

**COST-BENEFIT ANALYSIS OF THE COMMERCIAL  
SLAUGHTERHOUSE FACILITY ESTABLISHMENT  
INTERVENTION**

**IN FAAFAN VILLAGE, ETHIOPIA**

**PASTORALIST AREAS' RESILIENCE  
IMPROVEMENT AND MARKET DEVELOPMENT  
(PRIME)**

**FINAL REPORT**

This report was produced for review by the United States Agency for International Development (USAID). It was prepared by Optimal Solutions Group, LLC, and Cambridge Resources International, Inc., for USAID's *Learning, Evaluation, and Analysis Project (LEAP)*. Contract Number: AID-OAA-C-11-00169

**UNITED STATES AGENCY FOR INTERNATIONAL DEVELOPMENT  
LEARNING, EVALUATION, AND ANALYSIS PROJECT  
(AID-OAA-C-11-00169)**

**COST-BENEFIT ANALYSIS OF THE COMMERCIAL  
SLAUGHTERHOUSE FACILITY (ABBATOIR) INTERVENTION IN  
FAAFAN VILLAGE, ETHIOPIA**

**PASTORALIST AREAS' RESILIENCE IMPROVEMENT AND  
MARKET DEVELOPMENT (PRIME) INTERVENTION**

**Prepared for:**  
**U.S. Agency for International Development/Ethiopia**  
**Attn:** Mark Carrato, USAID Ethiopia

**Prepared by:**  
**Optimal Solutions Group, LLC**  
University of Maryland  
Research Park, M Square  
5825 University Research Court, Suite 2800  
College Park, MD 20740  
USA  
[www.OptimalSolutionsGroup.com](http://www.OptimalSolutionsGroup.com)

**Cambridge Resources International, Inc.**  
60 Montgomery Street  
Cambridge, MA 02141  
USA  
[www.cri-world.com](http://www.cri-world.com)

**Project Analysts:**  
Glenn P. Jenkins, Cost-Benefit Manager  
Mikhail Miklyaev, Cost-Benefit Analyst  
Mergia Bekele, Local Consultant

**March 25, 2013**

**Disclaimer**

The authors' views expressed in this publication do not necessarily reflect the views of the United States Agency for International Development or the United States government.

## Table of Contents

<b>ACKNOWLEDGMENTS</b> .....	<b>4</b>
<b>ACRONYMS</b> .....	<b>5</b>
<b>EXECUTIVE SUMMARY</b> .....	<b>6</b>
<b>CONCLUSIONS AND RECOMMENDATIONS</b> .....	<b>12</b>
<b>PRIME “COMMERCIAL SLAUGHTERHOUSE FACILITY ESTABLISHMENT INTERVENTION”: COST-BENEFIT ANALYSIS</b> .....	<b>13</b>
<b>METHODOLOGY</b> .....	<b>13</b>
PROJECT BACKGROUND.....	13
PROJECT RATIONALE .....	13
PROJECT DESCRIPTION AND ACTIVITIES.....	14
<i>PRIME Interventions in the Livestock Value Chain</i> .....	14
TECHNICAL COEFFICIENTS.....	15
PROJECT MODELING.....	20
PREPARATORY TABLES IN THE CBA EXCEL MODEL.....	20
<b>INTERVENTION</b> .....	<b>25</b>
<b>FINDINGS</b> .....	<b>28</b>
FINANCIAL ANALYSIS .....	28
ECONOMIC ANALYSIS .....	28
STAKEHOLDER AND BENEFICIARY ANALYSIS .....	31
SENSITIVITY ANALYSIS.....	35
<b>CONCLUSIONS AND RECOMMENDATIONS</b> .....	<b>42</b>
<b>REFERENCES</b> .....	<b>43</b>
<b>APPENDIX</b> .....	<b>44</b>

## **ACKNOWLEDGMENTS**

The LEAP team appreciates the assistance received from many people during the field visits to Somali Regional State, Ethiopia, including the representatives of USAID Ethiopia, MercyCorps, and private entrepreneurs. Special thanks are also directed to many pastoralists and local traders unknown by name who were interviewed to allow the team to obtain a clear picture of the current situation in the commodities of interest. The assistance and willingness to cooperate of all aforementioned people are greatly appreciated.

## ACRONYMS

CBA	Cost-Benefit Analysis
CF	Conversion Factor
EIRR	Economic Internal Rate of Return
ENPV	Economic Net Present Value
EOCK	Economic Opportunity Cost of Capital
ETB	Ethiopian Birr (Currency)
FEP	Foreign Exchange Premium
FIFO	First-In-First-Out
FIRR	Financial Internal Rate of Return
FNPV	Financial Net Present Value
FOB	Free on Board
FtF	Feed the Future (Program)
PRIME	Pastoralists Resilience Improvement and Market Development
TOP	Transiting Out of Pastoralism
VAT	Value-Added Tax
US\$	United States Dollar
USAID	United States Agency for International Development

## EXECUTIVE SUMMARY

USAID Ethiopia started to implement a 5-year US\$48.75-million Pastoralists Resilience Improvement and Market Development (PRIME) project in 2012, the overall goal of which is to reduce hunger and poverty. The project's primary objective is to increase household incomes and enhance resilience to climate change through market linkages. The motivation for the project's implementation is to address the problem created by interaction between "climate change, pastoralism/livestock, and chronic vulnerability." The project will meet these challenges through a multifaceted approach that includes

- fostering the growth and competitiveness of livestock value chains;
- addressing the needs of very poor and chronically food-insecure households by reaching down to this population through value-chain interventions; and
- improving the policy environment through a continuous evaluation and learning process of collaboration and linkages.

The key livestock value chains are cattle, camels, and sheep/goats. Livestock products include live animals, meat, milk, hides, skins, and leather.

**Strategic Context and Rationale:** The USAID Ethiopia PRIME project is part of the wider strategy of the Feed the Future (FtF) programs, which support investments in profitable and relatively easy-to-implement interventions in agricultural value chains. FtF's goal is to reduce poverty and hunger in a sustainable manner.

The intervention evaluated in this study proposes establishing a commercial abattoir in Faafan village, Somali Regional State, Ethiopia. The intervention will be co-financed with businesses in the private sector. The Somali region of Ethiopia is undeveloped, because for a long time, an unstable political situation prevented private investors from investing in the region. The PRIME intervention would reduce the potential risks for the private investor in an attempt to create a successful demonstration mechanism for other investors. In addition, the increased demand for low-weight small ruminants and a strong market linkage between the supplying pastoralists and the facility would create substantial net benefits for the participating households.

**Project Description:** The objective of this analysis of an abattoir-establishment intervention is to understand the situation at the ground level and to analyze the PRIME intervention designed to reduce potential risks to the private investor operating in this undeveloped region of the country. Field visits were conducted to collect primary data that were compared with credible publications and, when necessary, suitably adjusted. The adjusted data were then used to construct cost-benefit analysis (CBA) models of the proposed interventions that were designed to assess potential financial and economic outcomes of the intervention, such as the financial net present value (FNPV), the economic net present value (ENPV), the financial internal rate of return (FIRR), and the economic internal rate of return (EIRR) as well as to conduct a beneficiary analysis. The CBA models were built to be easily updated by changing the key parameters of the interventions in the models' Tables of Parameters so that they can then automatically recalculate all corresponding figures.

