



Cost of Maize Production in Small and Large-Scale Systems for the 2017 Cropping Year

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SUMMARY

Tegemeo Institute undertook its annual assessment of cost of production for maize in September, 2017. This was aimed at providing evidence to inform policy and investment decisions in order to improve competitiveness and enhance food security. The study focused on the cost of production of maize in small and large-scale production systems. The findings showed variance in the total cost of production across production systems with major contributors to cost being land preparation, fertilizer and post-harvest activities. Mechanization of farm activities and use of herbicides reduced costs and can be better options for maize farmers in the country. The use of subsidized fertilizer in place of commercial fertilizer by small-scale farmers saved them KES 178 per 90 kg bag. Further, large scale-farmers received higher prices hence better revenues as compared to small-scale producers. In order to improve maize productivity, the study recommends the revival of extension systems to effectively support farmers on good agricultural practices and adoption of efficient technologies such as mechanization to improve overall food security status in the country. Enhancing productivity will also contribute significantly to lower costs of production.

BACKGROUND

Maize is the most widely produced staple and it is consumed by majority of households both in urban and rural areas in Kenya. It is grown mainly under rain-fed conditions, exposing farmers to unpredictable weather patterns. In addition, other factors such as unsustainable land subdivision, high cost of production, declining soil fertility, inadequate input use, diseases and low profitability have resulted in declining production trends.

Owing to the importance of maize as a food security crop, the government prioritizes actions and interventions that ensure adequate supply of the commodity to the citizens. However, its demand has outstripped supply, necessitating imports from the East African region to bridge the gap. There is, therefore, a need to periodically monitor and analyse farm level costs of production in order to incentivise production despite changing production and trade environments. Interventions to reduce costs, increase productivity and reduce post-harvest losses are required in order to improve maize supply and ensure reasonable returns for farmers.

Tegemeo Institute undertakes annual cost of production (COP) assessments to monitor trends in production costs and factors influencing them. In 2017, the Institute conducted an assessment of COP of maize for both small and large-scale production systems for the main cropping season in 2017. The study sought to analyze the costs in the face of production challenges including fall armyworm infestation and drought.

Objectives

The aim of this study was to assess the cost of producing maize in Kenya in the 2017 main cropping season. The study specifically sought to:

- Assess the COP and profitability of maize across different production systems
- Determine the effect of pests (fall armyworm) control on maize COP
- Assess the business viability of maize enterprise in Kenya

Data and Methods

The typical farm approach (Deblitz & Zimmer, 2005) was used to establish the costs of production. This approach involves use of a group of participants comprising of farmers and other experts from a given area who are knowledgeable in production of the crop, to create prototype farms.

Four counties were purposively selected as study areas based on their importance in contribution to the overall national production of maize. The selected study regions were Kakamega, Nakuru, Uasin Gishu and Trans Nzoia. County agriculture officers were instrumental in identifying specific areas where most maize is produced and the predominant production systems within these locations.

Data was obtained through focus group discussions (FGDs) with small and large-scale farmers; Ward Agricultural Officers (WAOs); and, local agro-dealers and traders with good knowledge of maize production activities in the selected areas.

Data was 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 maize production for both small and large-scale systems and the average yield per acre were 16 and 20 bags, respectively. These low yields were attributed to the fall army worm (FAW) infestation as well as below normal and poorly distributed rains in the crucial months of May, June and July (MoALF, 2017). The average price per bag was KES 2,200 and KES 2,533 for small and large-scale production, respectively. The average total production cost was KES 25,849 and 27,038 per acre with land preparation contributing the highest cost at KES 3,625 and KES 4,767 in small- and large-scale systems, respectively. Seed costs were generally similar since most farmers relied on uniformly priced seeds marketed by Kenya Seed Company Limited. The cost of pesticides, which was mainly for FAW control, was lower for large-scale producers. The lower costs were due to discounts from bulk purchases and the higher level of precision in application achieved because of more knowledge and the use of mechanized equipment during application by large-scale producers.

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

Item/ Activity	Small	Large
Price (90kg bag)	2,200	2,533
Yield (bags)	16	20
Total revenue	35,933	49,822
Land preparation	3,625	4,767
Planting	1,663	1,670
Seed	1,820	1,810
Planting fertilizer	3,513	3,400
Topdress	2,425	2,350
Weeding	3,225	2,667
Pesticides	1,813	1,487
Harvesting	2,395	2,900
Post-harvest	3,339	3,427
Other intermediate	342	793
Working capital	1,691	1,769
Production costs	25,849	27,038

Table 2 represents shares of various costs components in the total cost for maize production. In both production systems, land preparation, planting fertilizer, weeding and post-harvest activities accounted for the largest cost shares at 14.0, 13.6, 12.5 and 12.9 percent, respectively, for small-scale

farmers and 17.6, 12.6, 9.9 and 12.7 percent, respectively, for large-scale maize producers. Large-scale producers employed mechanized chemical weed control as opposed to manual weeding used by small-scale producers. The share of pesticides cost in the large-scale system was also lower at 5.5 percent compared to 7 percent in small-scale system.

