Policy Brief No. 32
October, 2018

EGERTON UNIVERSITY
TEGEMEO INSTITUTE OF AGRICULTURAL POLICY AND DEVELOPMENT

Cost of Maize Production in Small and Large-Scale Systems for the 2018 Cropping Year

Timothy Njagi, Lilian Kirimi, Nicholas Odhiambo & Ephiphania Kinyumu

Policy Brief

SUMMARY

Tegemeo Institute carried out its annual assessment of the cost of production for maize in September 2018. The study was to establish the major drivers of the cost of production in small and large-scale production systems, and the policy interventions required to stimulate and enhance efficiency in maize production. Findings showed that there was increased productivity for both large and small-scale producers by 23 and 6 percent, respectively, compared to the 2017 cropping year. The increase was due to favourable weather and minimal effect of pests and diseases especially the Fall Army Worm. Production costs per bag for large and small-scale farmers declined by 18 and 15 percent, respectively. This was mainly due to improved yields. Besides, there was increased use and access to subsidised fertiliser, which would translate to a reduction in costs by 11 and 17 percent, respectively, among small and large-scale farmers. Rental cost of land, hiring of machinery, labour and fertilizer were the major contributors to the cost of production. In order to reduce costs and improve production, the study recommends: use labour-saving technologies such as herbicides in place of manual weeding; mechanisation of farm activities like land preparation, planting and harvesting; and, enhancing the adoption of climate-smart agricultural practices. At the time of the assessment, farmers were facing very low market prices which were likely to sustain in the short term as the long rain crop is harvested. Government's intervention in the maize market affected prevailing prices and farmers' expectations on prices and hence its role should be reduced. Strategic food reserves should be acquired through an alternative model comprising of virtual stocks, direct purchases from the market and warehouses, and contract farming.

BACKGROUND

Maize remains a critical food security crop accounting for 65% of the staple food calorie intake (Mohajan, 2014). It is also grown by a majority of farming households with about 40 percent of the crop area under maize (ERA, 2015). It is estimated that about 80% of small-scale farmers cultivate maize, although they account for a small proportion of the production. Kenya continues to be a net importer of maize. Imports into Kenya account for about half of the volumes traded in the East African region (EAGC, 2018).

The high cost of maize production has been one of the major challenges facing farmers in Kenya. To ensure that farmers remain profitable, the government has rolled out a number of interventions to support maize farmers, key among them being the fertilizer subsidy program and producer price support. It is, therefore, necessary to track these costs, establish the major cost components and the key drivers for maize production in the face of changing production environments in the country.

It is against this backdrop that Tegemeo Institute undertakes an annual assessment of cost of production. This year's assessment covered the long rains season for maize production for both large and small-scale production systems. The 2018 season was characterised by above normal rainfall that was well distributed in time and space, and minimal pest and disease incidence.

Data and Methods

The assessment follows the typical farm approach described by Deblitz & Zimmer (2005). This approach characterized the production systems and practices that define producers in the sampled location. The approach then establishes a prototype farm involving farmers, extension officers and other experts in the area including input suppliers and other relevant actors in the selected value chain.

The 2018 cost of production assessment was carried out in three counties that were purposively selected based on their high maize production. These counties are Trans Nzoia, Uasin Gishu and Nakuru. The county agriculture officers were involved in identifying specific locations where there is substantial production of maize in respective counties and characterizing the predominant production systems in these areas.

Data was then collected through focus group discussions with farmers, and experts in maize production in the area such as the ward extension officers, input suppliers and stockists and traders. The data obtained in this study were analyzed and presented in three scenarios:

- Scenario I: Actual cost of production
- Scenario II: Cost of production with land rent
- Scenario III: Cost of production using subsidized fertilizer

Results

Table 1 shows the costs of production for both small and large-scale production systems. The average yields per acre were 18 and 24 bags for small and large-scale systems, respectively. Compared to 2017 cropping year, these yields were higher due to favourable weather conditions in 2018. As indicated earlier, above normal rainfall was received in 2018 and there were minimal incidents of pests and diseases.

The average total production costs were KES 24,592 and 32,290 per acre for small and large-scale systems, respectively before considering the rental cost of land.

Under small-scale systems, the largest cost component was labour followed by machinery and fertilizer (Figure 1). On the other hand, the largest cost items for large-scale systems were the cost of hire of machinery followed by labour and fertilizer. This difference is expected since large-scale farmers use more of farm machinery.

