based on purchasing power parity in Egypt is much higher than that of Morocco: USD 11 089 against USD 7 198, even if GDP per capita levels are almost the same.

5 Data refers to 2011.

6 According to FAOSTAT (2011 data), total maize consumption in Egypt amounted to 63 kg per capita, against 36 kg per capita in Morocco and 3 kg per capita in Jordan. Maize consumption in Tunisia is negligible.

Overall per capita calorie intake in the region (Egypt, Morocco, Tunisia) has increased at relatively high rates, albeit from much lower base levels in the early 1960s. For all three countries, food consumption strongly correlates with GDP per capita dynamics.

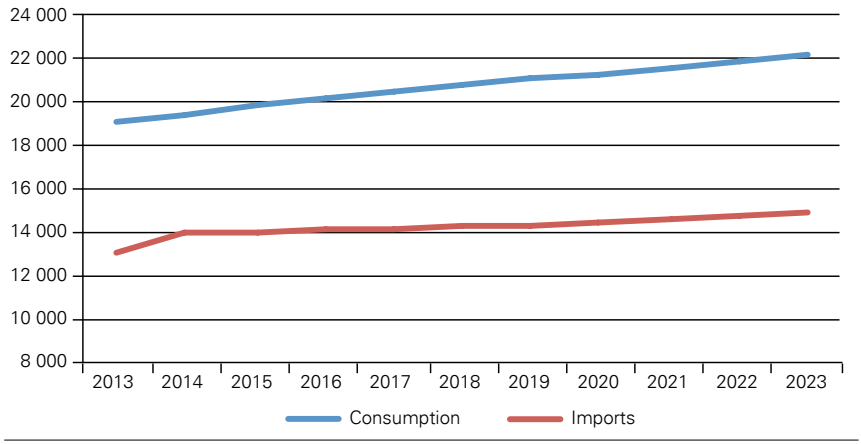
Based on the experience of Western Europe, it would be reasonable to expect that rising income levels will lead Egyptian consumers to diversify their food consumption in the future. Consumption of the top ten products in Europe is more evenly distributed between cereals, meat, sugar, milk and others. In addition, the top ten products consumed in Egypt (Cf. Annex 1) account for a lower share in the total food consumption than in most developed countries.

One of the main peculiarities in food consumption in Egypt is the low consumption of meat products. Indeed, none is included in the top ten products. In 2011, after some significant growth of meat consumption, its share in total daily calorie intake barely reached 3 percent, which is 5 percent lower than the world average.

Prospects

As can be seen from Diagram 3.6, according to the OECD-FAO Agricultural Outlook (2014), wheat consumption is expected to continue to grow at relatively stable rates. Imports will be growing too, but at a slightly slower rate.

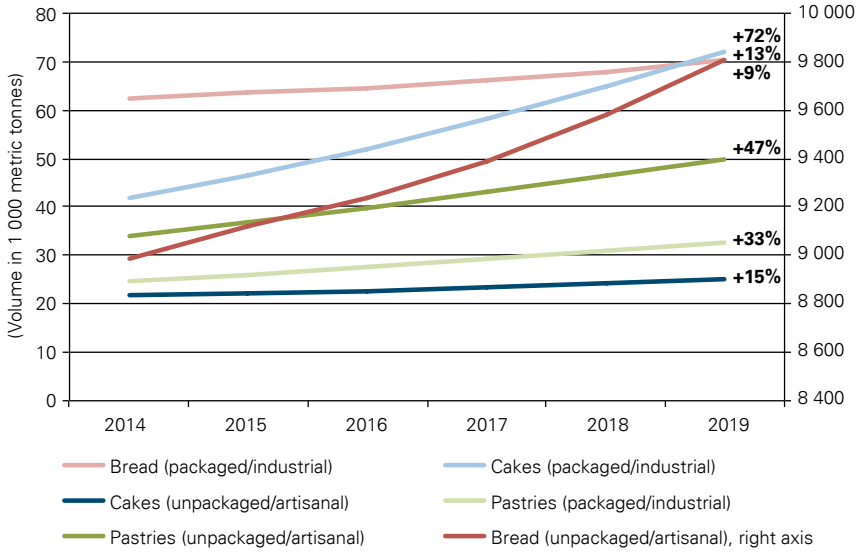
Diagram 3.6: Wheat consumption and imports outlook, 2013-2023



Source: OECD-FAO Agricultural Outlook (2014).

Looking in more detail at the human consumption of wheat, it is forecasted that the consumption of baked goods, which accounts for a very large share of human wheat consumption, will increase by almost 10 percent by 2019. With a 9 percent increase in consumption, the share of artisanal bread (overwhelmingly *baladi* bread) in total baked goods consumption will slightly decrease from the current 98 percent to around 97.5 percent in 2019. This will result from a higher increase in the consumption of other baked goods, such as cakes and pastries (Diagram 3.7), which could perhaps be attributed to changing consumer preferences resulting from increasing incomes. The 13 percent increase in packaged, 'western-like' bread consumption might also be attributed to this trend.

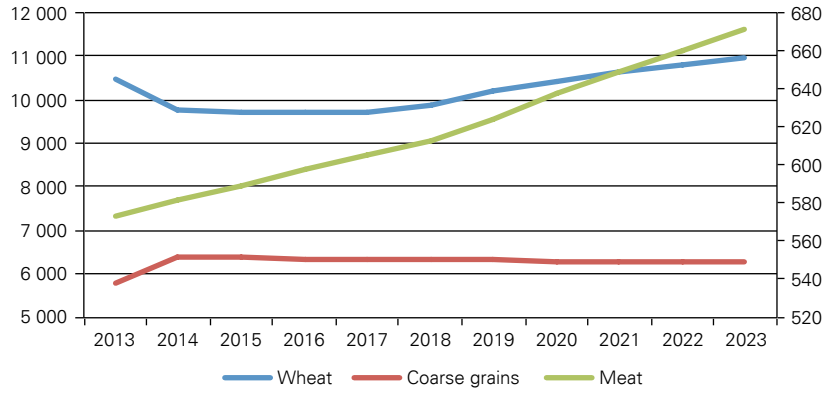
Diagram 3.7: Forecasted sales of baked goods by category, 2014-2019



Source: 'Passport: Baked Goods in Egypt', Euromonitor International, March 2015.

Meat consumption, represented in Diagram 3.8 below (Right Hand Side [RHS] axis), is also expected to grow. Imports of meat will be growing at a much slower rate, which means local meat production will be increasing and with it, the need for animal feed. As of 2013-2014, 1.9 million tonnes of wheat and almost 9 million tonnes of maize were consumed in Egypt as animal feed. This means that increasing meat consumption will be one of the factors responsible for the growing feed consumption of grains.

Diagram 3.8: Imports outlook, 2013-2023



Source: OECD-FAO Agricultural Outlook (2014).

According to the OECD-FAO Agricultural Outlook (2014), total wheat consumption between 2015 and 2023 is expected to increase by 12 percent, surpassing a level of 22 million tonnes per year. Both food and feed consumption are forecast to increase by 11-12 percent.

Wheat consumption and health

According to World Bank data, annually, Egypt loses over USD 814 million in GDP to vitamin and mineral deficiencies[7]. Despite some remarkable positive changes in terms of nutrition that can be observed, local dietary practices continue to have some negative consequences on health: obesity, stunting and wasting[8] are the most widespread problems. Several surveys were conducted in order to get more accurate information on this subject. One of them[9] found that around 35 percent of Egyptians are obese. Obesity in Egypt remains much higher than in other countries of the region. According to World Health Organization (WHO) data, there is an important gap between obesity levels in men and women. In 2008, the country ranked 8th in the world in terms of female obesity prevalence (46.3 percent of adults), but only 52nd (22.5 percent) in terms of male obesity. During the period 2006-2012, obesity prevalence in children under the age of five was 20.5 percent. As a matter of comparison, the world median is 6.2 percent and the maximum is 23.4 percent.

7 Nutrition at a Glance: Egypt, World Bank Factsheet, 2013.

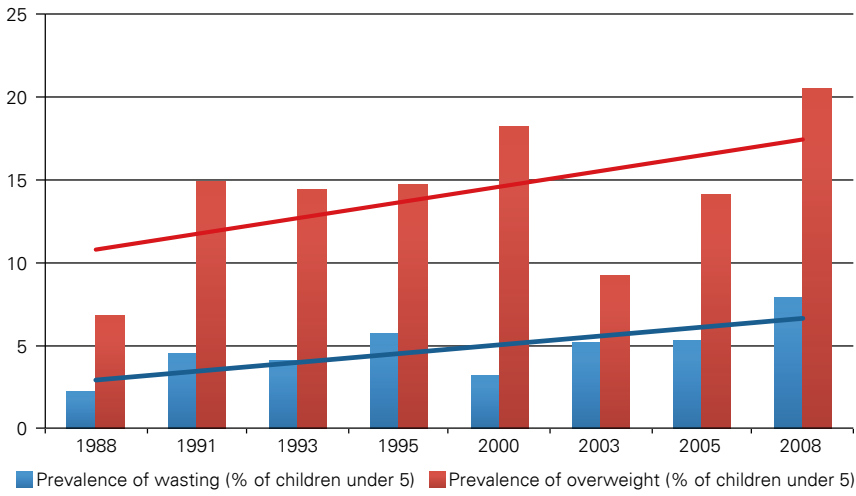
8 Gradual loss of weight, emaciation.

9 Sahar A. Ibrahim, Maysa A. Samy, Azza O. L. Saleh, Gulsen S., Ahmed, May K. Matter. Obesity among Egyptian adults with short stature. J T U Med Sci 2010;5(2):98–104.

These very high obesity levels seem to be driven by the fact that Egyptians still consume very large quantities of bread, sugar and oil and low quantities of meat. According to Diagram 3.5 below, both wasting and overweight prevalence are growing, although at different speeds. Resulting from some targeted government programs and general development, wasting is growing at a decreasing rate.

Growing obesity and wasting have contributed to government per capita expenditure on health, which has grown from PPP USD 81 in 2000 to PPP USD 125 in 2011. These values formed 7.3 percent and 6.3 percent of total government expenditures respectively.

Diagram 3.9: Prevalence of wasting and overweight among children under five, 1988-2008



Source: World Bank.

While the negative relationship between household income and obesity is widespread, a study showed that there is no significant dependency of obesity on income levels in Egypt[10], i.e. obesity is relatively evenly distributed among the population.

10 Mona Mowafi, Zeinab Khadr, Ichiro Kawachi, S.V. Subramanian, Allan Hill, Gary G. Bennett. Socioeconomic status and obesity in Cairo, Egypt: A heavy burden for all. Journal of Epidemiology and Global Health Volume 4, Issue 1, Pages 13–21, March 2014.

Considering the aforementioned trends, it seems that there is room for further inquiry, on behalf of the government, on the influence of food subsidies on consumption patterns and hence on the effects they thus have on public health. The positive influence that further changes in the subsidy system (for instance, by stimulating a more varied, less-carbohydrate heavy diet) could have on improving health should not be underestimated.

Chapter 4 – Wheat trade and storage

Wheat flows

As a result of the *baladi* bread subsidy, the Egyptian Government is heavily involved in the wheat sector. The government purchases wheat both from imports and from domestic production to produce subsidized *baladi* bread. There are major differences in the state agencies responsible for these two flows of wheat and in the storage facilities available to them. We will look at each in turn.

Domestic wheat

All domestically produced wheat is either bought by the government or consumed by farmers at the village level. Private milling companies do not purchase domestic wheat from farmers (though they do use domestic wheat in tolling contracts to supply the *baladi* bread program).

Table 4.1 shows the production of wheat in Egypt since the 2008/09 harvest. The government's procurement of wheat production has increased from around a quarter to two-fifths of total production. During this period, domestic production also increased from just under 8 million to close to 9 million tonnes. (In 2010/11, production collapsed to just under 7.2 million tonnes, as a result of the unusually hot weather and an outbreak of yellow rust disease). As a result, the total volume of wheat procured by the government has grown from around 2 million to 3.6 million tonnes. Wheat that is not purchased by the government is milled in village mills and consumed at the farm-level.

Table 4.1: Government and private sector purchases of domestic wheat

	Production (thousand tonnes)	Government purchases (thousand tonnes)	Private purchases (thousand tonnes)	Government share (thousand tonnes)
2008/09	7 977	2 000	5 977	25%
2009/10	8 523	2 800	5 723	33%
2010/11	7 169	1 700	5 469	24%
2011/12	8 370	2 500	5 870	30%
2012/13	8 699	3 400	5 299	39%
2013/14	8 934	3 600	5 334	40%
Three year average	*8 668*	*3 167*	*5 501*	*37%*

Sources: Production figures are from the OECD-FAO Agricultural Outlook (2014).
Government purchases until 2011/12 are from the MALR.
For 2012/13 and 2013/14 government purchases are estimated based on fieldwork data.
Private purchases are the difference between production and government purchases.

Government purchases of domestic wheat occur through three channels.

- The largest single buyer of domestic wheat is the PBDAC. They make these purchases on behalf of the GASC. In 2011/12 and 2012/13 PBDAC purchased 1.8 and 1.6 million tonnes of wheat, respectively. This volume has been stable for the last ten years.[11]
- In addition, the EHCSS also purchases wheat from the domestic market. Once again, this is done on behalf of GASC.
- Finally, some of the government mills have wheat delivered to them directly. This is co-ordinated by the FIHC,[12] an umbrella organization that includes the public mills and oversees the milling process. FIHC was also previously in charge of purchasing domestic maize to be mixed in to the flour. However, maize flour is no longer being mixed with wheat flour.