Table 2: Cost shares for small and large-scale maize production (percent)

Item/ Activity	Small Scale	Large Scale
Land preparation	14.0	17.6
Planting	6.4	6.2
Seed	7.0	6.7
Planting fertilizer	13.6	12.6
Topdressing	9.4	8.7
Weeding	12.5	9.9
Pesticides	7.0	5.5
Harvesting	9.3	10.7
Post-harvest	12.9	12.7
Other intermediate	1.3	2.9
Working capital	6.5	6.5

Table 3 presents an analysis of maize production under scenarios I and II for both production systems. In scenario I, the average cost of producing a bag of maize was KES 1,583 and KES 1,375 with a profit of KES 617 and KES 1,159 per bag for small-scale and large-scale producers, respectively. Scenario II shows the cost of production when land was valued at rental rates for both systems. The average COP per bag with land rent was KES 2,088 and 1,988 among small and large producers, respectively. Profit per bag reduced to an average of KES 112 and KES 577, respectively, for small-scale and large-scale farms, while the breakeven yield increased to an average of 15 bags. This underscores the importance of land costs in influencing profitability of maize production.

Table 3: Cost of maize production and returns under small and large-scale systems

	Per bag/acre	Small scale	Large scale
Scenario I	Cost/bag	1,583	1,375
	Profit/bag	617	1,159
	Breakeven yield	12	11
Scenario II	Land rent/season	8,250	11,333
	Cost/bag	2,088	1,957
	Profit/bag	112	577
	Breakeven yield	15	15

Scenario III as presented in Table 4 assesses savings derived from the use of subsidized instead of commercial fertilizers. All large-scale farmers used subsidized fertilizers obtained from the National Cereals and Produce Board (NCPB) stores. Large-scale farmers saved an average of KES 161 per bag. This was lower compared to savings of KES 178 per bag by small-scale farmers. The average cost saving per acre from the use of subsidized fertilizer was KES 2,848 for small-scale producers and KES 3,220 for large-scale producers. Given the challenges and associated costs that small-scale farmers face to access subsidized fertilizer, the cost saving is relatively low. This explains why most small-scale maize producers opt to use commercial fertilizers. Large-scale producers had an average acreage of 90 acres. The total cost saving for the large-scale producers was, therefore, higher totaling, KES 289,800, in spite of low savings per bag. The substantial saving is enough reason for large-scale producers to choose subsidized fertilizer despite access challenges such as late arrival.

Table 4: Cost saving from subsidized fertilizer in small and large-scale maize production

Per bag/acre	Small Scale	Large Scale
Fertilizer cost (CF)/acre	7,788	8,700
Fertilizer cost (SF)/acre	5,088	5,750
COP (CF)/Acre	27,828	30,195
COP (SF)/Acre	24,939	27,038
COP(CF)/Bag	1,712	1,541
COP (SF)/Bag	1,535	1,379
Profit/Bag (CF)	488	993
Profit/Bag (SF)	665	1,154
Cost saving/Bag	178	161
Breakeven yield (CF)	13	12
Breakeven yield (SF)	11	11

*CF – Commercial fertilizer

*SF- Subsidized fertilizer



Key Findings

Findings from the study showed that:

- The total cost of production differed across production systems. The major contributors to cost of maize production were land preparation, fertilizer and post-harvest activities. These contributed 14, 23, and 13 percent, respectively, for small-scale producers and 18, 21 and 13 percent respectively, for large-scale producers.
- Use of herbicides as alternatives to manual weeding as well as mechanization of farm activities are potential cost saving options for farmers.
- Control of FAW contributed a sizable share of total production costs; 5% and 7% in large and small-scale maize production systems, respectively. The costs incurred in FAW control, therefore, substantially contributed to erosion of producers' profit margins.
- The profit margins under small-scale systems were lower compared to their large-scale counterparts. This was attributed to higher produce prices, use of mechanization and subsidized fertilizer and application of herbicides by large-scale farmers.
- The average cost saving from use of subsidized fertilizers by small-scale maize farmers was KES 178 per 90 kg bag and KES 2,848 per acre. This was relatively small considering the challenges smallholders face in accessing the fertilizer. On the other hand, the cost saving from use of subsidized fertilizers by large-scale maize producers was substantial enough to justify its use given the acreage planted.



Policy Implications

Given the study findings:

- There is need to improve productivity by developing and adopting appropriate and efficient cost saving technologies such as mechanization. The government needs to create an enabling environment that will encourage agricultural research and development, commercial production and marketing of simple but appropriate technologies particularly suitable for use by small-scale farmers.
- There is need for constant surveillance of migratory pests such as FAW in the country. Both National and County governments need also to improve their preparedness for such incidences to help farmers avoid losses and unnecessary costs searching for effective remedies to deal with pest outbreaks.
- There is need to revive extension systems to effectively support farmers on good agricultural practices to complement fertilizer use in order to enhance maize yields. The extension system should also be responsive to farmers' needs.
- The national government should: speed up the fertilizer cost reduction program to enable farmers access fertilizers at lower prices; incorporate farmer characteristics in fertilizer subsidy programs; and, harmonize soil fertility interventions. The government should also move to comprehensively and conclusively address subsidized fertilizer access challenges to enable smallholders benefit from the program.



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