The key observations from the field visits were as follows:

1. There is a huge concentration of livestock in Somali Regional State, Ethiopia. Nevertheless, no commercial slaughterhouse facilities operate in the region. This absence can perhaps be explained by a historically unstable situation in the region that prevented the private sector from operating effectively.
2. The main livestock market for the Ethiopian pastoralist is the informal cross-border trade of live animals with Kenya, Somalia, and Djibouti.
3. The informal cross-border market is mainly controlled by the traders from the neighboring countries. These traders frequently manipulate livestock market prices to reduce the Ethiopian pastoralists' profits.
4. There is a huge concentration of small ruminants (lambs and kids) with a live weight of 22 to 25 kilograms. There is no demand for this category of small ruminants in the local market, because to be sold, they would have to be moved over long distances to the dealers in the neighboring countries. Traveling this distance for animals of this small size would result in significant live weight losses and a high rate of mortality. The market therefore demands only small ruminants that are 3 to 4 years old and have greater live weights.
5. While continuing to sell small herds of livestock of the size that the market demands, pastoralists are adding a few lambs and kids (about 10 percent) to the herds of animals they are selling. These small animals add little or no value to what the traders will purchase.
6. The abattoir facility would purchase these small ruminants with live weights of approximately 21 to 25 kilograms and sell them to the Middle East market after slaughter. Hence, it would create a market for a category of livestock that currently does not exist. In other markets around the world, the value of lamb and kid meat is higher per kilogram than for older animals.
7. The huge concentration of the livestock in the area results in severe overgrazing. The facility would increase the commercial off-take of the small ruminants and thus allow for faster weight gain among the pastoralists' residual herds.
8. The Somali's pastoralists currently do not prefer to sell lambs and kids of small ruminants in big quantities; their perception is that it is better to wait another year and sell the animals at a higher price when their live weights have increased. It should be noted that the pastoralists do not recognize direct feeding costs in their production system, so the project will need to work with them to correct this perception. Increased commercial off-take of the younger animals would result in enhanced environmental, financial, and economic benefits to the pastoralists.
9. The project will need to purchase the animals from the different markets in relatively small quantities to overcome the significant livestock price increase if a large number of animals is purchased from a single market point.
10. The establishment of the commercial abattoir in the region would also allow for an orderly destocking of animals during drought years, working for two 8-hour shifts per day during the destocking period.
11. For religious reasons, the project will not be financed using conventional loans. The private entrepreneur is a strict Muslim. Interest payments are forbidden, and no Islamic banking system has been established in Ethiopia.

**Intervention:** The proposed intervention is the co-financing of the establishment of a commercial abattoir facility. The total investment cost of the facility is estimated at US\$4,381,177.00. The USAID subsidy represents 31.53 percent of the total investment cost (US\$1,381,177.00). The equity contribution is US\$3.00 million. Because the share of the total investment contributed by USAID is 31.53 percent, an

equal percentage of the total benefits of the intervention can be attributed to this USAID assistance. Without USAID support, the project would need to find additional sources of financing, which may increase the financial riskiness of the investment; for instance, obtaining a loan from an Islamic bank operating in Kenya could result in a range of risks associated with foreign currency exchange rate fluctuations as well as debt service risks. Additionally, increased numbers of shareholders may result in the transfer of a portion of the project’s net benefits to residents outside Ethiopia.

**Financial and Economic Analysis Results:** The CBA has been carried out for a 20-year period. The main assumption of this analysis is that the private entrepreneur would receive the financial subsidy from USAID to cover part of the investment cost. The total investment cost and the corresponding USAID subsidy for the commercial abattoir establishment intervention are presented in table A, below.

Table A. Total investment cost of the commercial abattoir

<b>Line item</b>	<b>Investment cost (US\$)</b>
<b>Land</b>	200,000.00
<b>Electricity and road connection, transformers, etc.</b>	320,555.00
<b>Security fence, boreholes, etc.</b>	116,971.00
<b>Buildings</b>	1,214,238.00
<b>Cost, insurance, and freight (CIF) cost of machinery and equipment</b>	1,567,265.00
<b>Vehicles</b>	740,000.00
<b>Office furniture, fittings, and equipment</b>	30,960.00
<b>Preliminary administrative expenses</b>	182,298.00
<b>Local transportation of the machinery to the project site</b>	8,890.00
<b>Total investment cost</b>	<b>4,381,177.00</b>
<b>Total USAID investment required (millions US\$)</b>	<b>1,381,177.00</b>

The project will maintain a significant amount of land, approximately 285 hectares. This large landholding is required to keep the necessary quantity of livestock inventories as well as to produce the livestock fodder and feed. The government of Ethiopia constructed an asphalt road connecting the main road with the facility and has set up an electricity connection. The total amount of government support for these purposes is estimated at US\$320,555.00.

Over the 20-year period analyzed, the FNPV from the owner’s point of view is US\$10.34 million using a 12 percent real discount rate. The FNPV from the total investment point of view is US\$8.64 million using a 12 percent real discount rate, and the ENPV is US\$68.82 million using a 12 percent economic opportunity cost of capital (EOCK).

The positive FNPV from the total investment point of view suggests that the investment by itself would generate tangible financial returns for the private investor. However, significant risks are associated with any first-mover investment. Political risks are also associated with the historically unstable situation in the region. The exact cost of these risks is difficult to quantify.

The ENPV is also positive using a 12 percent EOCK. The difference between the financial and the economic outcomes of the project arises from the fact that the financial values do not include all the

externalities presented in the project. In the case of the commercial abattoir operations, the difference would occur because of five factors:

1. Meat is an internationally tradable good. Ethiopia currently exports significant amounts of products from the livestock industry. Internationally tradable goods, when exported, generate foreign exchange resources for the country. The foreign exchange premium (FEP) for Ethiopia is reported to be 6.5 percent (Kuo, 2011), so every incremental dollar earned on exports would have an economic value of 1.065 times the market exchange rate.
2. A tax of ETB10.00 is assessed on the sale of small ruminants, and a tax of ETB100.00 is assessed on the sale of large ruminants. This tax represents a transfer of resources between the pastoralists/traders and the government of Ethiopia. This transfer of resources does not represent a real economic resource cost, although it is a financial cost to the pastoralists/traders.
3. The trader's net margin is estimated at 2 percent of the value of the livestock and is calculated by deducting the operational expenses and the opportunity cost of the trader's time from the trader's gross revenues. The trader's net margin is the transfer of income between the trader and the pastoralists. The pastoralist households would benefit from the presence of the abattoir in the region. The average net household's benefit is assumed to be 10 percent of the value of livestock. After taking into consideration all these factors, the economic conversion factor (CF) of the cost of the raw materials (livestock) for the project is estimated to be 0.94. Hence, every incremental dollar spent by the project on the livestock input would have an economic cost of 94 cents.
4. Transportation costs also arise when meat is transported to the different domestic and export markets. High tax rates are assessed on the fuel required for transportation. Although these taxes on fuel are a component of the financial cost of transportation, they are not included in the economic cost of the project.
5. The financial cost of several inputs used in the facility operations is greater than their true economic cost due to taxes.

**Beneficiary Analysis Results:** The results of the analysis reveal that this USAID-assisted intervention has seven main stakeholders. The first beneficiary of the intervention is the entrepreneur, who would benefit because of the financial subsidy from USAID.

The second group of beneficiaries is the households supplying cattle and small ruminants to the project. The absence of any abattoir in the region and the frequent market manipulations caused by the importing countries' traders has created great uncertainty in the market prices that pastoralists currently receive. In addition, the limited demand for lambs and kids of small ruminants is forcing pastoralists to keep large herds of these animals. The local abattoir facility would significantly increase the demand for this category of small ruminants and create strong market linkages between pastoralists and the end market. The net benefit to the livestock-supplying households is assumed to be at least 10 percent of the value of the livestock supplied.

The livestock traders would also benefit from the increased demand for the livestock. However, the project would purchase live animals in relatively small quantities from many different market points to avoid any significant increase in the price. The traders would also benefit due to the strong market linkage with the meat processor. The net profit margin for the traders is estimated at 2 percent of the value of the livestock.

The commercial slaughtering facility would need to pay a higher wage rate to attract labor. The government of Ethiopia would also require the project to make a social insurance contribution. A fraction of the labor required by the project may include previously unemployed people. The labor involved in the production process therefore represents another group of beneficiaries.

The abattoir facility would also contribute 2.5 percent of its annual net operating income to benefit the Faafan village community. Such a contribution may assist in the building of schools, small hospitals, and other public places in collaboration with the government and other private investors. The 2.5 percent contribution, in addition to the charity basis, has some business logic. For any type of business, it is important to get reliable suppliers of the necessary raw materials. One entrepreneur stated during a field interview that the community may refuse to supply live animals to the project if the project did not contribute part of its income to benefit the local society. Making these contributions would thus allow the facility to develop a culture of trust within the community.

The other beneficiary of the intervention is the government, for the following reasons:

- The government would benefit directly from the taxes collected on the inputs and outputs of the intervention. The government would also collect income taxes after the 5-year tax holiday period is over.
- The government would also benefit indirectly, because 90 percent of the meat produced would be exported from Ethiopia. Exports allow the country to earn foreign exchange; hence, the FEP would be an additional benefit.