•

11 Meeting with PBDAC on the 11th of June 2014.

12 The Minister of Supply and Internal Trade, Khaled Hanafy, has recently (February 2015) announced plans to list FIHC on the capital market. Khaled Hanafy quoted in 'Egypt considers listing Food Industries Holding Company-minister', Reuters official web page, 22 February 2015 (available at: http://www.reuters.com/article/2015/02/22/egypt-supplies-ipo-idUSL5N0VW04W20150222, last accessed on 19 August 2015).

For 2014, it is believed that total government purchases of domestic wheat was in the region of 3.6 million tonnes. PBDAC accounted for 1.3 million tonnes, the EHCSS a further 1.8 million tonnes and the remaining half a million tonnes was bought directly by the FIHC on behalf of the mills.

Storage capacity for domestic wheat

As already mentioned in the executive summary, all inland wheat storage is operated by the government through three agencies: the GCSS, the EHCSS and the PBDAC (Table 4.2).

Table 4.2: Inland storage capacity by government agency

Agency	Capacity (thousand tonnes of wheat)	Type of storage
GCSS	160	Silo
EHCSS	750	Silo
PBDAC	2 100	Flat storage
Total	**3 010**	

Sources: Data on PBDAC storage capacity was kindly provided by the agency themselves. EHCSS and GCSS numbers are based on information provided from a range of interviews.

Note: In addition, the flour mills themselves have capacity to store wheat waiting to be milled.

GCSS and EHCSS[13] operate silo storage, while the GCSS is in charge of storing imported wheat. PBDAC has the largest yet most outdated storage capacity, consisting exclusively of wasteful *shona*, where bags (usually around ten per square metre) are stacked on top of each other reaching a height of about 5 metres and storing about a tonne of wheat. Bags are usually covered with jute cloth in summer and with plastic sheets in winter.

There are 355 *shona*, in Egypt ranging in capacity size from 6 000 to 8 000 tonnes. Of these *shona*, 88 have concrete floors. As Table 3.3 shows, they are distributed across Egypt, though as would be expected, they are most common in regions with large wheat harvests such as Menoufia.

The wheat is delivered to the *shona* either by farmers, rural traders or cooperatives. The *shona* can only accept wheat during a fixed period set by the MALR in conjunction with the Ministry of Supply and Internal Trade (MoSIT).

13 EHCSS operates 25 silos, most of which are 10-15 years old. The construction of many of them, was financed by the Danish Development Agency as well as by the Saudi and Kuwaiti Governments and the Organization of the Petroleum Exporting Countries (OPEC).

In 2014, wheat was allowed to enter the *shona* from 15 April until 15 July. The same ministries also set the procurement price for wheat. In theory, there are three levels of prices depending on the cleanliness of the wheat, but almost all wheat receives the price for the lowest cleanliness. While previously there were delays to payment, today if a representative of MoSIT is in attendance, the payment is made immediately. If no representative is overseeing the quality checks, 90 percent of the price is paid immediately and the remaining 10 percent is paid within 48 hours. The money for purchasing the wheat is provided by GASC, which also pays PBDAC a fee for storage.

As the procurement price of wheat is often above the world wheat price, a system of checks is in place to ensure that imported wheat is not fraudulently sold as, higher priced, domestic wheat. Both the central and regional office of PBDAC are tasked with inspecting the *shona* before they open and after they close to ensure they are empty and no wheat from the previous harvest is resold. The MoSIT also checks the *shona* adding another level of supervision. However, there are still rumours that imported wheat may be illegally resold as domestic wheat.

Very small amounts of wheat are withdrawn during the harvest; instead, the bulk of the wheat is withdrawn slowly over half the year, following the close of the *shona* and blended with imported wheat. While the *shona* are meant to be emptied within 6 months to ensure they can be cleaned and checked in time for the next harvest, a greater reliance on domestic wheat seems to mean that in some cases the storage period appears to have exceeded 6 months.

Table 4.3: Distribution of *shona* in 2013

Governorate	Number of *shona*
Qalyoubia	9
Menoufia	29
Gharbia	31
Sharkia	41
Kafr-El-Sheik	25
Dakahlia	26
Damietta	8
Suez, Port Said, Ismailia	11
Behera	24
Alexandria	3
Giza	11
Fayoum	14
Beni Suef	18
Menia	52
Assuit	23
Suhag	11
Qena	9
Aswan	2
New Valley	8
Total	**355**

Source: PBDAC.

Problems with government wheat procurement

PBDAC only accepts wheat that is delivered to the *shona.* As we saw in Chapter 2, most farms are very small and they sometimes have difficulties arranging truck rental. In addition, in previous years, there have been shortages of subsidized diesel. As a result, many farmers prefer to sell to local traders as they collect the wheat from the farm gate. The traders also often provide loans for input purchases, such as fertilizer and seed. The government provides no such support to wheat farmers (though nitrogen fertilizer is subsidized).

Interestingly, farmers consistently report that the traders are willing to offer the same price at the farm gate as the PBDAC offers for delivery to the *shona*. While the price at the *shona* is based on weight, the traders purchase the wheat using the traditional measure of the *ardab*. The *ardab* is a measure of volume and traders are believed to make an additional margin by taking a greater volume of wheat than the PBDAC would based on its weight (an *ardab* should weigh 150 kg). Some farmers are aware of this practice, but accept it as they need the credit for inputs. In other cases, there are problems with the absence of official measurement and poor dissemination of price information. As information on the sector remains very murky, there are no estimates of the share of wheat bought and resold by traders. Neither PBDAC nor GASC know how much of their wheat comes through traders.

Increasingly, the government has attempted to encourage cooperatives to assist farmers in delivering wheat to the *shona*. They have introduced a scheme under which cooperatives provide assistance to farmers through the extension services of the MALR. At the same time, they provide the farmers with certified seeds and pesticides at a lower cost. However, according to the PBDAC, the volume of wheat provided by cooperatives during the last year has been disappointing at only around 20 000 tonnes.

Given that the price of imported wheat is substantially lower (up to USD 100/tonne) than the procurement price for domestically grown wheat, this creates an incentive for unscrupulous intermediaries to pass imported wheat off as domestically grown wheat. No information is available on the scale of this potential problem.

Farmers are likely to retain some wheat for their own consumption. Particularly, as the quality of subsidized bread in the villages is often bad. However, as we saw in Table 4.1, despite the high procurement prices for domestic wheat, the government is only able to purchase two-fifths of the wheat harvested. Problems with the delivery of wheat to the *shona*, the proliferation of middlemen who provide input subsidies and transportation and the failing of cooperatives may go some way towards explaining this paradox.

On-farm storage of wheat is used for personal consumption and is very common. Farmers are fortunate that Egypt is warm enough to enable wheat to be sun dried. As a result, the moisture content of wheat is not as big an issue as in other countries. However, contamination with impurities and losses from pests are widespread owing to the low quality of storage.

Farmers hardly ever rent storage space, choosing instead to store their wheat in mud bins and plastic or jute bags in their houses. Most farmers can store around a tonne of wheat. Mud bins are made from a mixture of mud and straw and are often placed in the roofs of the houses. Many of the bins have cracks and cannot

be sealed firmly and are therefore vulnerable to insect and rodent damage as well as rain. Bags are also kept in the house, but are subject to deterioration in quality and attacks from insects and rodents. In regions with low levels of groundwater, farmers also use conical underground pits for storage, which can be as large as three metres deep. These have fewer problems with rodents and insects and are more secure as they are well hidden. However, they are laborious to excavate and removing and inspecting the grain can be difficult.

Imported wheat

As Table 4.4 shows total imports of wheat into Egypt are around 10 million tonnes. The GASC is responsible for close to half of total imports, which are made for the subsidized wheat program. The government's share of imports has been declining, partly as a result of the increased procurement of domestic wheat.

Table 4.4: Private and public sector wheat imports

	Total imports (thousand tonnes)	GASC imports (thousand tonnes)	Private imports (thousand tonnes)	Government share (thousand tonnes)
2008/09	9 900	5 481	4 419	55%
2009/10	10 500	5 175	5 325	49%
2010/11	10 600	6 035	4 565	57%
2011/12	11 650	5 220	6 430	45%
2012/13	8 300	3 440	4 860	41%
2013/14 (est)	10 500	4 345	6 155	41%
Three year average	10 150	4 335	5 815	43%

Source: Fieldwork data.
Total imports are from the USDA PSD.
GASC imports are calculated from information provided in the USDA GAIN reports.
Private imports are the difference between total imports and GASC imports.

Government purchases of wheat are often stored in government owned and operated storage facilities. As Table 4.5 shows, the government has 400 000 tonnes of storage facilities in the ports of Alexandria, Damietta and Safaga. These are operated by the GCSS. As Table 3.6 reveals, the private sector has much greater storage capacity overall, with just over 2.9 million tonnes. However, unlike the government sector, this storage is not used only for wheat, but also for other grains, as well as oilseeds and meals.

Table 4.5: Government port storage capacity for wheat

Port	Capacity (thousand tonnes)
Alexport	150
Damietta	150
Safaga	100
Total	**400**

Source: Fieldwork interviews.

Table 4.6: Private sector port storage capacity for wheat

Port	Capacity (thousand tonnes)
Dekhelia	1 583
Damietta	550
Alexport	300
Safaga	150
Adabiya	150
Port Said	85
Abu Qir	80
Al Nouberya	35
Total	**2 933**

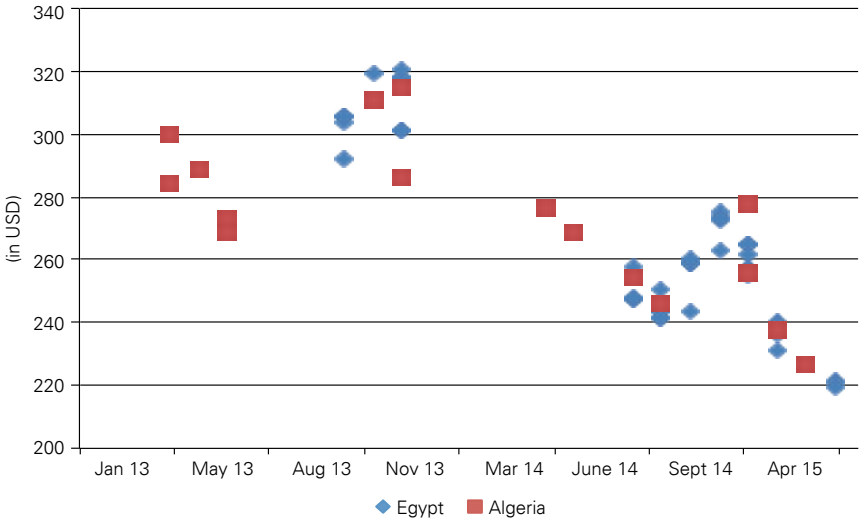
Source: Fieldwork interviews.

The average price paid by GASC for a tonne of imported wheat (any origin, including freight costs) in the period July 2013-April 2015 was USD 256[14]. This seems to be a lower average price than in other countries of the region (Algeria USD 280, Tunisia USD 285); this could be attributed to the country's dominant position as a purchaser of wheat, which allows it to buy wheat at a lower price, but also to the fact that Egypt imports lower quality wheat compared with other countries (mostly from the Black Sea basin), rather than to increased import efficiency. A comparison between milling quality wheat imports from France in Algeria and Egypt suggests a more nuanced picture. Although data points

14 Authors' calculation based on AgFlow data (https://app.agflow.com).

represent different moments in time, it seems that Egypt is paying a relatively similar price for French wheat as Algeria and sometimes even more. This raises the question of whether GASC tender complexity costs balance out the discount GASC benefits from due to the large volume of its purchases.

Diagram 4.1: Price per tonne paid by governments for imports of French milling wheat



Source: AgFlow Database.

Quality of infrastructure

There is extensive private port infrastructure. While professionally managed, this infrastructure suffers from long vessel turnaround times and extensive delays loading trucks. Inland transportation is by road and there are some issues with the quality of roads particularly in Upper Egypt[15]. There is no large-scale transportation with barges down the Nile. This is in part believed to be due to difficulties in receiving permission from the government.

Inefficiencies in government unloading and storage have caused delays and come at a great expense through increased demurrage fees. This is particularly problematic as is revealed in Table 4.7: the government has less storage capacity available than the private sector and therefore has to rely on a higher utilization (turn) of its capacity.

15 World Bank and FAO, 2012. The Grain Chain: Food Security and Managing Wheat Imports in Arab Countries, pp. 22-24.

The government facilities are used only for imported wheat; the volume of imports in Table 4.7 is therefore the same as the three-year average of wheat imports in Table 4.4. The private sector, however, also uses the storage facilities for imports of other grains (predominantly maize), oilseeds and oilseed meal (mainly soybeans). The 15.2 million tonnes of imports in Table 3.7 include all of these additional commodities.

Table 4.7: Government and private imports compared with port storage capacity, 2011-2023

	Government	Private
Volume of imports (thousand tonnes)	4 335	15 242
Storage capacity (thousand tonnes)	400	2 933

Sources: Government import data is based on USDA GAIN reports and total imports are from USDA as in Table 3.4.
Imports of other grains, oilseeds and protein meals in the private sector are from the OECD-FAO Agricultural Outlook (2014).

Note: Government storage is used only for wheat, while private sector storage is used for wheat, other grains, oilseeds and protein meal.

Table 4.7 shows that the volume of storage available to the private sector is greater than that to which the government has access. With limited and inefficiently utilized storage, there are delays at ports, with government boats reportedly spending up to ten additional days in port being unloaded. Finally, because the storage capacity is low and inefficiently utilized compared with other countries, such as Saudi Arabia, the volume GASC buys at a time is restricted.

Table 4.8 shows how many turns of storage will be required by 2022, assuming both the storage capacity remains the same and factoring in future storage capacity expansion. To calculate future imports, we have taken the OECD-FAO Agricultural Outlook's forecasts for wheat, other grain and oilseeds and meal imports. We have assumed that the Egyptian government will import 43 percent of total wheat imports as it has, on average, done over the past three years.