The average cost of seeds per acre for small-scale producers was lower at KES 1,620, compared to KES 1,949 per acre incurred by large-scale producers. This is due to differences in hybrid maize varieties planted. While small-scale producers relied on the commonly used varieties, large-scale producers used seed for slightly costlier varieties.

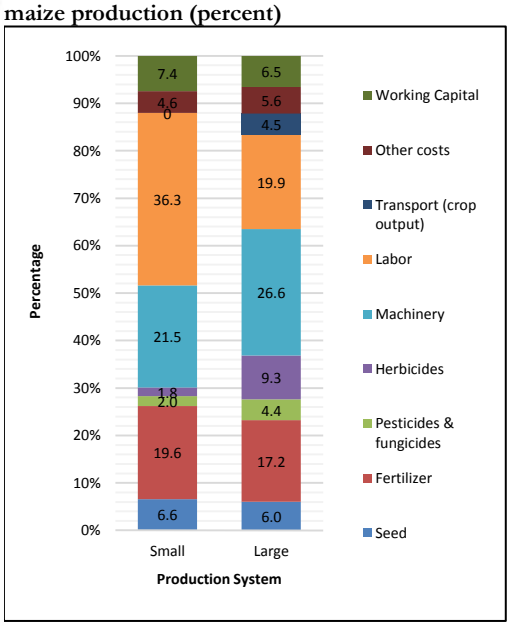
The cost of pesticides in the large-scale system was higher than in the small-scale system since the latter largely received free chemicals from County and National governments. There was low incidence of pests or diseases in 2018 and also enhanced surveillance particularly for the fall army worm. Both categories of farmers used pesticides to control storage pests.

Table 1: Cost of maize production in small and large-scale systems

Item/activity	Small	Large
Yields (bags)	18.0	23.8
Seed	1,620	1,949
Fertilizer	4,831	5,552
Pesticides & fungicides	503	1,406
Herbicides	450	3,000
Machinery	5,288	8,592
Labor	8,938	6,419
Transport	0	1,450
Other costs	1,140	1,810
Working capital	1,822	2,112
Production costs	**24,592**	**32,290**

Transport costs were incurred in moving the produce from the farm to the household stores. For small-scale farmers, hauling the produce to stores was done using labour and such costs are captured under labour. The cost shown under the large-scale system was the cost of hired transport. Other costs included the costs for sisal bags and twine used for bagging the produce.

Figure 1: Cost shares for small and large-scale maize production (percent)



Majority of smallholder farmers use their own land for production. On the other hand, large-scale farmers used own and rented land for production. Table 2 presents maize production cost analysis that includes land rent.

Table 2: Cost of maize production per bag with and without land rent

	Per bag/acre	Small scale	Large scale
Scenario I	Yields	18.0	23.8
	Total costs	24,592	32,290
	Cost/bag	1,366	1,360
Scenario II	**Land rent**	**10,000**	**10,000**
	Total costs	34,592	42,290
	Cost/bag	1,922	1,781

The rental cost of land was similar for both small and large-scale farmers. This represented an increase (18%) from 2017 for small-scale farmers and a decrease (13%) for large-scale farmers. The average cost of production per bag of maize with land rent was KES 1,922 and KES 1,781 in small-scale and large-scale systems, respectively.

Effectively, based on what was typical for both small and large-scale producers, the cost of production for a bag of maize was KES 1,366 for small-scale farmers (without land rent) and KES 1,781 for large-scale farmers (with land rent). Hence, these represent the break-even prices per

bag under both systems. If the market prices are lower these, then farmers would make losses.

In 2018, prevailing market prices were low due to increased stocks. This was occasioned by large balances from 2017 and the good harvest in 2018. Huge surpluses from 2017 were mainly from imports.

Both large and small-scale farmers were allowed to access subsidized fertilizer with the objective of reducing the costs of production for maize. Table 3 presents the simulation of total production costs with and without subsidy fertilizer for large-scale farmers.

Table 3: Effects of fertilizer subsidy in large-scale maize production

Item	No subsidy	With subsidy
Yields	23	25
Seed	1,810	1,677
Fertilizer	**10,200**	**7,975**
Pesticides & fungicides	4,155	1,150
Herbicides	2,400	3,900
Machinery	11,602	8,738
Labor	5,795	5,630
Transport	800	800
Others	2,420	1,225
Working capital	2,743	2,177
Production costs	41,924	33,271
Production costs per bag	**1,823**	**1,331**
Land rent	10,000	10,000
Production cost (with land rent)	51,924	43,271
Costs/bag (with land rent)	**2,258**	**1,731**

Farmers who received fertilizer subsidy had slightly higher yields compared to those without subsidy. At this base case, the total cost of producing a bag of maize including land rent, without and with subsidy fertilizer was KES 2,258 and KES 1,731, respectively. The costs per bag for farmers who used subsidy fertilizer would be slightly higher at KES 1,881, if evaluated at the lower yield of 23 bags (which was attained by farmers who used commercial fertilizers). However, this would still be lower than KES 2,258. Accessing subsidized fertilizer reduced cost of fertilizer by 22% and led to 17% decline in the cost of production per bag.