The analysis assumes that the total benefits gained by the government of Ethiopia would be distributed among the Ethiopian population. The Ethiopian government’s current spending is reported by the World Bank to be US\$33.79 per capita. The present value of US\$33.79 over the 20-year period is equal to US\$283.00.

The last stakeholder in this intervention is USAID. In this case, USAID would increase its negative financial externality, because it would provide the financial subsidy to the private investor.

The total number of beneficiaries, the present value of benefits per beneficiary, and the total present value of economic benefits of the slaughtering facility are reported in table B, below.

**Table B. Impact analysis of the commercial abattoir establishment intervention**

<b>Beneficiaries</b>	<b>Number of households</b>	<b>Present value of benefits/household</b>	<b>Total present value of economic benefits (millions US\$)</b>
<b>1. Small holders supplying cattle</b>	63,529	US\$202.35	US\$12.86
<b>2. Small holders supplying small ruminants</b>	211,765	US\$77.68	US\$16.45
<b>3. Livestock traders supplying cattle</b>	1,144	US\$2,248.34	US\$2.57
<b>4. Livestock traders supplying small ruminants</b>	1,144	US\$2,877.18	US\$3.29

<b>Beneficiaries</b>	<b>Number of households</b>	<b>Present value of benefits/household</b>	<b>Total present value of economic benefits (millions US\$)</b>
<b>5. Recipients of the government expenditures</b>	84,619	US\$283.00	US\$23.95
<b>6. Faafan village community</b>	2,867	US\$116.47	US\$0.33
<b>7. Private entrepreneur (FNPV)</b>	6	US\$1.72 mill	US\$10.34
<b>8. Labor</b>	133	US\$3,069.34	US\$0.41
<b>9. USAID</b>	NA	NA	-US\$1.38
<b>TOTAL</b>	<b>365,857</b>		<b>US\$68.82</b>

The USAID subsidy represents 31.53 percent of the total investment cost; hence, 31.53 percent of the total benefits generated by the project may be attributed to USAID's participation. Table C, below, present the net benefits generated by the project due to USAID's financial support.

**Table C. Impact analysis of the commercial abattoir establishment intervention (USAID share of the benefits)**

<b>Beneficiaries</b>	<b>Number of households</b>	<b>Present value of benefits/household</b>	<b>Total present value of economic benefits (millions US\$)</b>
<b>1. Small holders supplying cattle</b>	63,529	US\$63.75	US\$4.05
<b>2. Small holders supplying small ruminants</b>	211,765	US\$24.51	US\$5.19
<b>3. Livestock traders supplying cattle</b>	1,144	US\$708.04	US\$0.81
<b>4. Livestock traders supplying small ruminants</b>	1,144	US\$909.09	US\$1.04
<b>5. Recipients of the government expenditures</b>	26,676	US\$283.00	US\$7.55
<b>6. Faafan village community</b>	2,867	US\$36.72	US\$0.11
<b>7. Private entrepreneur (FNPV)</b>	6	US\$0.54 mill	US\$3.26
<b>8. Labor</b>	133	US\$967.62	US\$0.13
<b>TOTAL</b>	<b>365,857</b>		<b>US\$22.19</b>

## CONCLUSIONS AND RECOMMENDATIONS

The CBA of the commercial abattoir establishment intervention shows a positive FNPV from the owner's point of view.

The project also has a large positive ENPV, indicating that the project would be very good for the Ethiopian economy. The stakeholder analysis indicates that the project would improve the pastoralists' livelihoods, thus achieving the main goal of the USAID FtF program.

The field visits to the different market points revealed that the current market for the export of live animals generates highly volatile prices for pastoralists over time. The project, therefore, would need to create a strong market linkage between pastoralists and local traders to reduce the volatility of the input prices. In addition, the project would need to maintain a significant livestock inventory level to be able to wait for the next market day if the livestock prices on any given day were abnormally high.

The presence of a local abattoir facility would also allow pastoralist households to destock their herds during drought years. The financial returns to the project during such periods may increase because of the general decrease in the cost of the raw materials and the higher utilization of the plant. The households would also benefit, because the revenue from the sold livestock could be used to buy feed for the rest of the herd, thereby to some extent minimizing livestock losses.

The project, however, would also be vulnerable to drought because of the high cost of feeding the livestock inventories. The project obtained a significant quantity of land that could be used, under normal circumstances, to produce fodder and livestock concentrates. The slaughtering facility has already finished construction of boreholes to stabilize its water supply.

Overall, the project is potentially sustainable and desirable for the private investor and the country's economy. However, some potential risks are associated with the project:

1. If USAID assistance were not available, the entrepreneur would need to seek financing from the Islamic bank in Kenya. In this case, a number of risks associated with the debt burden may arise for the project. The nature of this business is rather volatile; hence, having such a repayment schedule of financing obtained from abroad may, under a range of uncertain circumstances, put the project at risk. Obtaining equity financing from alternative sources is likely to constrain the facility operations.
2. The Somali region was politically unstable for a long period of time. The village's proximity to the border with Somalia produces a range of political risks for the project. The security of private property is always questionable for industrial facilities operating in this border area.
3. A significant risk is also associated with livestock disease outbreaks. If that were to happen, an embargo of Ethiopian meat exports would cause the project to face significant financial problems.
4. The project also needs to find a way to counter pastoralists' negative attitude toward selling small ruminants as lambs and kids. Because of the difficulty of bringing live lambs and kids to the international market, the pastoralists' current view is that they are better off raising the small animals for another year or so; doing so enables them to receive a higher price per animal, even though the meat is inferior. As the facility creates a demand for these small animals, it may result in a price increase for lambs and kids, thus squeezing the abattoir's profit margin.

# **PRIME “COMMERCIAL SLAUGHTERHOUSE FACILITY ESTABLISHMENT INTERVENTION”: COST-BENEFIT ANALYSIS**

## **METHODOLOGY**

### **Project Background**

USAID Ethiopia was awarded a 5-year, US\$48.75-million contract under the U.S. government’s Feed the Future (FtF) Initiative to serve as part of USAID’s FtF program. Specifically, Pastoralists Resilience Improvement and Market Development (PRIME) is part of the second component of the USAID Ethiopia FtF strategy: Linking vulnerable members of the population to markets. Under this component, USAID Ethiopia seeks to build capacity and promote the “market readiness” of targeted Transiting Out of Pastoralism (TOP) households by supporting the development of sustainable livelihoods and creating economic linkages between the chronically food-insecure regions of pastoral Ethiopia and productive areas of Ethiopia.

The project’s objective is to increase household incomes and enhance resilience to climate change through market linkages. The design and implementation of the project are based on the interaction between “climate change, pastoralism/livestock, and chronic vulnerability.” The project will attain these objectives through a multifaceted approach that includes

- fostering the growth and competitiveness of livestock value chains;
- addressing the needs of very poor and chronically food-insecure households by reaching down to this population through value-chain interventions; and
- improving the policy environment through a continuous evaluation and learning process through collaboration and linkages.

The key livestock value chains are cattle, camels, and sheep/goats. Livestock products include live animals, meat, milk, hides, skins, and leather.

### **Project Rationale**

Ethiopian farmers have had a long tradition of animal husbandry. It is estimated that Ethiopia possesses the largest number of livestock in Africa, comprising about 59 million cattle, 35 million sheep, and 31 million goats (Negassa, Rashid, and Gebremedhin, 2011).

The proposal is to build a commercial slaughtering facility located in the Somali regional state of Ethiopia. The Somali region possesses the largest animal population in Ethiopia, estimated at 23.76 million cattle (48 percent of the national cattle population), 16.01 million sheep (64 percent of the national sheep population), 9.4 million goats (43 percent of the national goat population), and 1.25 million camels (43 percent of the national camel population).

Despite the presence of this huge livestock concentration, no commercial abattoir operates in the entire region. The market is dominated by the informal cross-border trade of live animals with Somalia, Djibouti, and Kenya, which are then shipped live to the Gulf States for processing. The livestock markets in the

region are generally controlled by the traders from these neighboring countries, who frequently try to manipulate market prices.

## **Project Description and Activities**

### ***PRIME Interventions in the Livestock Value Chain***

The objective of the analysis of the establishment of the commercial abattoir intervention is to determine its feasibility and to suggest ways of reducing potential risks facing private investors operating in this highly undeveloped region of the country.