As we discuss in Chapter 5, the United Arab Emirates has provided funding for a silo building program which will increase total government storage capacity for wheat by almost half - adding 1.5 million tonnes of capacity. Of this additional capacity, 120 000 tonnes will be at the ports. In addition, we know that GCSS has begun work on a further 420 000 tonnes of capacity. As a result, capacity should more than double by 2022, and with imports only increasing by 26 percent, the number of turns required should decline to six.

We have no evidence of any private sector expansion to port storage and have therefore left the storage capacity the same to 2022. However, imports are forecasted to more than double, suggesting that some expansion will be needed.

Table 4.8: Government and private imports compared with port storage capacity, 2022

		Government	Private
a	Volume of imports (thousand tonnes)	5 464	34 504
b	Present storage capacity (thousand tonnes)	400	2 933
c = a/b	Imports as share of capacity (thousand tonnes)	14	12
d	Estimated future storage (thousand tonnes) capacity	940	2 933
e = a/d	Imports as share of capacity (thousand tonnes)	6	12

Sources: Government import data is based on USDA GAIN reports and total imports are from the USDA as in Table 3.4.
Imports of other grains, oilseeds and protein meals in the private sector are from the OECD-FAO Agricultural Outlook (2014).

Notes: Government storage is used only for wheat, while private sector storage is used for wheat, other grains, oilseeds and protein meal.
We have assumed that the share of wheat imports by GASC remains at the three-year average of 43 percent.

Storage costs

In Diagram 4.2, we have compared the cost of storage in a traditional *shona* with that in a modern silo.

- The costs for the *shona* are based on information supplied by the PBDAC. We have assumed that the *shona* has 6 000 tonnes of capacity that is fully utilized, but does not take more than one load of wheat per year (one turn).
- The costs for the silo are based on interviews and fieldwork data. We have assumed that the silo has a capacity of 30 000 tonnes. To make a fair comparison, we have performed our calculations under the assumption that the silo is used in the same way as the *shona, namely* to store one load of domestic wheat in a year (one turn). We later explore how the profitability of storage differs depending on the number of turns.

Overall, the costs of storing in a silo are higher than those in the *shona*. However, as we can see in Diagram 4.3, the variable costs are lower. This is

because the single largest cost is depreciation**,** which is a fixed cost. We have assumed the cost of investment for a high-quality silo is USD 4.5 million and that this is depreciated over 15 years. By contrast, we have assumed there is no depreciation cost for the *shona*, as they are already fully depreciated. Even if there were a depreciation cost it would be very low given the minimal investment required to build a *shona*.

In addition, maintenance has also been treated as a fixed cost. We have assumed, in line with estimates in other countries, that the maintenance cost is 1.5 percent of the investment cost. By contrast, the PBDAC assumes there is no maintenance cost in the *shona* (though in practice there may be some very minor repairs necessary).

In the *shona* the largest single cost is labour, accounting for more than half of total costs. This high cost is due to the number of employees administrating the complex system of procurement and guarding the premises. Labour costs per tonne are much lower in the silo both because of the larger volume that is stored and because of the greater security and simplicity of dealing with bulk wheat.

The second largest cost for the *shona* is that of jute bags for storage. This cost is eliminated in the silo as the wheat is handled in bulk. Other costs in the *shona* include the cost of insurance, administration and the cost of calibrating the scales.

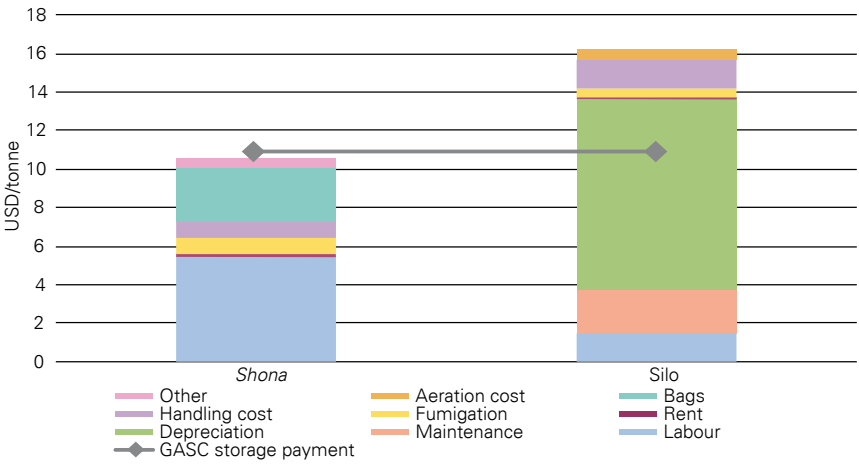
Both the *shona* and silo share similar costs for fumigation. Fumigation costs are slightly higher for the *shona*, but both are a small cost of storage. In addition, there is an aeration cost of EGP 50 cents per tonne in the silos, which is not present in the *shona*.

The total cost of rent is the same for both the *shona* and the silo as both occupy a similar area, but as the silo is able to store much larger volumes vertically the rent cost per tonne is much lower.

Finally, handling costs are higher in the silo than in the *shona*. While in the *shona* the bags are stacked manually, in the silos the system of mechanized handling uses electricity and skilled labour.

Alongside the cost, we have included the payment of EGP 75 per tonne in USD per tonne that GASC makes to the PBDAC for storage. Diagram 4.3 shows that while this payment is sufficient to ensure that the *shona* makes a modest return, a modern silo with its much higher fixed costs could not. However, we have not taken into account the great strength of the silo, which is its lower rate of wastage, which will be reviewed in the next chapter.

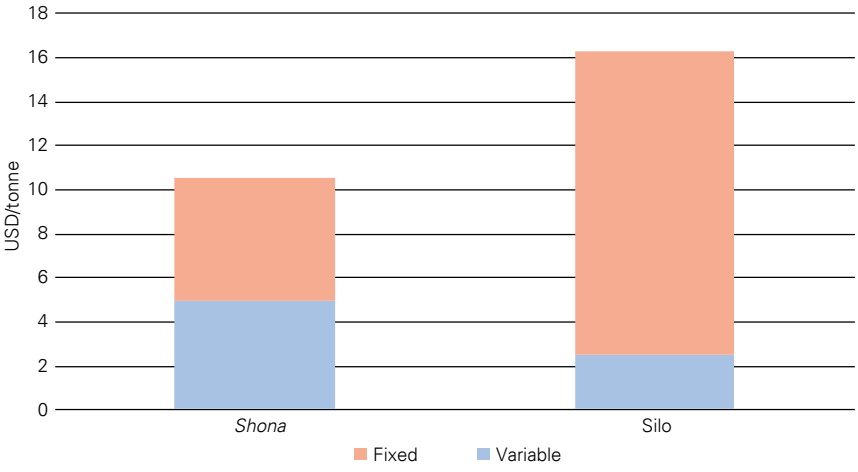
Diagram 4.2: Cost of storage in a *shona* and silo, 2013



Source: Authors' calculations.

Note: Depreciation is calculated over a 15 year period.

Diagram 4.3: Variable and fixed storage costs in a shona and silo, 2013



Source: Authors' calculations.

Losses from storage

We have assumed that quantitative losses in the *shona* is 10 percent of the total volume of wheat. This is at the lower end of most estimates. We have assumed that in the silos losses are around 2 percent, as they would be in an efficient storage system.

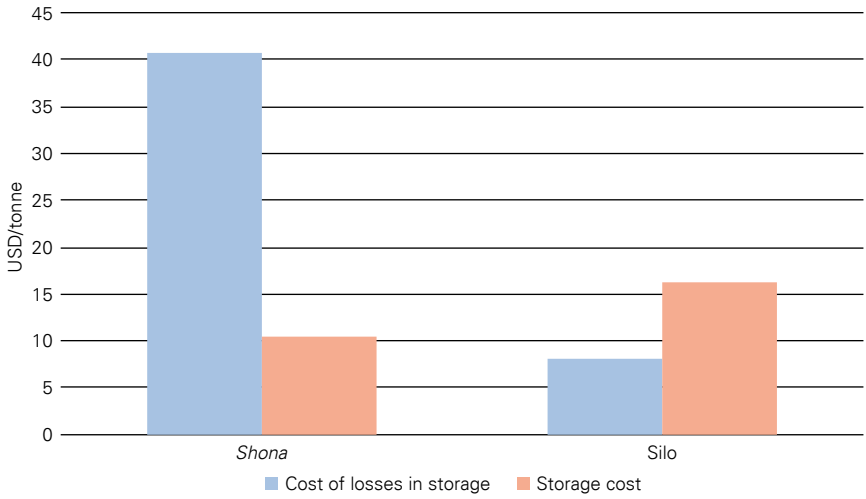
Diagram 4.4 shows the high cost of storage losses in the *shona*. The indirect cost of losses is much greater than the direct cost of storage. In the silo system, the cost of losses is equivalent to only half of the storage cost. The handling of wheat in the *shona* is wasteful due to the jute bags, which often tear and leave the wheat exposed to pests and further losses. The high procurement price of wheat makes these losses particularly expensive.

Poor storage in the *shona* also causes qualitative losses to the wheat, reducing its suitability for milling. However, as there is no reliable information on qualitative losses of wheat in storage and no price information to determine the discount of wheat quality loss, we were not able to assess the extent of qualitative losses in storage.

While a silo storage system is marginally more expensive than the basic *shona* system, the savings from reduced losses would compensate several times for the additional cost. By offering slightly higher storage fees to private sector silos, GASC could save a large amount of money in terms of reduced wastage.

Based on the calculations in Diagram 4.4, by paying USD 5.70 per tonne more for storage, GASC could reduce the cost of losses from USD 40.80 per tonne in the *shona* to USD 8.20 per tonne in the silos. As a result, GASC could save USD 32.60 per tonne in waste while increasing storage costs by USD 5.70 per tonne, yielding a net gain of USD 26.90 per tonne. Based on the fact that the PBDAC usually purchases around 1.6 million tonnes of wheat, this would save a total of just over USD 43 million per year.

Diagram 4.4: *Shona* and silo storage costs compared with costs from losses

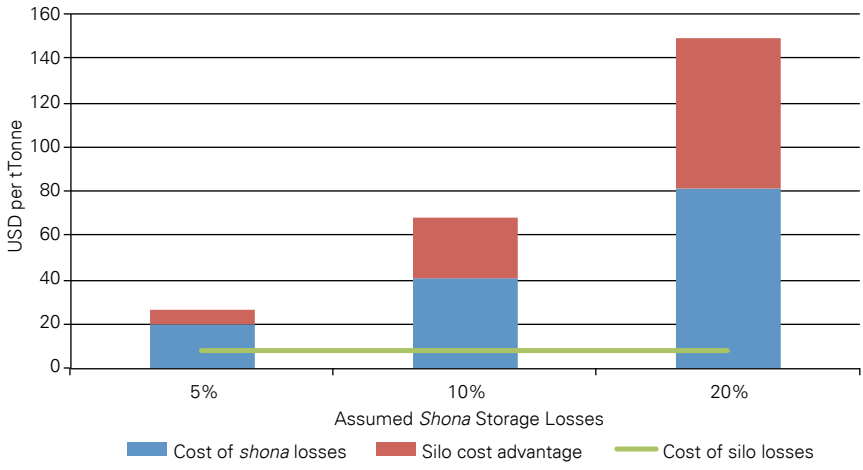


Source: Authors' calculations.

The above modelling is based on an assumption that 10 percent of the volume of grain is lost during storage in *shonas*.[16] This estimate is based on figures communicated by government officials. It should be noted that there is a wide range of estimates of losses due to the poor quality of *shona* storage, therefore, the table below presents the estimated losses of *shona* storage and the potential cost advantages of switching to privately operated silo storage for a range of loss assumptions.

16 This figure is comparable to the 10¬15 percent losses typically recorded in flat storage in Eastern Europe.

Diagram 4.5: Estimated silo cost advantage depending on *shona* storage losses



Source: Authors' estimations.

Note: Silo cost advantage is shown as the total of silo storage costs plus storage loss value minus the same variables for a *shona*. With the 10 percent loss assumption, the potential cost savings of switching to private silo storage is USD 27 million, rising to USD 67 million for 20 percent of losses.

Return on storage investment

So far we have examined the costs for storing wheat for a whole season. In most storage facilities, however, wheat is stored for shorter periods before being moved on. In these cases, the speed at which wheat is turned over is critical to the profitability of the venture.

In Diagram 4.6, we have calculated the Net Present Value (NPV) on the USD 4.5 million investment required to construct a 30 000 tonne silo complex, based on the number of turns achieved per year (numbers in white, expressed in USD million).

The silo faces the same costs as outlined above. To calculate the revenue from storage we have assumed that for the fifteen years of its operation:

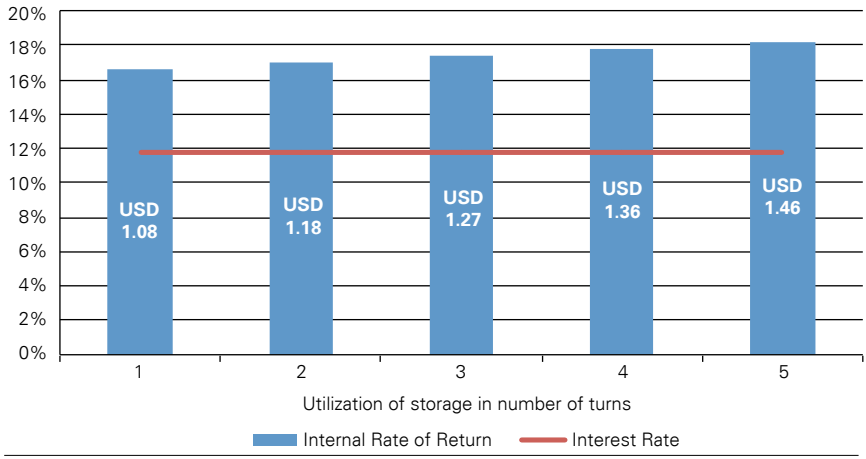
- For each turn, the silo receives a handling fee of USD 3 per tonne.
- For each day of storage, the silo receives USD 0.15 per tonne (around EGP 1 per tonne). We have further assumed that for every 20 days of storage, two days are free, reflecting the fact that users are able to negotiate discounts for longer term storage.