Table 4 shows the simulation of total production costs with and without subsidy fertilizer for small-scale maize farmers.

Table 4: Effects of fertilizer subsidy in small-scale maize production

Item	Without subsidy	With subsidy
Yields (bags/acre)	18	18
Fertilizer	**7,956**	**4,965**
Other costs (excluding fertilizer)	19,760	19,760
Production costs	**27,716**	**24,725**
Costs/bag	1,540	1,374
Land rent	10,000	10,000
Production cost (with land rent)	**37,716**	**34,725**
Costs/bag (with land rent)	**2,095**	**1,929**

Access to subsidized fertilizer by small-scale farmers would result in 38% decline in fertilizer costs. However, although this is significant, majority of the small-scale farmers were unable to access the subsidized fertilizer due to high transaction costs (non-monetary) involved. The productions costs per bag without land rent, which is typical for small-scale farmers, would reduce by 11% when subsidized fertilizer was accessed.

Key Findings

The study findings showed that:

- There was an increase in maize production for both large and small-scale farmers in 2018 compared to 2017. Yields among large-scale producers increased by 23% from 20 to 24 bags, and 6% from 17 to 18 bags for small-scale farmers.
- In 2018, the production cost per 90 kg bag for large-scale farmers was KES 1,781 compared to KES 2,179 in 2017, representing an 18% decline. Similarly, small-scale farmers' costs dropped to KES 1,366 from KES 1,611 in 2017, representing 15% decline in the cost of production. This was due to higher yields in 2018.
- The improved production in 2018 was attributed to favourable weather and minimal pests and disease prevalence.
- Accessibility to subsidized fertilizer by both large and small-scale farmers reduced their costs per bag by 17% and 11%, respectively.
- The main drivers of the cost of production among large-scale producers were land rent (23%), machinery (19%) and labour (15%). For small-scale producers, the keys costs were land rent (28%), labour (25%) and machinery (16%).
- Market prices in 2018 were low affecting farmers' profitability. However, large-scale farmers who usually sell their maize to NCPB expected the government to announce higher prices following trends established under the producer price support intervention. Farmers had this expectation at the onset of the season, and it's likely that it influenced production decisions. The low prices may cause farmers to reduce acreage under maize grain, a situation that will have long-term impacts on food security.

Policy Implications

- Increasing productivity is the most effective way to reduce production costs. Other measures that can help reduce production costs are the adoption of labour-saving technologies and mechanization especially for key activities such as land preparation, planting, weeding and harvesting.
- The commercial grain trading function of NCPB results in huge losses for the government and NCPB. The government needs to reduce its role in maize markets by restructuring the NCPB and the way it purchases grain for the strategic food reserves (SFR).
- A model for SFR purchases that is less disruptive to the market should be adopted. For instance, purchasing maize directly from warehouses or the market, keeping virtual stocks and contracting farmers to produce maize grain for the SFR are alternatives that the government should pursue.
- There is to need fast-track the warehouse receipts system bill. Enactment of the law will improve access to storage and reduce post-harvest losses as well as ease liquidity constraints for farmers.
- There is need to enhance the adoption of climate-smart agricultural practices to ensure sustainable maize production in the face of variation in weather conditions.

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ACKNOWLEDGMENT

Tegemeo Institute acknowledges support for its research programmes from key partners, especially the United States Agency for International Development (USAID). Others include Bill and Melinda Gates Foundation (BMGF), the Rockefeller Foundation, the World Bank, European Union, Ford Foundation and the Food and Agriculture Organization of the United Nations (FAO).

Tegemeo Institute of Agricultural Policy and Development
George Padmore Road, Off Marcus Garvey KILIMANI P. O. Box 20498-00200, Nairobi KENYA
Tel: + 254 (020) 2347297/3504316 Cell: (+254) 720 895 454/ 714 895 454/ 714 658 222/ 734 658 222
E-mail: egerton@tegemeo.org
http://www.tegemeo.org/