The proposed intervention would establish a commercial abattoir in Faafan village, Ethiopia. USAID support would be in the form of a financial subsidy to the private company investing in the establishment of the facility, representing 31.53 percent of the total investment cost required to establish it.

Field visits were conducted to collect primary data. Using these data, a cost-benefit analysis (CBA) model was constructed for this project that was designed to allow the assessment of the financial and economic outcomes of the interventions, such as financial net present value (FNPV), economic net present value (ENPV), financial internal rate of return (FIRR), and economic internal rate of return (EIRR), as well as to conduct a beneficiary's analysis. The CBA models were built to be easily updated by changing the key parameters of the interventions in their Tables of Parameters.

The total investment cost and the corresponding USAID subsidy for the project are presented in table 1, below.

**Table 1. Total investment cost of the abattoir facility establishment**

<b>Line item</b>	<b>Investment cost (US\$)</b>
Land	200,000.00
Electricity and road connection, transformers, etc.	320,555.00
Security fence, boreholes, etc.	116,971.00
Buildings	1,214,238.00
Cost, insurance, and freight (CIF) cost of machinery and equipment	1,567,265.00
Vehicles	740,000.00
Office furniture, fittings, and equipment	30,960.00
Preliminary administrative expenses	182,298.00
Local transportation of machinery to the project site	8,890.00
<b>Total investment cost</b>	<b>4,381,177.00</b>
<b>Total USAID investment required (millions US\$)</b>	<b>1,381,177.00</b>

Without the USAID subsidy, the private entrepreneur would have to search for additional financing. The entrepreneur cannot consider loan-based investment financing due to religious reasons; the six main shareholders of the company are strict Muslims, and no Islamic banking institutions operate in Ethiopia. During the field visit, the entrepreneur mentioned that an alternative option for financing might be an Islamic bank in Kenya. A number of private investors from Sudan and Ethiopia are also interested in obtaining ownership shares of the facility.

## Technical Coefficients

The abattoir facility would primarily produce deboned beef and carcasses of small ruminants (sheep and goats). The hides and skins would be sold to domestic tanneries. The edible offal of large ruminants (cattle) would be sold in the domestic markets, and the edible offal of small ruminants would be sold for exports. The project is already in the phase of making contractual arrangements with the tanneries, and a Chinese company has expressed interest in buying edible offal from the small ruminants.

- **Facility establishment phases:** The facility would have two production lines. The first production line would slaughter small ruminants starting in May 2013, therefore allowing the plant to operate 66.67 percent of the full-year period (8 out of 12 months). The second production line would slaughter and debone large ruminants. It is estimated that the second line would start operating in September 2013, so the facility would therefore produce deboned meat only 33.33 percent of the year (4 out of 12 months). It is also assumed that 1 year equals 300 working days.
- **Production capacity:** The full production capacity of the facility would allow for the processing of up to 200 large ruminants and 2,000 small ruminants per 8-hour working shift.
- **Weight of the animals:** The slaughterhouse facility would purchase small ruminants with an average weight of 23 kilograms. The average weight of the large ruminants when purchased by the facility is assumed to be 250 kilograms. The facility would also fatten the animals for an average period of 2 weeks. The weight gain after the feeding is assumed to be 2 and 14 kilograms for the small ruminants and large ruminants, respectively.
- **Production coefficients:**
  - The average carcass weight is assumed to be 45 percent of the live weight of the small ruminants.
  - The average weight of the beef cuts is assumed to be 32 percent of the live weight of the large ruminants.
- **Average feeding and veterinary cost:** The project would also apply all required vaccinations, medicines, and so forth after the livestock are transported to the project site. The average cost of feeding and veterinary expenses is estimated at Ethiopian Birrs (ETB) 125.00 per head for the small ruminants and ETB224.00 per head for the large ruminants.
- **Inventory:** The project would need to keep a significant level of raw materials (livestock) inventories. The inventories level is assumed to be 7.5 percent of the annual production capacity.
- **Packaging:** The carcasses of the small ruminants would be packed in cotton covers for transportation to the end market. The beef cuts would be packed using imported packaging materials. The project is exempt from the import duty on the raw materials required to produce the final goods, so no import duty would be paid on the imported packaging materials. The cost of packaging is estimated at ETB9.00/carcass and ETB2.00/kg of red meat.
- **Destocking:** The analysis assumes that the project would run two production shifts in years when drought hits the region. The exact timing of a drought occurrence is extremely difficult to predict, especially over a 20-year period, but recent trends have shown that a major drought occurs almost every 5 years. The destocking period is assumed to last 25 percent (3 months) of the year when the drought hits. Because the exact timing of drought occurrence is unknown, the average annual

increase in the production utilization is estimated at 5.88 percent of the potential production. The analysis assumes that the price of the livestock would be the same during the drought years; for instance, the pastoralists may sell well-conditioned animals and use revenues generated to feed the rest of the herd. During the destocking period, the facility would operate at a greater level of intensity, so the financial returns to the facility may increase because of the increased production capacity utilization.

- **Production potential utilization:** The analysis assumes that the slaughterhouse facility would not be able to start operating with 100 percent capacity. The project would require some time to establish a network of customers as well as suppliers. The potential production utilization schedule is presented in table 2, below.

**Table 2. Annual production potential utilization**

Year	Capacity utilization
2012	0.00%
2013	50.00%
2014	90.00%
2015 and after	100.00%
2015 and after (adjusted for destocking)	105.88%

The production capacity for 2013 is also adjusted for the plant establishment phases discussed above.

**Labor:** The labor requirements for operational phase one (slaughtering lambs and kids), additional labor requirements for operational phase two (slaughtering cattle), total labor requirements adjusted for the destocking operations (facility working two shifts), and the wage rates are presented in table 3, below.

**Table 3. Labor requirements and annual wage rates**

Position	Labor requirements for slaughtering lambs and kids	Additional labor requirements for slaughtering cattle	Total labor requirements, including destocking	Monthly real wage rates (ETB)
General manager	1	0	1	32,400.00
Director of procurement	1	0	1	27,000.00
Veterinary doctors	2	2	8	10,800.00
Finance and administration	1	0	1	10,800.00
Director of marketing	1	0	1	10,800.00
HR manager	1	0	1	10,800.00
Production managers	1	1	4	10,800.00
ICT manager	1	0	1	7,200.00
Accountants	1	1	2	7,200.00
HR supervisors	1	1	2	4,500.00
Security supervisors	2	0	2	7,200.00

Accounts clerks	1	1	2	3,600.00
Industrial engineers (mechanical)	1	1	2	7,200.00
Laboratory technicians	1	1	2	3,600.00
Animal keepers	8	7	30	3,375.00
Electricians	1	1	2	3,375.00
Secretaries	1	1	2	3,375.00
Plumbers	1	0	1	3,375.00
Cashiers	1	1	2	3,375.00
Drivers	6	0	6	3,375.00
Office assistants	1	0	1	2,250.00
Deboning/cutting	0	30	45	2,250.00
Slaughter hall attendants	17	13	45	2,250.00
Security staff	15	5	20	2,250.00

In addition to the wage rates listed above, the facility would pay an 8 percent social insurance contribution. The entrepreneur also stated that the facility would increase the real wage rate by 5 percent every year.

The project would create 133 labor positions. The additional labor hired and the additional hours worked during destocking years are excluded from this calculation, but the increase in labor costs during the destocking years is estimated at ETB841,725.00. It is also assumed for the analysis that destocking would not occur during the first 3 years of the project operations for two reasons:

1. A major drought occurred in the region relatively recently, and there is a low probability that it would happen again in the next 3 years.
  2. The facility would not be able to double its capacity before establishing a strong customer network. Hence, the 5.88 percent increase in the potential capacity utilization and corresponding increase in the cost of labor and other operational expenses would not start until 2015.
- **Production disposition and losses:** The mortality of the large and small ruminants before slaughtering is assumed to be 1 percent and 0.20 percent of the livestock purchased by the project, respectively. These numbers represent a total loss to the plant. The commercial slaughterhouse facility would target domestic and export markets. The domestic market share is 10 percent of the small ruminant's carcasses and beef cuts produced. The remaining 90 percent would be exported. The edible offal of the large ruminants would be sold domestically, while the edible offal of the small ruminants would be sold for export, perhaps to China. The hides and skins would be sold to the tanneries operating in Ethiopia.