- In addition, we have assumed that the discount rate is 11.8 percent. This is based on the average, monthly weighted interest rate from October 2013 until July 2014, from the Central Bank of Egypt.[17]

Because the handling fee is high compared with the cost of storage, as Diagram 4.2 reveals, the higher the number of turns, the better the return is on the investment (the NPV is shown in USD millions in the blue bars of the chart). If the silo were only able to make 1 turn/year, the NPV of the investment would be just over USD 1 million.

At five turns per year, the NPV increases to about USD 1.5 million. Private companies are able to achieve higher turn rates, both because of better training and because they store many different commodities for a range of clients and are therefore better able to utilize their capacity. With a higher return, private silos are able to provide storage at lower costs. As a result, the government could realize large savings by using the private sectors expertise. Diagram 4.6 also shows the internal rate of return (IRR) implied by our calculations, alongside the interest rate (blue bars and red line).

Diagram 4.6: NPV and IRR on a 30 000 tonne silo investment based on capacity utilization



Source: Authors' calculations.

17 http://www.cbe.org.eg/English/Statistics/Monthly+Average+Interest+Rates+%28Retail%29/ Accessed on the 24th of September 2014.

Chapter 5 – Wheat milling and bread production

Types of flour

There are three main types of flour in Egypt:

- As we saw in the previous chapter, the government procures domestic and imported wheat for the *baladi* bread program. This wheat is then distributed to government and private mills to be ground into 82 percent extraction flour.
- About 3 million tonnes of domestic wheat, which is not procured by the government, is used by the farmers themselves. In some cases, farmers use wheat as animal feed. However, given the high domestic price for wheat, this is not likely to account for a large share. The vast majority of wheat is ground into very coarse 100 percent extraction whole wheat flour in numerous village mills for a fee. Farmers then bake bread in their own homes.
- Private mills do not purchase any wheat from the domestic market and rely only on imported wheat. This wheat is milled into much finer 72 percent extraction flour for *fino* bread and cakes. Unless they are acting for the government, private mills are forbidden to produce 82 percent flour to prevent black market trade.

Previously, 76 percent extraction flour was also produced for another form of subsidized bread called *tabaki*, which is no longer produced. Table 5.1 shows the share of wheat used for each of type of flour, using averages from the past three years (2010-2013). In total, two-fifths of domestic and imported wheat is ground into 82 percent flour to be used in the *baladi* bread program with the remainder split relatively evenly between 100 percent flour in village bakeries and 72 percent flour for *fino* bread. Outside of the villages, there are no stone mills left and all wheat is milled in cylinder mills.

Table 5.1: Wheat end-use by flour type, average from 2010-2013

	100% (village mills)	82% (*baladi* bread)	72% (*fino* bread)	Total
Domestic (thousand tonnes)	5 501	3 167		8 668
Imported (thousand tonnes)		4 335	5 815	10 150
Total	5 501	7 502	5 815	18 818

Sources: Domestic wheat used for 82 percent flour is based on figures from the MALR.
Imported wheat for 82 percent flour are based on GASC import figures from the USDA GAIN reports.
Domestic wheat used in village bakeries is the difference between OECD-FAO wheat production and domestic wheat used for 82 percent flour from the MALR.
Imported wheat for 72 percent flour is based on total imports of wheat from the USDA PSD minus imports for GASC from the USDA GAIN reports.

Note: Public mills also produce some 72 percent flour. To simplify matters we have omitted these flours from our calculations.

Baladi **bread**

The wheat for the *baladi* bread program is milled in both public and private mills as illustrated in Table 5.2. All mills producing 82 percent flour are given a premix as part of the Wheat Flour Fortification Program, which they add to the flour to provide ferrous sulphate and folic acid.

There are 80 public sector mills and 69 private sector mills engaged in producing 82 percent flour. The public sector mills have an average capacity of just over 82 000 tonnes per year (250 tonnes per day), while the private sector mills have a smaller average capacity of just under 62 000 tonnes per year (approximately 190 tonnes per day). Close to two-thirds of wheat is milled in public sector mills with the remainder done by the private sector. As a result, the average capacity utilization is higher (72 percent) in the public than in the private sector mills (63 percent). Both private and public mills may also be milling higher quality (72 percent) flour, adding to their capacity utilization, though in practice the volumes are believed to be small.

Table 5.2: Capacity and share of wheat milled in public and private mills for *baladi* bread, average from 2010-2013

	Number of mills	Capacity of mill	Wheat milled	Capacity utilization
Private (thousand tonnes/year)	69	4 259	2 720	63%
Public (thousand tonnes/year)	80	6 601	4 782	72%
Total (thousand tonnes/year)	149	10 860	7 502	

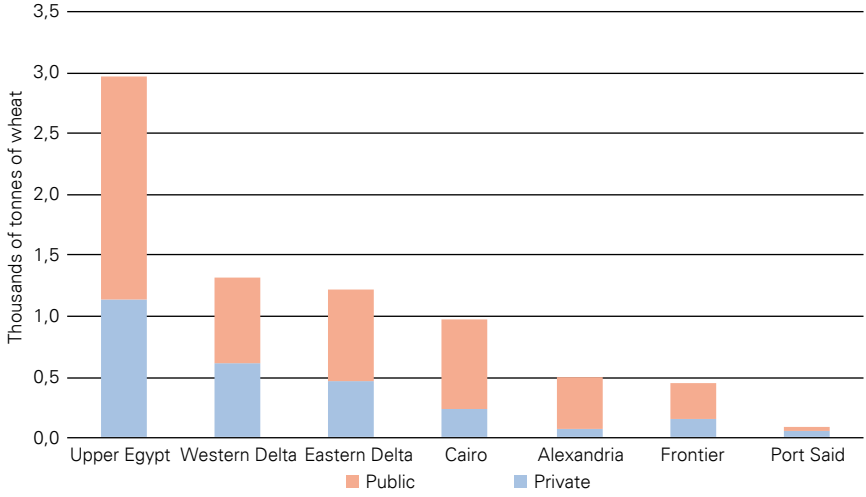
Source: MoSIT and authors' calculations.

Note: We have assumed that mills operate for 330 days per year.

Diagram 5.1 shows the milling of wheat by region, distinguishing between wheat milled by the public and private sector. Government policy is to use private mills where there are insufficient public mills available. Of the private mills engaged in milling for the government, on average, three-quarters of their capacity is used to produce 82 percent extraction flour. This suggests they mill solely for the government. However, this share is only around half in Cairo and Giza. They are therefore more likely to be milling 72 percent flour in Cairo and Giza, alongside the government contracts.

The share of private sector milling is highest in the Western Delta at around 47 percent. It is lowest in Alexandria (13 percent), where there are ten public sector mills that dominate. In Matrouh, the New Valley and North Sinai the government has no mills and relies on the private sector.

Diagram 5.1: Private and public sector milling of wheat



Source: MoSIT.

As we have seen in Table 5.1, the *baladi* bread program uses both imported and domestically grown wheat. In practice, the two types of wheat are blended together before being milled. In addition, in previous years, the government has included a small share of maize in the flour. The MoSIT may decide on wheat blending for flour production. In 2013, it decreed that flour should be a mix of 60 percent imported wheat, 30 percent domestic wheat and 10 percent maize. According to USDA, while local wheat is of a sufficiently good milling quality at harvest, the traditional storage means that impurities enter the wheat and that different qualities of wheat are mixed together. As a result, blending with imported wheat is important to achieve the right quality of flour.

In 2014, the MoSIT signalled that they will not include maize in the flour. This may be because there have previously been some difficulties with mills who were not adept at incorporating maize flour. In addition, it is understood that there were difficulties drying the maize. Over the previous three years (2009-2013) Egypt produced an average of 5.6 million tonnes of white maize (alongside an additional 1 million tonnes of yellow maize for feed). As maize is grown as a summer and *nili* crop, it is available when domestic wheat stocks are low. The use of white maize in flour therefore would appear to be a reasonable means of reducing the need for wheat flour. The problems drying maize have been solved by companies in Sub-Saharan Africa and the government may wish to avail itself of their expertise.

Fino bread

Fino bread is produced by private sector millers from imported wheat. There are a vast number of private sector mills and no accurate figures of their total capacity. Informed estimates suggest that capacity is in the region of 15-20 million tonnes. We will use a conservative estimate of 15 million tonnes.

Table 5.3: Volume of wheat milled in private mills, average 2010-2013

	Wheat milled
For 72% flour	5 815
For 82% flour	2 720
Total	**8 535**
Capacity	15 000
Capacity utilization	57%

Source: Table 5.1 and Table 5.2.

As shown in Table 5.1, the private sector mills around 5.8 million tonnes of imported wheat for 72 percent extraction flour. In addition, they mill around 2.7 million tonnes on behalf of the government for 82 percent extraction flour for the *baladi* bread program.

Table 5.4: Capacity of main private sector wheat mills, 2013

Company	Location	tpd (tonnes per day)	tpy (tonnes per year)
Gold Five Stars	Suez	2 000	660 000
Alexandria Flour Mills	Alexandria	949	313 170
Flour Land Mills	Cairo	750	247 500
Egyptian Miller Mills	Cairo	750	247 500
Wadi El Melouk for Milling	Cairo	500	165 000
Egyptian International Mill Industries	Cairo	360	118 800
Horus Mills	Assiut	330	108 900
Arab Mills & Food Industries	Alexandria	292	96 360
Wehda Cereals Grinding	Assiut	201	66 330
Misr El Menufeya for Mills	Menufeya	120	39 600
Total		**6 252**	**2 063 160**

Source: Authors' compilation.

Note: It is assumed that wheat mills operate for 330 days a year.

Table 5.3 shows that the total volume of wheat milled by the private sector is around 8.5 million tonnes. As a result, assuming there are 15 million tonnes of capacity in the private sector, it is apparent that there is some overcapacity. Relying more strongly on the private sector mills would allow the government to improve the quality of its flour and reduce the overcapacity.

Table 5.4 displays the capacity of some of the main wheat mills. A large number of these mills are based in Cairo, as it is the largest market in Egypt. Gold Five Stars is notable as it has the single largest complex based in Suez, where it mills imported wheat, predominantly from Australia. Australia's Graincorp recently acquired a stake in Gold Five Stars.

Milling margins

Margins differ between government mills, private mills producing 82 percent extraction flour and private mills producing 72 percent extraction flour. Margins differ both because the yields differ and because prices are different depending on whether the flour is destined for the *baladi* bread program or the free market.

Table 5.5 shows the yield of flour and bran depending on the extraction rate. The process of tempering (adding water before milling) means that 1 tonne of wheat produces just over 1 tonne of flour. The coarser milling process for 82 percent extraction flour yields a smaller volume of bran but a greater volume of flour. In actual fact, yields may vary as not all flour is milled to exactly 82 percent. In some cases, we have been told extraction rates have reached 88 percent producing very coarse and dark flour.

Table 5.5: Flour and bran yield depending on extraction rates

Wheat (kg)	Flour (kg)	Extraction rate	Flour (kg)	Bran (kg)
		82%	833	183
1 000 →	1 016 →		→	
		72%	732	284

Source: Fieldwork data.

Note: The volume of flour is greater than the volume of wheat as the miller temper the flour (by adding water).

Prices for wheat, flour and bran differ depending on whether the milling is performed for the public or private sector. Table 5.6 shows the spot margins for

wheat milling both by a government mill producing 82 percent extraction flour and a private sector miller producing 72 percent extraction flour. Private millers who produce 82 percent extraction flour operate as toll millers and receive a flat fee of EGP 80. This is much lower than the margin for both government mills and private sector mills. It is widely believed that private mills producing 82 percent flour rely on the illicit resale of flour to improve their margins.

Public mills receive wheat at a subsidized rate of EGP 2 200 per tonne. From 1 tonne of wheat they are able to produce 833 kg of flour and 183 kg of bran. The flour and bran prices are set by the government yielding a revenue of EGP 2 717 per tonne and a margin of EGP 517 per tonne. This is viewed by the government as sufficient to cover their costs and give a return. Free market bran prices in Egypt are higher than the government prices and in fact are similar to wheat prices. Unscrupulous government mills therefore can earn an additional EGP 110 per tonne by selling their bran on the black market (EGP 600 times 0.183 tonnes).

The private sector imports wheat at a price of around EGP 1 900 per tonne. One tonne of wheat produces 732 kg of 72 percent flour and 284 kg of bran. Both the flour and the bran sell at a higher price and the overall margin is more than double that of both the government mills and the private mills working as toll millers. Private mills have higher efficiency and fewer employees reducing costs slightly. There are insignificant volumes of flour imports and therefore limited competition from outside.

Table 5.6: Spot gross margins for 82 percent and 72 percent flour milling, 2013

	Public sector (government prices) (EGP/tonne)	Private sector (free market prices) (EGP/tonne)
Extraction rate	82%	72%
Wheat price	2 200	1 908
Price of flour	2 800	3 000
Price of bran	2 100	2 700
Revenue from flour	2 333	2 195
Revenue from bran	384	768
Total Revenue	**2 717**	**2 963**
Margin	*517*	*1 055*

Source: Fieldwork data.

Note: The price of bran for 82 percent flour is fixed by the government, which is why it is lower than for 72 percent flour.