- **Output prices:** The project output prices are presented in table 4, below.

**Table 4. Prices of the final goods produced by the abattoir facility**

Line item	Price
Red meat of small ruminants (US\$/kg)	5.20
Red meat of large ruminants (US\$/kg)	4.40
Skins (ETB/skin)	40.00
Hides (ETB/hide)	120.00
Edible offal of small ruminants (ETB/head)	57.50
Edible offal of large ruminants (ETB/head)	190.00

The 10 percent share of the carcasses and beef cuts sold domestically is assumed to receive the same price as the share of the production sold for the exports. This assumption is also consistent with the entrepreneur vision. The project would not sell the products domestically for a price below what could be received if the goods were exported.

- **Direct, indirect, and overhead production costs:** Direct, indirect, and overheads costs of the commercial slaughterhouse facility production are presented in table 5, below.

**Table 5. Cost of production inputs**

Line items	Cost (ETB)
<b>DIRECT COSTS (ETB/KG)</b>	
Transportation cost of chilled meat delivery to Addis Ababa	1.70
Transportation charge for delivery of frozen beef to Djibouti	2.00
Packaging of small ruminants (ETB/carcass)	9.00
Packaging of large ruminants (ETB/kg)	2.00
Cost of electricity (ETB/KWh)	0.69
Fixed electricity consumption (KWh/year)	152,000.00
Electricity consumption large ruminants (KWh/head)	6.94
Electricity consumption small ruminants (KWh/head)	0.14
Generator fuel consumption (liters/hour)	63.00
Number of hours running generator (hours/year)	48.00
Fuel cost (ETB/liter)	18.00
<b>INDIRECT COSTS (ETB/YEAR)</b>	
Cost of uniforms	135,000.00
Telephone and postage (year 1)	180,000.00
Telephone and postage (year 2 and after)	540,000.00
Printing and stationery	18,000.00
CIF cost of chemicals (US\$)	18,000.00
<b>OVERHEAD COST (ETB/YEAR)</b>	
Certifications and licenses	18,000.00
Health insurance for employees	100,000.00
Site insurance	110,000.00
Bank charges (transactions)	135,000.00
Other office expenses	600,000.00

- **Working capital:** The abattoir facility would attempt to maximize its cash-based payments to the livestock suppliers to strengthen the market linkages with them in an attempt to stabilize the livestock supply. The CBA assumes that the accounts payable maintained by the project are equal to 5 percent of the cost of the livestock purchased.
- **Government regulations** require the importers of Ethiopian meat to deposit funds equal to the value of the order into Ethiopian banks before importing the meat. Such regulations would minimize the accounts receivable of the project. A share of the production would be sold domestically, so the project would have a small balance of accounts receivable. The analysis assumes that the accounts receivable of the project equal 1 percent of the value of sales. The cash balance is assumed to be 10 percent of the value of the sales.
- **Taxes:** The slaughterhouse facility would be exempt from business income tax payments for the first 5 years of its operation. After this 5-year tax holiday period is over, the project would be subject to 30 percent income tax. The government would also collect sales tax on the livestock. The sales tax for the small ruminants is set at ETB10.00 per animal, and the sales tax for large ruminants is set at ETB100.00 per animal. The abattoir facility would share the sales tax payment with the traders supplying the livestock to the project on a 50/50 basis. The value-added tax (VAT) in Ethiopia is 15 percent. Export of meat is zero rated, and a refund would be given for any VAT paid on inputs. The import duty on chemicals is 10 percent, but the project would be exempt from paying the import duty tax on the inputs of the production.
- **Macroeconomic parameters:** The foreign exchange premium (FEP) for Ethiopia is estimated at 6.5 percent. The monthly inflation rate in Ethiopia in 2012 was around 20 percent. The analysis assumes that the same inflation rate would exist in the future. However, this assumption concerning the future rate of inflation can be easily changed in the model. The U.S. inflation rate is assumed to be 2.5 percent. The real exchange rate between ETB and US\$ is ETB18.00/US\$1.00. The financial discount rate and the economic opportunity cost of capital (EOCK) are assumed to be 12 percent.

## **PROJECT MODELING**

The financial and economic feasibility of the PRIME establishment of the commercial abattoir intervention has been estimated using a cost-benefit model in which all revenues or resource inflows have been treated as inflows and all expenditures or resource outflows have been treated as outflows (Jenkins, Kuo, and Harberger, 2012). The analysis has been carried out for a 20-year time period.

The cash-flow statements in the financial analysis have been constructed from the total investment/project and equity points of view.

The total investment point of view determines the overall strength of the project. This point of view sees a project as an activity that generates tangible financial benefits and absorbs tangible financial resources. It disregards any distinction in the sources of finance but asks whether the financial receipts generated from the operations of the project would be sufficient to cover the investment and operating expenditures and whether they would provide a sufficient return.

The owner of a project examines the incremental net cash flow from the investment relative to what could have been earned in the absence of the project. Unlike the total investment point of view, the owner adds the financial subsidy from the USAID as a cash receipt.

The economic resource-flow statements have been constructed by adjusting each of the line items in the cash-flow statements of the total investment point of view by the corresponding economic conversion factors (CFs).

## **PREPARATORY TABLES IN THE CBA EXCEL MODEL**

The CBA model that accompanies this report is divided into three sections. The first section presents the integrated financial and risk analysis of the commercial abattoir facility. This section is required to determine the sustainability and general picture of the project from the total investment and owner points of view. The sensitivity analysis that is discussed in detail later in this report is designed to determine the level of project vulnerability if some of the key parameters were to change.

The second section presents the economic analysis of the project by examining it from the viewpoint of the economy. The calculation of the economic CFs is presented in the second tab “Con. Fact. For Economic Analysis” of the CBA model (Excel file) that accompanies this report.

The third section presents the stakeholder and distributive analysis of the facility operations. It is designed to identify the project’s winners and losers. It also determines the amount of benefits that would be generated by the project for different stakeholders, such as the pastoralists, the traders, the labor involved in the production process, and so forth.

Table 2 of the CBA model presents domestic and U.S. inflation for the evaluation period. The analysis is carried out on an annual basis. The annual inflation rate in Ethiopia is currently 20 percent, and for the base case this rate is maintained throughout the life of the project. The domestic price index is used to adjust the current prices to reflect the impact of inflation over the evaluation period. The expected

exchange rate of ETB to US\$ is derived by multiplying the current exchange rate by the relative price index. The relative price index, in turn, is the ratio of the price index of Ethiopia to that of United States.

Table 3 of the CBA model presents the total investment cost of the abattoir facility. The total investment cost is estimated at ETB78.86 million in 2012 prices. Table 4 presents the total investment cost in nominal terms.

Table 5 of the CBA model depicts the annual capacity utilization of the plant and livestock losses. The table derives the total quantity of the livestock available for slaughtering for every year of the project evaluation period.

Table 6 translates the total quantity of livestock available for production into the final amount of goods produced. It disaggregates the final production of goods into the share of the goods sold domestically and the share produced for export.

Table 7 of the CBA model presents the annual value of the production in nominal terms. The table derives the total project sale revenues on an annual basis. The first year, 2012, is the project development phase, so no revenues would be generated from sales of goods by the project this year.

Table 8 of the CBA model presents the annualized inputs' cost of the project in nominal values. The table is disaggregated into five categories: the cost of the livestock purchased by the project, the feeding and veterinary services cost, the other direct costs of the production, the indirect production costs, and the overhead costs. The table then derives the total annual cost of the production, excluding the labor cost.

VAT in Ethiopia is set at 15 percent. Table 9 of the CBA model presents the VAT payments. The export of meat is zero-rated. The share of the production sold domestically is subject to the VAT payment. The VAT credits collected on the inputs of production are subtracted from the total VAT collected during the sale of the finished products to yield the net VAT payment to be made by the processing plant. The net VAT payment is later subtracted from the total revenues to accurately calculate the project's tax liabilities.

Table 10 of the CBA model presents the facility's working capital calculations, which are later used in the cash-flow statements. Accounts receivable are calculated as 1 percent of the net sales. The cash balance is assumed to be 10 percent of the total cost of inputs. Accounts payable are assumed to be 5 percent of the cost of the livestock. The table also calculates the change in accounts receivable, accounts payable, and the cash balance. The table is presented in nominal values.

The average real increase in wage rates in Ethiopia is assumed to be 2 percent. Table 11 of the CBA model calculates the direct and indirect labor cost in real values using a 2 percent real increase in the cost of labor. An entrepreneur who was interviewed stated that the project would attempt to maximize the number of employees sourced from the local community. The project would also increase the real wage rate to develop a good company image within the community. This strategy is also designed to stabilize the supply of the livestock to the facility. Table 12 calculates the cost of the labor in nominal terms using a 2 percent real increase in the wage rates.

Table 13 of the CBA model presents the raw materials (livestock) inventory valuation using the first-in-first-out (FIFO) method, which is required to identify the physical units sold in terms when they are produced and the respective cost of the production to apply on each unit. The cost of goods sold is then

used in the income tax statement to determine the project's income tax liability. The table is presented in nominal values in millions of ETB.

Table 14 of the CBA model presents the residual values of the project's assets in real terms. The economic life of the slaughterhouse facility assets is presented in table 6, below.

**Table 6. Economic service life of the project assets**

<b>Asset</b>	<b>Economic service life</b>
Buildings (years)	50
Machinery and equipment (years)	20
Office furniture, fittings, and equipment (years)	5
Motor vehicles (% annual depreciation)	10%

Most of the project's assets would have some value at the project closing date. In this case, the real future market value of the assets should be incorporated as a part of the final year's net benefit. In the case of vehicles, however, the service life would be less than the project evaluation period, so the vehicles would need to be replaced before the end of the project evaluation period. Land also has residual value, but land is a specific asset. The residual value of land is equal to the value of land at the beginning of the project, unless the value does not increase/decrease due to the project operations. Table 7, below, present the nominal residual market values of the project's assets at the end of the evaluation period. These values are included in the cash-flow statements as a cash inflow.

**Table 7. Residual values of the facility assets (ETB mill, nominal)**

<b>Asset</b>	<b>Value (mill ETB, nominal)</b>
Buildings	299.35
Machinery and equipment	432.92
Office furniture, fittings, and equipment	45.06
Motor vehicles	183.18

Table 15 of the CBA model calculates the total annual amount of depreciation allowance. Table 8, below, presents the annual depreciation rates and depreciation methods used for the different groups of project assets.

**Table 8. Depreciation rate and method**

<b>Asset</b>	<b>Rate (%)</b>	<b>Method</b>
Buildings	5.00%	Straight line
Machinery and equipment	20.00%	Pool
Office furniture, fittings, and equipment	20.00%	Pool
Motor vehicles	20.00%	Pool

The annual depreciation allowance in nominal terms is presented in table 9, below.

**Table 9. Annual depreciation allowance of the facility (ETB mill, nominal)**

<b>Year</b>	<b>Depreciation allowance (mill ETB, nominal)</b>
2013	9.54
2014	7.85
2015	6.50
2016	5.42
2017	4.55
2018	3.86
2019	3.31
2020	2.86
2021	2.51
2022	2.23
2023	2.00
2024	1.82
2025	1.67
2026	1.56
2027	1.46
2028	1.39
2029	1.33
2030	1.28

Table 16 of the CBA model presents the income statement of the abattoir facility. The annual net income of the project during the evaluation period is presented in table 10, below.

**Table 10. Abattoir facility net income (mill, nominal)**

<b>Year</b>	<b>ETB</b>	<b>US\$</b>
2013	44.65	2.12
2014	191.30	7.75
2015	285.99	9.90
2016	348.61	10.31
2017	419.89	10.61
2018	353.50	7.63
2019	424.72	7.83
2020	509.94	8.03
2021	611.97	8.23
2022	734.17	8.43
2023	880.56	8.64
2024	1,055.96	8.85
2025	1,266.14	9.06
2026	1,518.01	9.28
2027	1,819.85	9.50
2028	2,181.57	9.73
2029	2,615.05	9.96
2030	3,134.52	10.20

The net income is calculated in nominal terms, so inflation is the reason for the gradual increase in the nominal income after the maximum production level is reached. The sudden drop in the net income in 2018 occurs because the tax holiday period would be over.

## INTERVENTION

The CBA determines the total financial and economic benefits of the intervention and the distribution of these benefits between different stakeholders.

The private entrepreneur is limited in the amounts of funds available for the project. The project would seek additional sources of financing if USAID support were not obtained. Possible alternative financing methods may include increasing the number of shareholders or obtaining financing from Islamic banks operating in Kenya. USAID support would eliminate the risks facing the owner from these alternative sources of finance. The increased number of shareholders could, in turn, result in the partial transfer of net benefits arising from the project outside the country.

Table 11, below, presents the cash-flow statement from the total investment point of view. The cash-flow statement from the total investment point of view does not treat the USAID financial subsidy as a cash inflow, because it looks at the investment without considering how it would be financed. The main objective of the total investment point of view is to determine whether the investment is financially feasible.

Table 12, below, presents the cash-flow statement from the owner point of view. This time, the analysis *does* consider the way the project would be financed. The USAID subsidy is treated as a cash inflow from the owner point of view.