Bread baking

In total there are approximately 38 000 bakeries across Egypt. Of these 20 000 produce higher quality *fino* bread and pastries and the remaining 18 000 are *baladi* bakeries producing subsidized bread. There are not believed to be any bakeries which produce both *baladi* and *fino* bread.

Table 5.7 shows the number and capacity of *baladi* bakeries. The vast majority of bakeries are privately owned. The government owns 149 bakeries and a further 184 are owned by the police and the military with a share of less than 2 percent of the total number of bakeries. However, government-owned bakeries are larger than private bakeries with an average throughput of 7 tonnes of flour per day, compared with 1 tonne of flour in the private bakeries. As a result, their share of total baking capacity is higher at around 12 percent.

The *baladi* bread is distributed through small outlets, near the bakeries, 60 percent of which are owned by the government. In addition, they have recently introduced a system of home delivery in some areas for a fee. Since 1989, a loaf of subsidized *baladi* bread has been sold at a fixed price of 5 *piastres,* while the same bread on the free market today retails at 36 *piastres*. (There are 100 *piastres* to one EGP). Previously, people could buy as many loaves as they liked, though there were limits to how many they could buy in one trip. However, a limit of 5 loaves/person/day has been introduced.

Table 5.7: Number and capacity of *baladi* bakeries

	Number	Share	Capacity (tonnes of flour/day)	Share
Public sector bakeries	149	1%	1 043	5%
Private bakeries	17 435	98%	17 435	88%
Police and military	184	1%	1 288	7%
Total	**17 768**	**100%**	**19 766**	**100%**

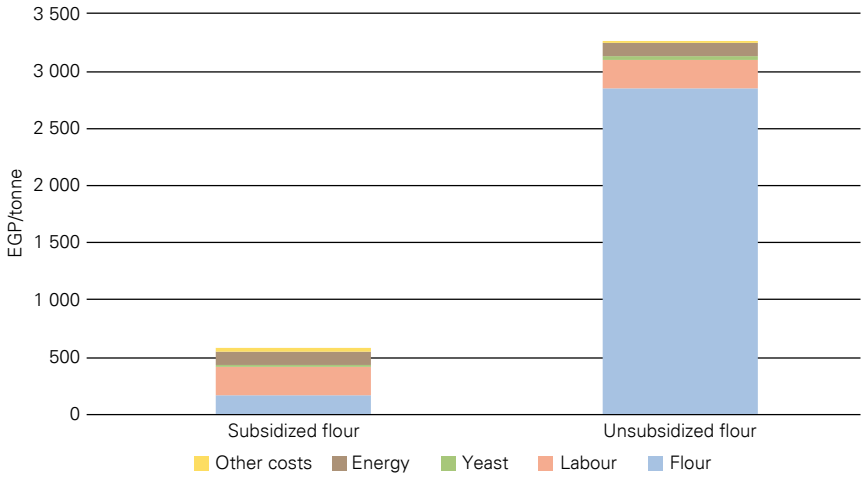
Source: Anwar M. El Nakeeb (2013) Supply Chain of Wheat in Egypt with Focus on Subsidized Wheat, pp. 18-20.

Historically the subsidy system involved the government providing subsidized flour to bakeries who in turn produced loaves and sold them at the subsidized price. Outside of occasional inspections, this meant the government had no way of knowing how many loaves had been sold. In addition, they relied on a system of quotas to allocate flour to the different bakeries. Finally, as the bakery receives the same revenue regardless of its actual sales, there is no incentive

to produce good quality bread. In some cases the poor quality of flour also contributes to the low quality of bread.

Diagram 5.2 shows the variable cost of baking 1 tonne of 82 percent extraction flour based on subsidized and unsubsidized flour. It is immediately apparent that, when not subsidized, the single largest cost for bakeries is the cost of flour. Labour and energy costs are the second and third largest costs, respectively.

Diagram 5.2: Variable costs of baking one tonne of flour in a *baladi* bakery



Source: Authors' calculations.

The government has recently introduced trial, smart card systems to change the subsidy mechanism. In the trial areas, the bakeries purchase the flour at the free market price and sell the bread for 5 *piastres* but the difference between the subsidized and free market bread price is refunded by the government (31 *piastres* = 36- 5).

The average private sector *baladi* bakery has a throughput of 1 tonne of flour. Table 5.8 shows how the profitability of *baladi* bakeries under the new and old system of subsidies compare.

- Under the old system, the bakery bought the flour for EGP 160 per tonne. Under the new system, the bakery buys the flour at the free market price of EGP 2 850 per tonne.
- In both cases, the bakery receives a production incentive of EGP 800 per tonne (EGP 80 per 100 kg of flour).

- The variable costs and fixed costs are the same in both instances. The variable costs are those itemized in Diagram 5.2. Fixed costs are made up of rent, maintenance and taxes and come to EGP 200 per tonne.
- Under the new system each loaf weighs 90 grams and 1 tonne of flour produces 11 000 loaves. Of these, 400 loaves are lost through wastage, leaving 10 600 loaves for sale.
- Under the subsidized flour system each loaf weighed an average of 115 grams (in practice it varied between 110-120 grams). As a result, the bakery could only produce 8 600 loaves, of which about 300 were lost through wastage, leaving 8 300 for sale.
- When the bakery has received subsidized flour it sells the bread at 5 *piastres*. When the flour is unsubsidized the bakery also sells the bread at 5 *piastres*, but receives the difference from the government. As a result, it effectively receives 36 *piastres* per loaf.

Table 5.8 shows that in practice the new system is more generous to bakers than the system utilizing subsidized flour. It also shows that under this format, there is no need for a production incentive, as the higher revenue from the sale of *baladi* bread covers the costs and gives a return of around EGP 350 per tonne.

Table 5.8: Profitability of *baladi* bakery under the old (subsidized) and new (unsubsidized) system

		Subsidized flour	Unsubsidized flour
Flour	EGP/tonne	160	2 850
Variable costs	EGP/tonne	418	418
Fixed costs	EGP/tonne	200	200
Total costs	**EGP/tonne**	**778**	**3 468**
Number of loaves sold	Loaves/day	8 300	10 600
Price per loaf	EGP/loaf	0.05	0.36
Revenue from loaf sales	EGP/day	415	3 816
Production incentive payment	EGP/tonne	800	800
Total revenue	**EGP/tonne**	**1 215**	**4 616**
Margin	*EGP/tonne*	*438*	*1 149*
Margin without production incentive	*EGP/tonne*	*-363*	*349*

Source: Fieldwork and data from the Egyptian Inspectorate for Bread.

The government's proposal to reform the system of payments for bakers and remove the allocation of subsidized flour has resulted in widespread demonstrations by bakers. This is despite the fact that the new system seems to actually be more generous than the subsidized flour program. The explanation may lie in the fact that some bakers are rumoured to sell the subsidized flour on the black market. As we saw in Table 5. 8, subsidized flour is bought at EGP 160 per tonne while the free market price is EGP 2 850 per tonne. Selling the entire allocated flour on the black market would therefore yield EGP 2 690 per tonne just from the sale of flour. In practice, this would leave a bakery without any bread to sell, which would arouse suspicion. However, selling even smaller volumes of flour on the black market is potentially very lucrative. The extra profit available from the illicit resale of subsidized flour explains why there is pressure to retain the status quo.

The system of smart cards that the government is trialling rectifies many problems related to bread quality and misuse of subsidized flour. It means the government no longer needs to allocate flour by quota and reduces the enticement for bakeries to sell that flour on the black market. The smart card makes monitoring sales possible and creates an incentive to ensure that bread is of a better quality to increase revenue from sales. The government should be applauded for taking this initiative.

Chapter 6 – Wheat policy

Introduction

Since the beginning of the 1960s, the Egyptian Government has been involved in the production of many major crops including cotton, wheat, rice, sugar cane and onions by defining output and crop area. Farmers were required to participate in agricultural cooperatives and had to sell part or all of their production to government-owned entities, which operated at fixed prices, usually lower than the free market ones. In parallel, the PBDAC provided farmers with fertilizer, while marketing and processing were also handled by the State. The overall consensus is that this policy had a negative impact on the agricultural sector's performance overall.

From 1986 onward, important reforms were introduced that targeted improving the overall performance of the sector. These took place in two major periods. The first, between 1986 and 1990, under the Economic Reform and Structural Adjustment Programme (ERSAP), when prices were partially liberalized for the ten major crops, delivery quotas were eliminated and subsidies on farm inputs were diminished. The second phase of reforms, from 1990 to 1997, deepened the previously undertaken reforms and proceeded to invoke changes on the macroeconomic level. Guaranteed price floors, however, were kept for wheat and rice, which are announced at the time of planting.

Egyptian policy in the wheat sector has been shaped by the underlying desire of achieving higher self-sufficiency in this staple food product.

Providing subsidized bread is a central aspect of the social security net of Egypt, where one-quarter of the population lives below the poverty line (World Bank, 2011). With such an important proportion of the population being impoverished, wheat policy inevitably has an impact on the political stability of the country and the popular support for any government and this, to an even greater extent after the changes in 2011.

Currently, the involvement of the Egyptian government in the wheat sector can broadly be divided in the following major categories:

(i) Producer input and output support: government support includes input and output subsidies at the farm-level – under the form of subsidized fertilizer prices for producers (input) and domestic procurement prices (output) at higher than the import parity price.

(ii) Consumer support, under the form of a heavily subsidized price of *baladi* bread. The government also owns 12 percent of the bread baking capacity.

(iii) Public investment in improved grain storage facilities and state trading.

(iv) Public support to general services (agronomic research with the aim of improving wheat yields, phytosanitary control, etc.)

The Egyptian Government is heavily involved in the wheat value chain at all levels. Not only does it import more than one-third of all wheat imported into Egypt and represents the sole purchaser of domestic wheat, but it also owns an important share of storage capacity and more than half of the milling capacity of the country.

Table 6.1. below summarizes public and private sector interaction in the wheat value chain.

Table 6.1: Public and private sector interaction in the wheat value chain

Section	Public sector	Private sector
Imports	GASC imports around 37% of total wheat imports.	Imports operate efficiently, with a 0% tariff on wheat and little government regulation.
Port storage	Government operates port storage through GCSS (which has 400 000 tonnes of storage in three ports).	There are 2.9 million tonnes of private sector storage, for both wheat and other commodities, that operate efficiently without government involvement.
Wheat production	No direct government growing of wheat.	Government support through high procurement prices. Limited input support through subsidized fertilizers. Private sector mills cannot purchase domestically grown wheat.
Domestic storage	PBDAC and EHCSS operate domestic storage. There are various projects to increase storage capacity.	Private sector wheat stored at the mill, no domestic purchases or storage. Government does not use private sector storage.
Milling	Government, through FIHC, owns 80 mills with 6.6 million tonnes of capacity.	69 private mills operate as toll millers for the government. No support for private sector millers.
Baking	Government owns only 2% of the 18 000 *baladi* bakeries in Egypt (though these account for 12% of total capacity). The government also owns bread distribution facilities.	Government used to provide subsidized flour and production incentives. Now moving towards a system of production incentives and reimbursement for bread sales.

Source: Authors' compilation.

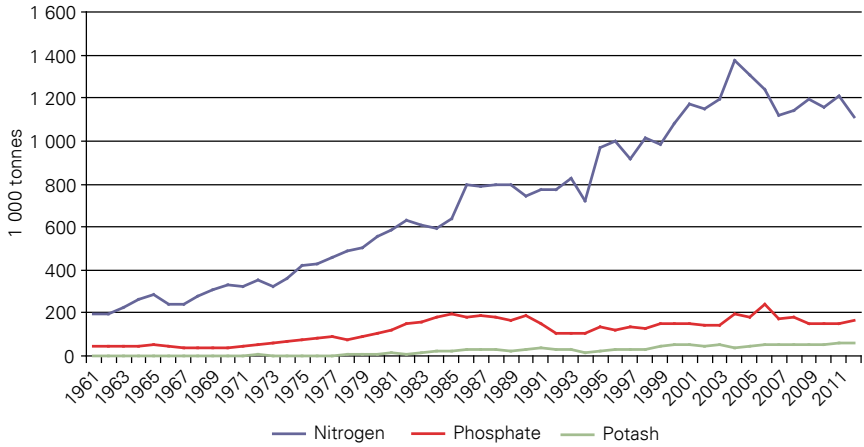
Input subsidies

The only major input support at the farm level in Egypt's wheat production sector consists of fertilizer subsidies for producers. There are no subsidies for seeds, but in some cases, these are provided by cooperatives under the guidance of the MALR.

Globally, fertilizer consumption has been on the rise in the last fifty years and Egypt has proven to be no exception to this rule, as can be seen in Diagram 6.1. Concerning wheat in particular, the rates of fertilizer application recommended by the MALR were raised from 110-140 kg of nitrogen fertilizer (the most commonly used for wheat cultivation) per hectare in 1979/1980 to 160-180 kg per hectare in 2003/2004.[18]

It is estimated that the three main cereal crops (wheat, maize and rice) consume most of the fertilizer available[19] in Egypt.

Diagram 6.1: Domestic fertilizer consumption, 1961-2013



Source: FAOSTAT.

All domestic fertilizer production capacity was state-owned until 1996, when planned additions to capacity opened the doors to private companies in the sector. As of 2012, 96 percent of nitrogen and 62 percent of phosphate fertilizer production in Egypt is carried out by the private sector. This, however, could be a

18 'Fertilizer use by Crop in Egypt', Rome: FAO 2005, p. 28.

19 'Fertilizers industry in Egypt', Alex Bank Economic Research, May 2012.

misleading distinction as in fact, private sector participation seems to consist of "mixed" companies where government entities own at least 25 percent of the shares. It also has to be underlined that the largest producer of nitrogen fertilizer in Egypt is the Abu Qir Fertilizers Company, and although it has the status of a private company, most of its shares are owned by the public sector.

Until 1992, the PBDAC had a monopoly on the distribution of both domestic and imported fertilizers. In contrast, fertilizer distribution has been mostly in the hands of the private sector since the mid-1990s. The distribution chain is organized on three levels, which are as follows:[20]

- Distributors: as of 2005, there were 27 large-scale distributors dealing directly with fertilizer manufacturers; each distributor is subject to a quota, based on previous transactions with manufacturers.
- Wholesalers: wholesalers serve as an intermediary between distributors, from whom they buy fertilizer, and retailers, who sell fertilizer to producers.
- Retailers: in 2005, the number of private traders with fertilizer was estimated to be 6 000. About half of these were licensed and the other half were not.

The Egyptian Association of Fertilizer Distributors and Traders establishes the appropriate margins for its members, so that they are not accused of unfair trading practices.

In recent years, Egypt has been a net exporter of fertilizer and in 2012 imports represented less than 10 percent of exports.

According to several sources,[21] [22] the subsidized price for a 50 kg bag of fertilizer for wheat producers ranged between EGP 70 and EGP 75 (EGP 1.41-1.45/kg) as opposed to EGP 35-38 (EGP 0.70-0.76/kg) before 2008, when the government decided to increase prices. This price, however, is still much lower than the black market price (non-subsidized) which was estimated to range between EGP 120 and EGP 150 (EGP 2.4-3.0/kg).

20 'Fertilizer use by Crop in Egypt', Rome: FAO 2005.

21 Saleh, Yasmine 'Farmers say Egypt's wheat crop hopes are "a dream"', Reuters, 15 Apr 2013 at http://www.reuters.com/article/2013/04/15/us-egypt-wheat-idUSBRE93E0AB20130415, accessed 14 Oct 2014.

22 Saaman, Magdy 'Fertilizer Prices Forced to Grow', American Chamber of Commerce in Egypt, April 2008 at. http://amcham.org.eg/resources_publications/publications/business_monthly/issue.asp?sec=4&subsec=Fertilizer%20Prices%20Forced%20To%20Grow&im=4&iy=2008, accessed 14 Oct 2014.

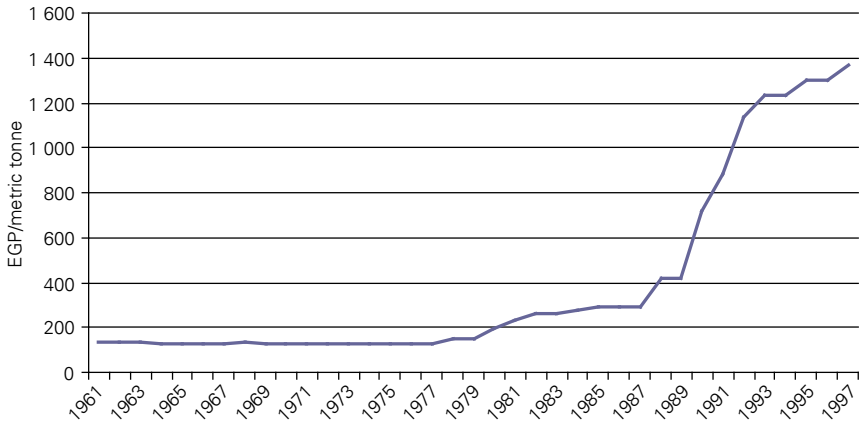
Table 6.2: Egypt, fertilizer prices

	Per bag (50 kg)	Per kg
Pre-2008 subsidized price	35-38	0.7-0.76
Post-2008 subsidized price	70-75	1.4-1.5
Black market price	120-150	2.4-3.0

Source: Authors' compilation.

Indeed, the price paid by farmers for ammonium nitrate fertilizer – which is in fact the type of fertilizer subsidized by the government for wheat cultivation – has increased dramatically since the 1980s (Diagram 6.2), in parallel with the two stages of government-led reforms of the sector mentioned above. This notwithstanding, assuming the 2003/2004 fertilization rates for wheat recommended by the MALR, and considering that the harvested area of wheat in 2013 amounted to 1 418 708 hectares (FAOSTAT), government spending on subsidized ammonium nitrate fertilizer for wheat production can be estimated to be anywhere between EGP 227 million and EGP 383 million per year, respectively equivalent to a value between USD 32 million and USD 54 million (October 2014 exchange rate) per year (assuming that all farmers have access to and use subsidized fertilizer at the suggested application rates).

Diagram 6.2: Egypt, price paid by farmers in EGP for ammoniumnitrate fertilizer, 1961-1998



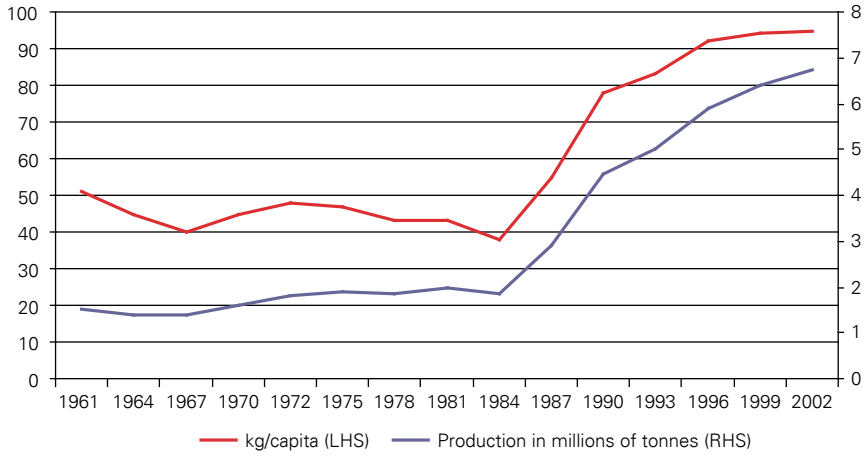
Source: FAOSTAT.

Output subsidies

The main instrument used by the government to encourage domestic wheat production is setting high domestic procurement prices. As shown in Diagram 6.4, domestic procurement prices have been set at a premium to the import parity price, in order to bolster domestic production. As the government, through three agencies acting on its behalf, is the only entity allowed to purchase domestic wheat, this constitutes a very powerful tool in supporting wheat production. The share of domestically grown wheat that the government purchases, however, is no more than 37 percent, as the remainder of it is believed to be for on-farm wheat consumption.

As can be observed from Diagram 6.3, until the mid-1980s, the overall production of wheat was increasing. However, per capita production in fact flattened.

Diagram 6.3: Egypt: total and per capita wheat production, 1961-2002



Source: FAOSTAT.

At the same time, the dependence of Egypt on wheat imports was as visible from Diagram 6.4. Domestic wheat prices were close to the import parity prices until 2007-2008. Since then, the government has increased the domestic wheat procurement price to encourage wheat production.

Diagram 6.4: Domestic wheat price and import parity price, 2003-2013

Source: MALR and LMC calculations.

According to government sources,[23] the 2014 price offered by the government for a tonne of wheat amounted to EGP 2 800 (USD 392), while the import price was about EGP 2 200 (USD 308). This is equivalent to a difference of about USD 84 per tonne as per the 15 May 2014 (mid-harvest) exchange rate. The 2015 price for domestic wheat is set to be USD 394.

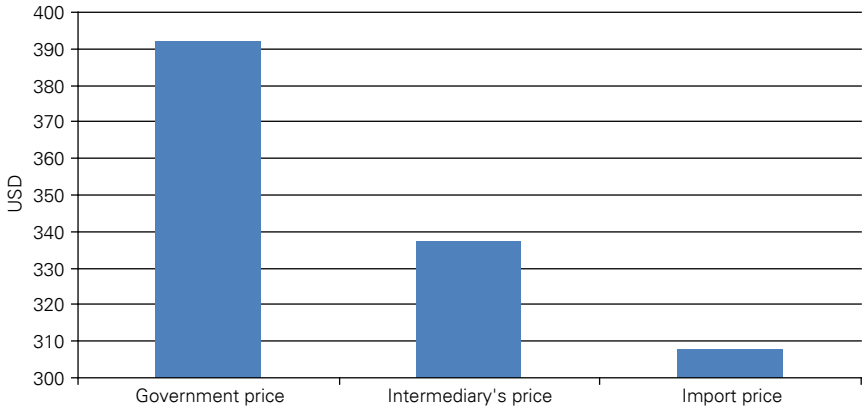
The total volume of domestically produced wheat purchased by the government in 2014 was estimated to be around 4.25 million tonnes. This means that the government has spent about USD 357 million on subsidizing the price of domestic wheat this year. Along this chain, intermediaries who, according to government sources, buy wheat from producers at a price 14 percent lower than the government one, make a profit of about USD 55 per tonne. While the proportion of wheat that is handled by these intermediaries is difficult to estimate, it would seem that the figure is relatively high.[24] Eliminating them from the trade chain has been a priority for the government during the 2014 harvest. In addition, with the domestic procurement price being higher than that for imported wheat, there is

23 MALR official quoted in Deya, Abaza 'Egypt expects record purchase of domestic wheat in 2014' in Ahram Online at http://english.ahram.org.eg/NewsContent/3/12/99740/Business/Economy/Egypt-expects-record-purchase-of-domestic-wheat-in.aspx, accessed on 17 October 2014.

24 Ibid.

an incentive for similarly unscrupulous intermediaries to resell imported wheat as domestic, with a potential profit of up to more than USD 80 per tonne of wheat.

Diagram 6.5: Egypt, price of wheat per tonne (2014)



Source: Authors' calculations.

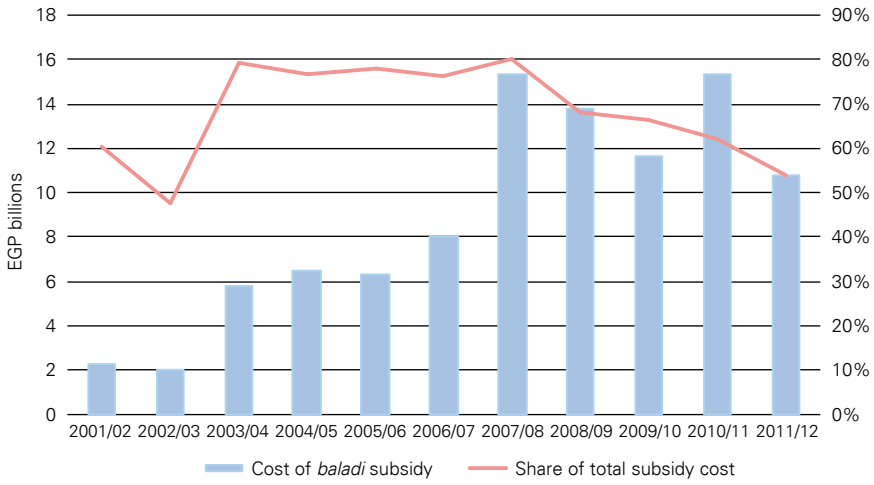
Consumer support

In a drive to provide food security to all of its citizens, and in the context of its policy of social inclusiveness, the Egyptian government has been subsidizing the price of *baladi* bread. Initially set at 1 *piastre* per loaf, the price, since 1989, has increased to 5 *piastres* yet remains considerably lower than the free market price of 36 *piastres*.

As Diagram 6.6 shows, the *baladi* bread subsidy is the single most important food subsidy accounting for over half of the total cost of Egypt's extensive ration card system. The cost of the *baladi* bread subsidy depends on the international price of wheat and the coverage of the programme (in 2010/11 it amounted to 0.8 percent of Egypt's GDP). The cost of the programme has grown over the past decade owing to a growing population, a weaker Egyptian Pound and high world wheat prices. Reform of the *baladi* bread programme, therefore, is a high priority for the Egyptian Government which has had increasing difficulties funding the subsidy.

The government has long recognized that substantial losses occur throughout the wheat value chain. The poor storage of wheat leads to both quantitative and qualitative losses. Quantitative losses occur from poor handling and from the leakages in the system, where wheat is re-sold illicitly. This is also believed to occur at the mills, as well as in the bakeries. Recognizing these losses, the government has tried to encourage new investment in storage capacity and to reform the system of subsidies to eliminate the black market sale of flour.

Diagram 6.6: Cost of *baladi* bread subsidy and share of total ration card costs, 2001/02-2011/12



Source: Ministry of Finance data reproduced in Anwar M. El Nakeeb (2013) Supply Chain of Wheat in Egypt with Focus on Subsidized Wheat, p.13.

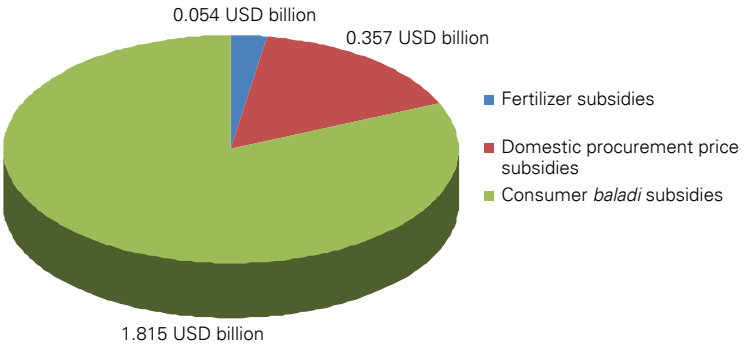
Historically, the government provided subsidized wheat to the bakeries, with which they were meant to produce *baladi* bread to be sold at a subsidized price. The government recognized, however, that under this system, apart from periodic inspections, there was no systematic means of tracing the actual volume of bread produced and consumed, which left it open to widespread fraud. In practice, there was substantial selling of subsidized flour on the black market. As a result, there was at times limited *baladi* bread available for sale, causing long queues and political tension. In addition, the quality of the bread was poor, particularly in the villages.