**Table 11. Cash-flow statement, total investment point of view (mill ETB, real)**

	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031		
<b>RECEIPTS</b>																						
Gross sales	0.00	298.95	994.29	1,169.75	1,169.75	1,169.75	1,169.75	1,169.75	1,169.75	1,169.75	1,169.75	1,169.75	1,169.75	1,169.75	1,169.75	1,169.75	1,169.75	1,169.75	1,169.75	1,169.75	0.00	
Changes in accounts receivable	0.00	-2.99	-7.45	-3.41	-1.95	-1.95	-1.95	-1.95	-1.95	-1.95	-1.95	-1.95	-1.95	-1.95	-1.95	-1.95	-1.95	-1.95	-1.95	-1.95	9.75	
Liquidation values																						
Land																					9.37	
Buildings																					13.55	
Machinery and equipment																					1.41	
Motor Vehicles																					5.73	
<b>TOTAL CASH INFLOW</b>	<b>0.00</b>	<b>295.96</b>	<b>986.84</b>	<b>1,166.34</b>	<b>1,167.80</b>	<b>39.81</b>																
<b>EXPENDITURES</b>																						
<i>Investment Cost</i>																						
Land	3.60																					
Electricity and road connection, transformers and etc.	5.77																					
Security Fence, boreholes and etc.	2.11																					
Buildings	21.86																					
ClF cost of Machinery and Equipment	28.21																					
Vehicles	13.32	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	8.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Office furniture, fittings and equipment	0.56																					
Preliminary Administrative Expenses	3.28																					
Local transportation of the machinery to the project site	0.16																					
<i>Operating Cost</i>																						
<i>Livestock Cost</i>																						
Small ruminants	0.00	162.33	438.28	515.62	515.62	515.62	515.62	515.62	515.62	515.62	515.62	515.62	515.62	515.62	515.62	515.62	515.62	515.62	515.62	515.62	515.62	0.00
Large ruminants	0.00	65.04	351.20	413.18	413.18	413.18	413.18	413.18	413.18	413.18	413.18	413.18	413.18	413.18	413.18	413.18	413.18	413.18	413.18	413.18	413.18	0.00
<i>Feeding cost</i>																						
Small ruminants	0.00	25.00	67.50	79.41	79.41	79.41	79.41	79.41	79.41	79.41	79.41	79.41	79.41	79.41	79.41	79.41	79.41	79.41	79.41	79.41	79.41	0.00
Large ruminants	0.00	2.24	12.10	14.23	14.23	14.23	14.23	14.23	14.23	14.23	14.23	14.23	14.23	14.23	14.23	14.23	14.23	14.23	14.23	14.23	14.23	0.00
<i>Other direct costs</i>																						
Transportation cost of Chilled meat delivery to Addis-Ababa	0.00	3.82	10.31	12.13	12.13	12.13	12.13	12.13	12.13	12.13	12.13	12.13	12.13	12.13	12.13	12.13	12.13	12.13	12.13	12.13	12.13	0.00
Transportation charge for delivery of frozen beef to Djibouti	0.00	1.67	9.03	10.63	10.63	10.63	10.63	10.63	10.63	10.63	10.63	10.63	10.63	10.63	10.63	10.63	10.63	10.63	10.63	10.63	10.63	0.00
Packaging of small ruminants	0.00	1.80	4.85	5.71	5.71	5.71	5.71	5.71	5.71	5.71	5.71	5.71	5.71	5.71	5.71	5.71	5.71	5.71	5.71	5.71	5.71	0.00
Packaging of large ruminants	0.00	1.67	9.03	10.63	10.63	10.63	10.63	10.63	10.63	10.63	10.63	10.63	10.63	10.63	10.63	10.63	10.63	10.63	10.63	10.63	10.63	0.00
Fixed electricity consumption	0.00	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.00
Electricity consumption small ruminants	0.00	0.02	0.05	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.00
Electricity consumption large ruminants	0.00	0.05	0.26	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.00
Cost of running generator	0.00	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.00
<i>Indirect Costs</i>																						
Cost of uniforms	0.00	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.00
Telephone and Postage	0.00	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.00
Printing and Stationery	0.00	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.00
Cost of chemicals	0.00	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.00
<i>Overhead costs</i>																						
Certifications and Licenses	0.00	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.00
Health Insurance for Employees	0.00	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.00
Site insurance	0.00	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.00
Bank Charges (T T transactions)	0.00	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.00
Other office expenses	0.00	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.00
<b>Total Labor Cost (Wages and Social Insurance)</b>																						
Total direct labor cost	0.00	1.94	3.60	3.67	3.74	3.82	3.89	3.97	4.05	4.13	4.21	4.30	4.38	4.47	4.56	4.65	4.74	4.84	4.94	5.04	5.14	0.00
Managerial Staff	0.00	0.86	1.31	1.33	1.36	1.39	1.42	1.44	1.47	1.50	1.53	1.56	1.60	1.63	1.66	1.69	1.73	1.76	1.80	1.84	1.88	0.00
Administrative staff	0.00	0.43	0.80	0.82	0.84	0.85	0.87	0.89	0.90	0.92	0.94	0.96	0.98	1.00	1.02	1.04	1.06	1.08	1.10	1.12	1.14	0.00
Other personnel	0.00	0.59	0.92	0.94	0.96	0.98	1.00	1.02	1.04	1.06	1.08	1.10	1.12	1.15	1.17	1.19	1.22	1.24	1.27	1.30	1.33	0.00
Annual Labor wages over-run during de-stocking	0.00	0.00	0.00	0.88	0.89	0.91	0.93	0.95	0.97	0.99	1.01	1.03	1.05	1.07	1.09	1.11	1.13	1.16	1.18	1.21	1.24	0.00
<b>Working Capital</b>																						
Changes in accounts payable	0.00	-3.80	-8.32	-3.91	-2.25	-2.25	-2.25	-2.25	-2.25	-2.25	-2.25	-2.25	-2.25	-2.25	-2.25	-2.25	-2.25	-2.25	-2.25	-2.25	-2.25	11.23
Changes in cash balance	0.00	29.89	74.52	34.12	19.50	19.50	19.50	19.50	19.50	19.50	19.50	19.50	19.50	19.50	19.50	19.50	19.50	19.50	19.50	19.50	19.50	-97.48
<b>Net VAT Payment</b>	<b>0.00</b>	<b>0.04</b>	<b>2.30</b>	<b>2.77</b>	<b>2.77</b>	<b>0.00</b>																
<b>TOTAL CASH OUTFLOW</b>	<b>78.86</b>	<b>295.75</b>	<b>979.91</b>	<b>1,104.68</b>	<b>1,091.87</b>	<b>1,092.03</b>	<b>1,092.19</b>	<b>1,092.35</b>	<b>1,092.51</b>	<b>1,100.84</b>	<b>1,092.86</b>	<b>1,093.03</b>	<b>1,093.21</b>	<b>1,093.39</b>	<b>1,093.58</b>	<b>1,093.77</b>	<b>1,093.96</b>	<b>1,094.16</b>	<b>1,094.36</b>	<b>1,094.56</b>	<b>-86.25</b>	
<b>NET CASH FLOW (BEFORE TAX AND FINANCING)</b>	<b>-78.86</b>	<b>0.21</b>	<b>6.93</b>	<b>61.66</b>	<b>75.93</b>	<b>75.78</b>	<b>75.62</b>	<b>75.46</b>	<b>75.29</b>	<b>66.96</b>	<b>74.95</b>	<b>74.77</b>	<b>74.59</b>	<b>74.41</b>	<b>74.23</b>	<b>74.04</b>	<b>73.84</b>	<b>73.64</b>				

**Table 12. Cash-flow statement, owner point of view (mill ETB, real)**

	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031		
<b>RECEIPTS</b>																						
Gross sales	0.00	298.95	994.29	1,169.75	1,169.75	1,169.75	1,169.75	1,169.75	1,169.75	1,169.75	1,169.75	1,169.75	1,169.75	1,169.75	1,169.75	1,169.75	1,169.75	1,169.75	1,169.75	1,169.75	0.00	
Changes in accounts receivable	0.00	-2.99	-7.45	-3.41	-1.95	-1.95	-1.95	-1.95	-1.95	-1.95	-1.95	-1.95	-1.95	-1.95	-1.95	-1.95	-1.95	-1.95	-1.95	-1.95	9.75	
Liquidation values																						
Land	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	9.37	
Buildings	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	13.55	
Machinery and equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.41	
Motor Vehicles	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.73	
USAID Contribution to cover the investment cost	24.86																					
Government Support	5.77																					
<b>TOTAL CASH INFLOW</b>	<b>30.63</b>	<b>295.96</b>	<b>986.84</b>	<b>1,166.34</b>	<b>1,167.80</b>	<b>39.81</b>																
<b>EXPENDITURES</b>																						
<i>Investment Cost</i>																						
Land	3.60																					
Electricity and road connection, transformers and etc.	5.77																					
Security Fence, boreholes and etc.	2.11																					
Buildings	21.86																					
CIF cost of Machinery and Equipment	28.21																					
Vehicles	13.32	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	8.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Office furniture, fittings and equipment	0.56																					
Preliminary Administrative Expenses	3.28																					
Local transportation of the machinery to the project site	0.16																					
<i>Operating Cost</i>																						
<i>Livestock Cost</i>																						
Small ruminants	0.00	162.33	438.28	515.62	515.62	515.62	515.62	515.62	515.62	515.62	515.62	515.62	515.62	515.62	515.62	515.62	515.62	515.62	515.62	515.62	515.62	0.00
Large ruminants	0.00	65.04	351.20	413.18	413.18	413.18	413.18	413.18	413.18	413.18	413.18	413.18	413.18	413.18	413.18	413.18	413.18	413.18	413.18	413.18	413.18	0.00
<i>Feeding cost</i>																						
Small ruminants	0.00	25.00	67.50	79.41	79.41	79.41	79.41	79.41	79.41	79.41	79.41	79.41	79.41	79.41	79.41	79.41	79.41	79.41	79.41	79.41	79.41	0.00
Large ruminants	0.00	2.24	12.10	14.23	14.23	14.23	14.23	14.23	14.23	14.23	14.23	14.23	14.23	14.23	14.23	14.23	14.23	14.23	14.23	14.23	14.23	0.00
<i>Other direct costs</i>																						
Transportation cost of Chilled meat delivery to Addis-Ababa	0.00	3.82	10.31	12.13	12.13	12.13	12.13	12.13	12.13	12.13	12.13	12.13	12.13	12.13	12.13	12.13	12.13	12.13	12.13	12.13	12.13	0.00
Transportation charge for delivery of frozen beef to Djibouti	0.00	1.67	9.03	10.63	10.63	10.63	10.63	10.63	10.63	10.63	10.63	10.63	10.63	10.63	10.63	10.63	10.63	10.63	10.63	10.63	10.63	0.00
Packaging of small ruminants	0.00	1.80	4.85	5.71	5.71	5.71	5.71	5.71	5.71	5.71	5.71	5.71	5.71	5.71	5.71	5.71	5.71	5.71	5.71	5.71	5.71	0.00
Packaging of large ruminants	0.00	1.67	9.03	10.63	10.63	10.63	10.63	10.63	10.63	10.63	10.63	10.63	10.63	10.63	10.63	10.63	10.63	10.63	10.63	10.63	10.63	0.00
Fixed electricity consumption	0.00	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.00
Electricity consumption small ruminants	0.00	0.02	0.05	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.00
Electricity consumption large ruminants	0.00	0.05	0.26	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.00
Cost of running generator	0.00	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.00
<i>Indirect Costs</i>																						
Cost of uniforms	0.00	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.00
Telephone and Postage	0.00	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.00
Printing and Stationery	0.00	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.00
Cost of chemicals	0.00	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.00
<i>Overhead costs</i>																						
Certifications and Licenses	0.00	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.00
Health Insurance for Employees	0.00	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.00
Site insurance	0.00	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.00
Bank Charges (TT transactions)	0.00	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.00
Other office expenses	0.00	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.00
<b>Total Labor Cost (Wages and Social Insurance)</b>																						
Total direct labor cost	0.00	1.94	3.60	3.67	3.74	3.82	3.89	3.97	4.05	4.13	4.21	4.30	4.38	4.47	4.56	4.65	4.74	4.84	4.94	5.04	5.14	0.00
Managerial Staff	0.00	0.86	1.31	1.33	1.36	1.39	1.42	1.44	1.47	1.50	1.53	1.56	1.60	1.63	1.66	1.69	1.73	1.76	1.80	1.84	1.88	0.00
Administrative staff	0.00	0.43	0.80	0.82	0.84	0.85	0.87	0.89	0.90	0.92	0.94	0.96	0.98	1.00	1.02	1.04	1.06	1.08	1.10	1.12	1.14	0.00
Other personnel	0.00	0.59	0.92	0.94	0.96	0.98	1.00	1.02	1.04	1.06	1.08	1.10	1.12	1.15	1.17	1.19	1.22	1.24	1.27	1.30	1.33	0.00
Annual Labor wages over-run during de-stocking	0.00	0.00	0.00	0.88	0.89	0.91	0.93	0.95	0.97	0.99	1.01	1.03	1.05	1.07	1.09	1.11	1.13	1.16	1.18	1.21	1.24	0.00
<i>Working Capital</i>																						
Changes in accounts payable	0.00	-3.80	-8.32	-3.91	-2.25	-2.25	-2.25	-2.25	-2.25	-2.25	-2.25	-2.25	-2.25	-2.25	-2.25	-2.25	-2.25	-2.25	-2.25	-2.25	-2.25	11.23
Changes in cash balance	0.00	29.89	74.52	34.12	19.50	19.50	19.50	19.50	19.50	19.50	19.50	19.50	19.50	19.50	19.50	19.50	19.50	19.50	19.50	19.50	19.50	-97.48
Net VAT Payment	0.00	0.04	2.30	2.77	2.77	2.77	2.77	2.77	2.77	2.77	2.77	2.77	2.77	2.77	2.77	2.77	2.77	2.77	2.77	2.77	2.77	0.00
<b>TOTAL CASH OUTFLOW</b>	<b>78.86</b>	<b>295.75</b>	<b>979.91</b>	<b>1,104.68</b>	<b>1,091.87</b>	<b>1,092.03</b>																