In response, the government has introduced a new system in many cities, including most recently greater Cairo, in which each person is entitled to 5 loaves of *baladi* bread at the subsidized price of 5 *piastre*, using an electronic smart card to purchase the bread and hence determine the subsidies to which the baker is entitled. This system is far more efficient and if properly implemented should reduce wastage significantly. The government plans to move all bakeries onto the new system and has certainly already made impressive progress. As of January 2015, it is understood that the new system has been rolled out in 19 of the 27 Egyptian governorates.

In the long run, however, replacing food subsidies with cash payments would be optimal. In the first place, this is the best way of ensuring that the country's resources are rationally utilized (i.e. that bread made from imported wheat does not end up being used as animal feed when cheaper *berseem* is available). Second, it would give citizens the freedom of spending the cash subsidy on food items other than bread, which could have potentially beneficial effects on public health, as a result of the diversification of the currently carbohydrate-heavy diet of most Egyptians. In any case, the system would be expected to lead to a reduction in bread consumption levels, which would have an expected positive impact on nutrition. Furthermore, no particular public discontent should arise as the cash subsidy system would represent more freedom of choice for the citizens.

In 2011/2012, the total cost of the *baladi* bread programme for the Egyptian Government was estimated to be about EGP 11 billion (USD 1.815 billion). The overall yearly cost of the government's expenditure in the wheat value chain through its input (fertilizer), output (high domestic procurement price) and consumer subsidies can thus be estimated to be over USD 2 billion. This figure alone is equivalent to about 1 percent of Egypt's GDP.

Diagram 6.7: Public spending in the wheat sector



Source: Authors' estimates.

Public investment in storage

In Chapter 4 of this study, we examined the need for growth and modernization in wheat storage capacity. Current state policy in this respect is one of public investment.

The EHCSS aims to operate 50 silos with a total capacity of 1.5 million tonnes. At present, they have 25 silos and growth has been very slow. However, the

Saudi Fund for Development has recently announced their intention to provide a loan to EHCSS to complete the project.

Table 6.3: Storage investment through the United Arab Emirates

	Number of silos	Capacity (tonnes of wheat)
Port silos	2	120 000
PBDAC	11	660 000
FIHC	2	120 000
EHCSS	10	600 000
Total	**25**	**1 500 000**

Source: Fieldwork data.

Other countries have also signalled their intention to provide assistance. Of these, the most committed appears to be the United Arab Emirates, which has provided funding for a silo building program which will increase total government storage capacity for wheat by almost half, adding 1.5 million tonnes of capacity. Table 6.3 outlines the allocation of this capacity: 120 000 tonnes will be used for port storage and a further 660 000 will be designated to the PBDAC to replace the *shona*. This should provide higher quality storage, but ideally, all *shona* storage should be replaced by more efficient silos to reduce the cost of losses. There is, therefore, scope for further investment. The remainder will be allocated to the FIHC and the EHCSS.

In addition, for the first time, there has been some limited private sector involvement in inland storage, through two contracts in place for private silos in the Delta (respectively with 35 000 and 45 000 tonnes of capacity). Thus, 480 000 tonnes of additional capacity are believed to be underway in the ports for GCSS.

The construction of the 25 silos is a key component of a USD 4.9 billion Emirati aid package to Cairo. In parallel to this, the government recently announced a USD 28 million investment partnership with American company Blumberg Grain, which, by April 2015, is expected to complete the construction of 93 small-scale, modern wheat storage facilities across Egypt that will be capable of processing 3.7 million tonnes annually and of storing 750 000 tonnes of

wheat.[25] The partnership, which provides for project expenditures of up to USD 56 million, will also include the modernization of up to 164 *shonas* in total, reducing losses to under 5 percent.

In addition, during the finalization phase of the report, the Minister for Supply, Hanafy, announced plans for the construction of a "grain logistics hub" for grain trade and storage in the Mediterranean port city of Damietta, in order to better integrate the supply chain. The project includes the expansion or construction of various logistical units such as ports, storage, internal transportation, processing and redistribution. In addition, it is also expected to facilitate trade and reduce operating costs to internationally acceptable levels.[26] The hub would have a total targeted static storage capacity of 7.2 million tonnes.

State trading: complexity of tender documentation

GASC buys wheat opportunistically throughout the year, although it often ceases to import during May and June as the Egyptian harvest is underway. Diagram 6.8 displays the monthly imports by GASC. While total imports have actually declined, the monthly spikes of imports have become greater as GASC imports have become more sporadic due to difficulties with the availability of foreign exchange.

On average, tenders come out every two to three weeks and are released on Reuters late in the evening in Cairo, after the CBOT has closed. GASC monitors the prices on the CBOT, as well as the other major exchanges.

GASC usually makes its purchasing decisions on the next day. Delivery is set for one to two months from the tender date. GASC buys from the major trading houses (such as Cargill, Bunge and Louis Dreyfus) as well as from smaller, regionally specialized commodity traders. International suppliers are required to have a local agent in Egypt.

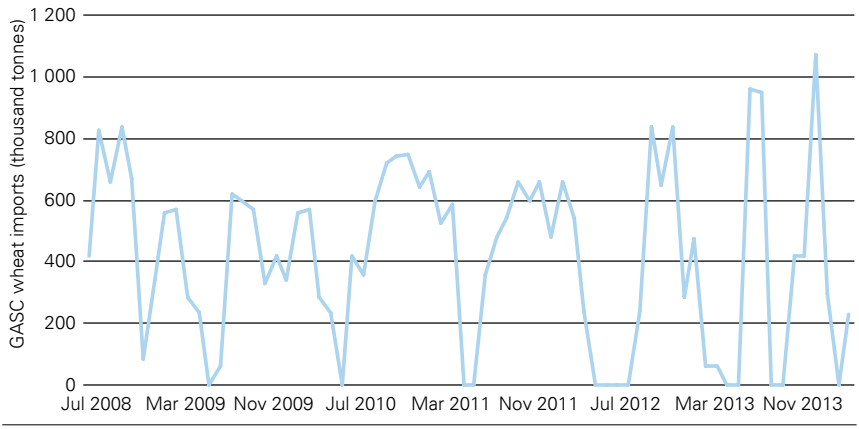
GASC buys from a range of locations, including the following: France, Australia, Canada, and the United States, as well as from the countries in the Black Sea region (Ukraine, the Russian Federation and Romania), which have recently dominated imports. Selection is based on the lowest price meeting the tender's specifications. GASC tenders on all types of wheat, despite the fact that *baladi* bread requires only soft wheat. In general, GASC requirements are often higher

25 Keene, Stephanie 'Egypt and Blumberg Grain Launch World's Largest Integrated Food Storage System', 22 January 2015, available at http://www.covafrica.com/2015/01/egypt-and-blumberg-grain-launch-worlds-largest-integrated-food-storage-system/, accessed: 30 January 2015.

26 'New Logistic Center for cereals and grains Trade, located in Damietta', 29 December 2014, Egypt embassy in the US website, available at: http://www.egyptembassy.net/news/new-logistic-center-for-cereals-and-grains-trade-located-in-damietta/, accessed: 1 July 2015.

than the specifications set by the Egyptian Organization for Standardisation and Quality (EOS 1601/2005).

Diagram 6.8: Monthly imports of wheat by GASC, 2008-2013



Source: USDA.

Over the last ten years, the tender document has become increasingly complex. General requirements for delivery are as follows:

- GASC only accepts imports through Panamax ships (55-60 000 tonnes). They purchase the entire shipment rather than sub-lots. This rule is designed to avoid traders sending smaller ships and causing delays at port.
- The wheat must come from a port in the country where it was grown, with exceptions made for landlocked countries such as Kazakhstan, who can nominate a port in a neighbouring country.
- The tenders provide separate prices for wheat and freight, and GASC may choose to combine the offers from different tenders.
- The vessel is checked by inspectors nominated by GASC at the port of loading. Upon arrival in Egypt, the shipment is inspected by numerous agencies: the General Authority for Export and Import Control (GOEIC), the Ministry of Health, the Central Administration for Plant Quarantine (CAPQ) and the Atomic Radiation Agency, each of whom examine a sample from the shipment. The plethora of agencies that inspect the shipment add to the complexity of the importation process. In particular, it appears unnecessary for the Atomic Radiation Agency to be engaged in inspecting each shipment as radiation levels are not an active concern in Black Sea wheat shipments. Traders have said that they appreciate the port of loading inspection system because it ensures there are fewer unofficial problems at the ports.

In addition, there is an increasing number of specific requirements on the tender documents. The most common requirements are summarised in Table 6.4. As a result, over the past few years there have been a number of cases in which inspection requirements have resulted in problems with shipments:

- Russian wheat imports were delayed in 2009 because the shipment was believed to breach the maximum quantity of dead insects. Russian wheat was also removed from the tender specifications for a short period following their export ban in 2010.
- A Kazakh wheat shipment was rejected in 2012, due to the presence of "unauthorized seeds".
- In 2010 the CAPQ imposed a freedom from Ambrosia (Ragweed) requirement. This resulted in at least one US vessel being held up in 2013.
- In 2014, French wheat producers had difficulties meeting the moisture requirements, which were reduced to 13 percent.

The proliferation of stricter requirements, uneven enforcement and testing delays have made suppliers increasingly wary of the GASC tenders. In addition, the shipping time for GASC tenders is on very short notice, which means suppliers incur additional costs arranging for transportation. On some occasions, when ports are very busy, traders have not been able to arrange for delivery. As a result of these requirements, the price GASC pays for imports of wheat is usually around USD 67/tonne higher than among private companies.

The estimated costs due to GASC tenders and procedures are as follows:

- The cost of GASC inspections at the port of loading is estimated to be USD 0.68/tonne, whereas the cost of local, private sector inspection services is USD 0.2/tonne.[27]
- The complexity of the GASC tender documents increases the cost of tenders by USD 6 to USD 7/tonne, relative to identical private sector shipments.
- If a cargo is rejected due to the ambrosia rules, then additional costs in terms of demurrage, sieving and additional storage are incurred, which total roughly USD 12 to USD 15/tonne.

Longer delivery periods in tenders would help to reduce costs significantly.

Concerning the current "freedom from ambrosia" requirement, a shift to a risk-based, phytosanitary regulation policy in line with standard, international practice,

27 These estimates are based upon a survey of traders. Figures given averages for Panamax sized vessels.

would be strongly welcomed and would help reduce the current risk premium, owing to the risk of additional costs related to the presence of ambrosia.

Table 6.4: Tender specifications for GASC imports

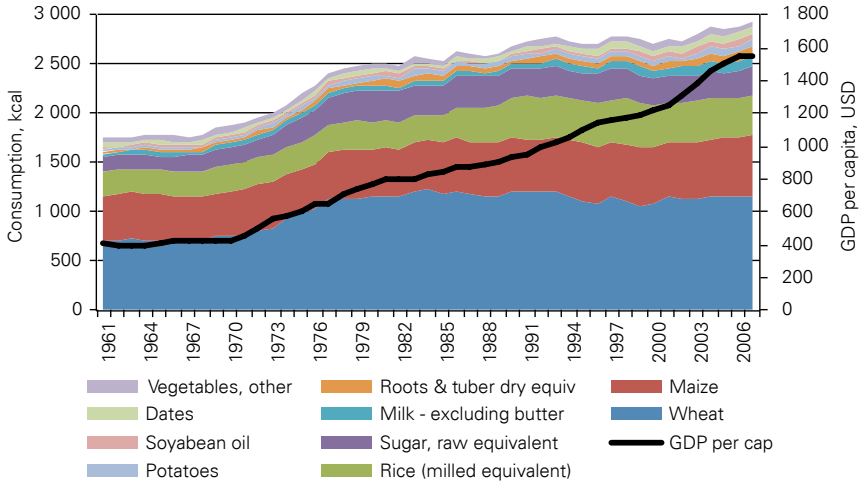
Minimum specifications:	
	A moisture level of 13% or less.
	A falling number of 200.
	A limit on impurities of 0.5%.
	A minimum protein content of 10-12%.
	A specific weight of less than 76 kg per hectolitre.
	The wheat must be safe for human consumption and free of unpleasant odours and tastes.
	Must meet international limits on pesticide residues, mycotoxins and heavy metals.
Defects must be within these limits:	
	Total defects must not exceed 5% of the weight.
Specific limits on defects include:	
	A limit on grain admixture of 1.5% of the weight.
	Dead insects must be less than 1% of the weight.
	Damaged grains must be less than 4% the weight.
In addition there are restrictions on organic waste:	
	The wheat must be free of live insects and dead rodents.
	If two insects are found within a sample of one kilogram, fumigation is necessary.
	Other organic materials must be less than 5% of the weight.

Source: GASC.

Note: These are the main requirements; in practice, tender documents will differ depending on the countries involved.

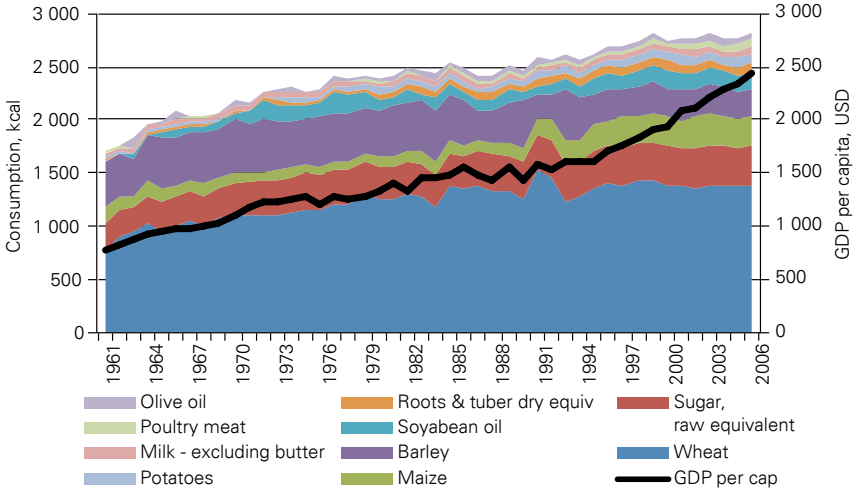
Annex 1 – Consumption trends

Diagram 1: Top ten most consumed Egyptian products



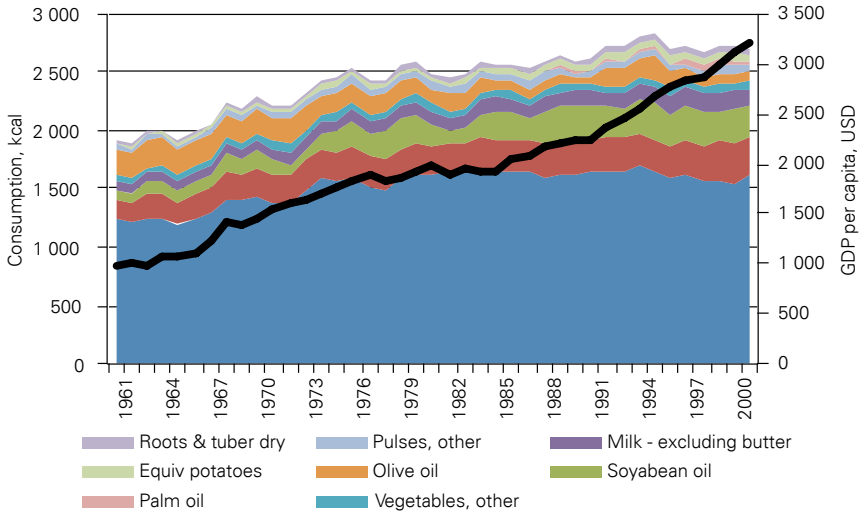
Source: FAOSTAT and World Bank data.

Diagram 2: Top ten most consumed Moroccan products



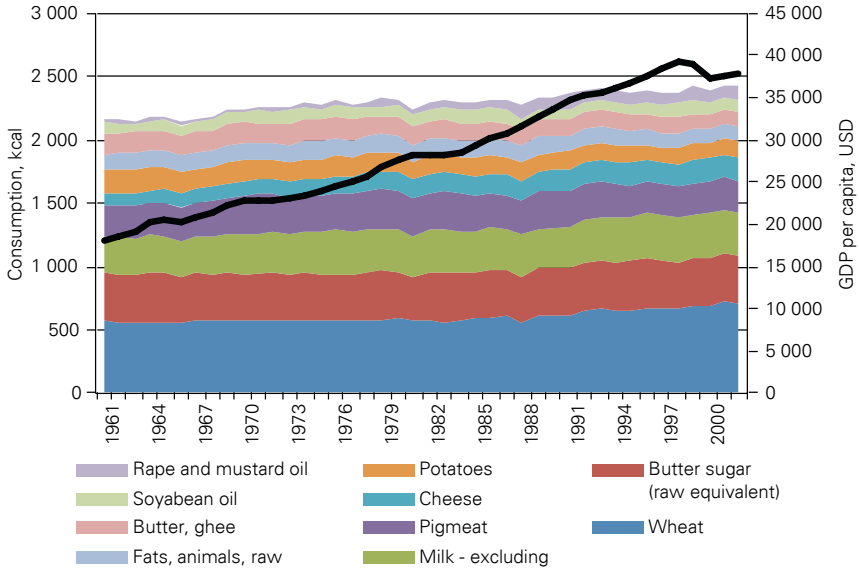
Source: FAOSTAT and World Bank data.

Diagram 3: Top ten most consumed Tunisian products, 1960-2001



Source: FAOSTAT and World Bank data.

Diagram 4: Top ten most consumed Western European products



Source: FAOSTAT and World Bank data.

Table 1: Top five most consumed products in Egypt, Italy, Morocco, Tunisia and Western Europe

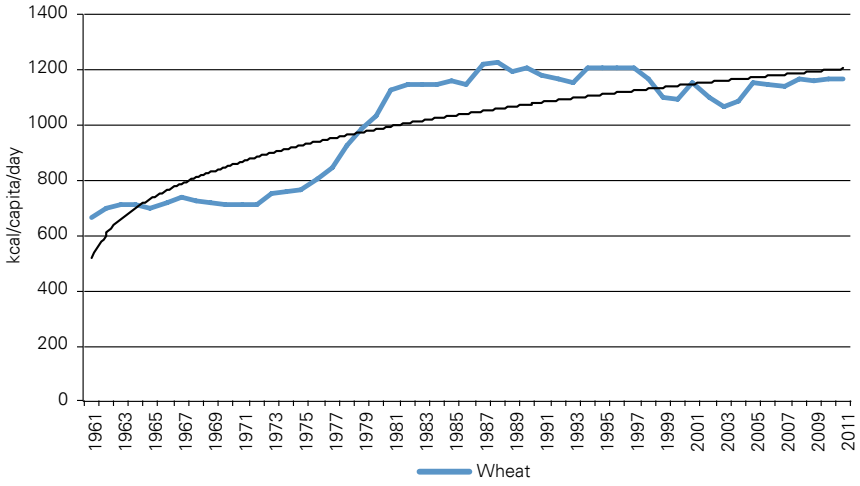
Top five products consumed for researched countries, kcal/day/cap

Country/products	1961	1980	1990	2000	2005	2008	2009	2010	2011
Egypt									
Wheat	662	1 034	1 205	1 090	1 155	1 165	1 161	1 166	1 169
Maize	443	462	542	581	560	570	598	597	604
Rice (milled equivalent)	236	277	324	426	386	424	410	383	414
Sugar, raw equivalent	123	257	313	299	271	273	251	297	303
Dates	52	35	39	58	62	67	63	66	66
Italy									
Wheat	1 183	1 220	1 064	1 069	1 046	1 040	1 053	1 027	1 033
Sugar, raw equivalent	242	337	288	293	301	280	278	275	274
Olive oil	221	253	297	312	278	291	261	268	282
Milk - excluding butter	183	271	286	275	288	289	269	288	287
Bovine meat	84	148	155	139	130	126	128	127	117
Morocco									
Wheat	950	1 161	1 390	1 349	1 385	1 373	1 374	1 370	1 373
Barley	333	433	425	271	271	272	268	261	271
Sugar, raw equivalent	272	336	303	366	365	396	397	366	380
Maize	54	83	124	258	280	294	268	272	273
Milk - excluding butter	37	44	43	42	49	58	61	63	72
Tunisia									
Wheat	1 246	1 599	1 645	1 592	1 625	1 550	1 628	1 629	1 632
Sugar, raw equivalent	233	260	272	275	326	332	346	334	343
Olive oil	163	161	93	145	77	76	75	73	75

Country/products	1961	1980	1990	2000	2005	2008	2009	2010	2011
Milk - excluding butter	71	94	115	161	150	165	160	159	159
Vegetables, other	40	63	63	58	69	75	75	90	87
Western Europe									
Wheat	635	583	571	617	670	692	687	727	709
Sugar (raw equivalent)	328	365	339	372	403	377	381	380	371
Milk - excluding butter	286	315	333	331	347	344	357	346	351
Potatoes	225	154	142	139	115	122	119	115	123
Pig meat	189	308	290	280	250	248	250	250	245

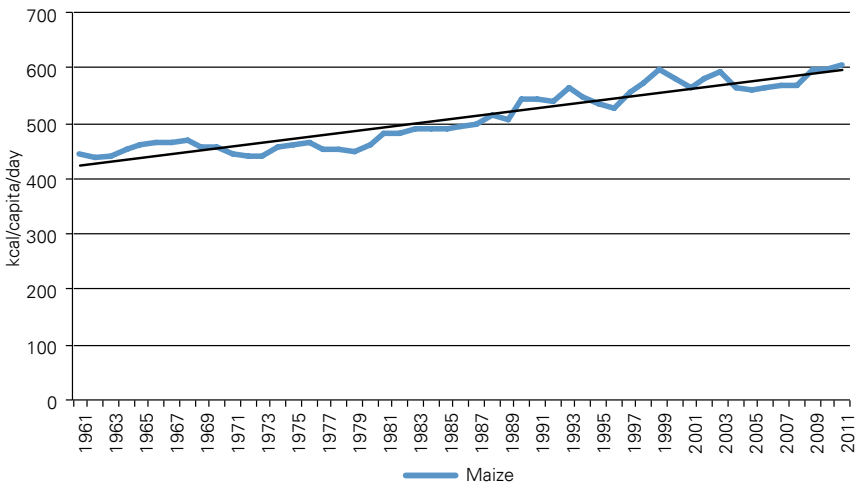
Source: FAOSTAT.

Diagram 5: Daily per capita energy intake from wheat (and products) in Egypt, 1960-2011



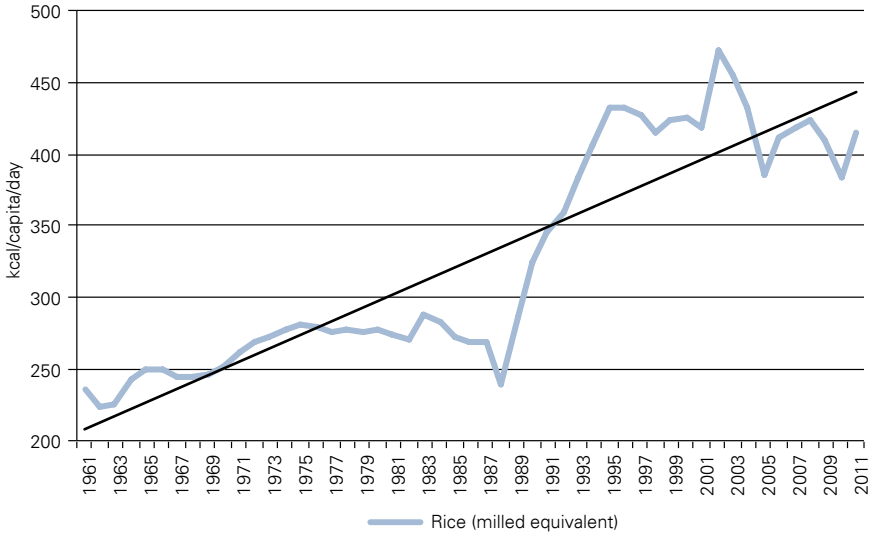
Source: Authors' calculations based on FAOSTAT data.

Diagram 6: Daily per capita energy intake from maize (and products) in Egypt, 1960-2011



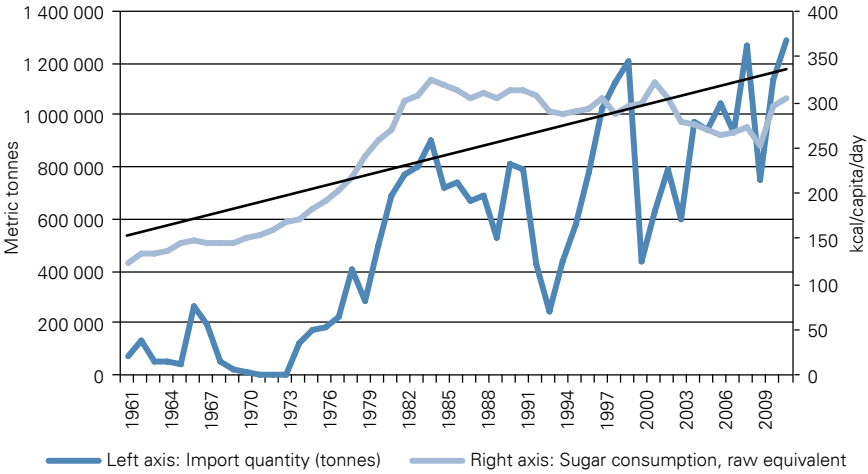
Source: Authors' calculations based on FAOSTAT data.

Diagram 7: Daily per capita energy intake from rice (milled equivalent) in Egypt



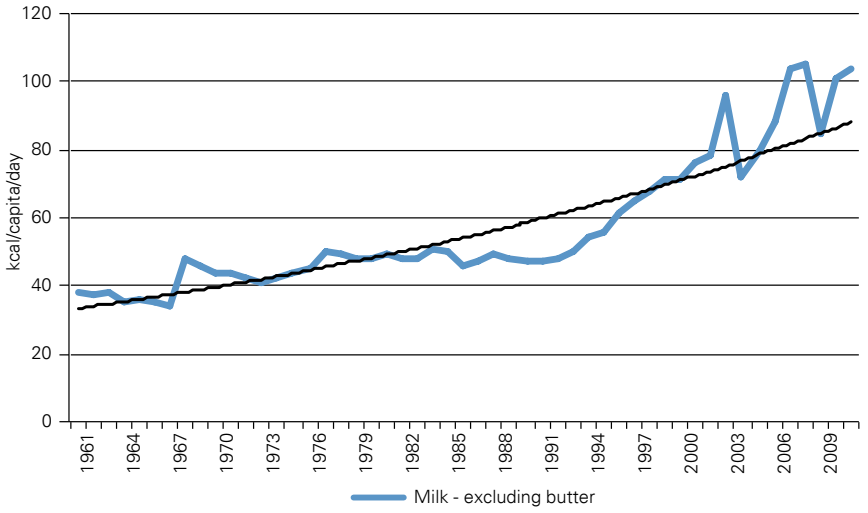
Source: Authors' calculations based on FAOSTAT data.

Diagram 8: Sugar (raw equivalent), yearly import quantity and daily per capita energy intake in Egypt, 1960-2011



Source: Authors' calculations based on FAOSTAT data.

Diagram 9: Daily per capita energy intake from milk (excluding butter) in Egypt, 1960-2011



Source: Authors' calculations based on FAOSTAT data.

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