# FINDINGS

## Financial Analysis

The financial analysis performed for the establishment of the commercial abattoir project yields positive FNPVs and FIRRs from the total investment point of view and from the owner point of view. Both the FNPVs from the total investment point of view and the owner point of view are calculated using a 12 percent real discount rate. The FNPVs and FIRRs are presented in table 13, below.

**Table 13. Financial indicators of the project**

Point of view	FNPV (ETB mill)	FNPV (US\$ mill)	FIRR (%)
Total investment point of view	ETB161.55	US\$8.64	36.06%
Owner point of view	ETB192.18	US\$10.34	52.32%

The FNPV of the facility from the owner point of view is higher than the FNPV from the total investment point of view (US\$10.34 million versus US\$8.64 million). The reason for the increase in the FNPV is the financial subsidy from USAID. The FIRR from the owner point of view is also higher, by 16.26 percent.

The positive FNPV from the total investment point of view suggests that the project is financially sustainable: over the life of the project, the financial benefits would outweigh the financial costs of the project. The positive difference between the FNPV from the owner point of view and the total investment point of view, in turn, suggests that USAID support would substantially increase the returns on the investment. The increase in the FIRR also supports this conclusion.

## Economic Analysis

Differences emerge between the financial and economic outcomes due to the fact that the financial values do not include all the externalities that are present in the economy. In this case, a number of externalities would arise:

- The pastoralists who would be supplying the livestock to the facility currently have very limited ability to sell lambs and kids of small ruminants due to the transportation cost involved with getting live animals to the market. The net benefit to the pastoralists due to the presence of the local slaughterhouse facility is assumed to represent at least 10 percent of the value of the livestock sold.
- The income gained by the traders supplying livestock to the facility is the net benefit that is calculated after deducting all operating expenses and the opportunity cost of the traders' labor. The net benefit in this case is a transfer of resources from the project/pastoralists to the traders.
- The project would also increase the amount of taxes collected by the government of Ethiopia, either directly from the taxation of production inputs or indirectly via the FEP.

The facility would increase exports of livestock-industry products. The FEP for Ethiopia is reported to be 6.5 percent (Kuo, 2011), so every incremental dollar earned from exports would have an economic value of 1.065 times the market exchange rate.

To measure the economic impacts of the proposed intervention on the Ethiopian economy, the economic values are derived by adjusting the financial values by the appropriate economic conversion factors. If no distortions are present in the market, then the financial value of an item is used to measure its economic value.<sup>1</sup>

The USAID subsidy, the facility's contribution to the community, the income tax payments, and the net benefits to the pastoralists and the traders represent a resource flow from one stakeholder to the other. The conversion factor for a transfer of resources item is zero.

Table 14, below, presents the economy resource-flows statement generated by the slaughterhouse facility.

The analysis reveals that the ENPV using the 12 percent EOCC is positive. The ENPV of the commercial slaughterhouse facility is estimated at US\$68.82 million. The EIRR is 115.28 percent.

---

<sup>1</sup> The list of conversion factors used for the purpose of this analysis is presented in table A in the appendix.  
Cost-Benefit Analysis of the PRIME Commercial Slaughtering Facility Establishment Intervention



## STAKEHOLDER AND BENEFICIARY ANALYSIS

An economic surplus in the economy is created by producing an output that has an economic value greater than the economic cost of the inputs, such as capital, land, and labor that are used to produce the item. PRIME interventions in the livestock value chain would yield seven main stakeholders: the households supplying the livestock to the abattoir facility, the Faafan village community, the livestock traders, the labor employed by the project, the private entrepreneurs, the government of Ethiopia, and USAID.

1. The government of Ethiopia would benefit due to the following factors:
  - a. The additional inflow of taxes coming from the tradable inputs used in the production. For instance, Ethiopia assesses a high tariff rate and other taxes on the imports of fuel that increase its financial cost. Taxes, in turn, are just a transfer of resources from consumers to the government. At the same time, fuel is internationally traded and requires foreign exchange that has an economic cost to the economy that is 6.5 percent greater than its financial cost. Overall, the economic cost of fuel is less than its financial cost. Every incremental dollar spent on fuel required to transport meat or to run the generator has an economic cost of 79 percent of its financial cost. These figures also contribute to the difference between the financial and economic outcomes of the intervention. In addition, the abattoir facility would pay income tax of 30 percent after the 5-year tax holiday period ends.
  - b. The products of the livestock industry, such as meat, hides/skins, and edible offal, are currently exported from Ethiopia. The project would increase the exports of the goods through formal channels, resulting in an increase in foreign currency earnings by the government of Ethiopia. The FEP for Ethiopia is reported to be 6.5 percent, so every incremental dollar earned on exports would have an economic benefit of 1.065 times the market exchange rate.
  - c. The project would also employ 133 workers. The government levies personal income tax, so the newly employed labor would generate additional tax inflows for the government.
  - d. The project would pay the 8 percent social insurance contribution on the salaries to the government of Ethiopia.
  - e. The government would charge sales tax when live animals are sold to the facility. The sales tax on the small ruminants is equal to ETB10.00/head. The sales tax on the large ruminants is equal to ETB100.00/head. The project would purchase a large quantity of animals for processing, thereby increasing the government's tax revenues.
2. The pastoralist households supplying the livestock to the project would also benefit due to the presence of the local livestock abattoir. These benefits would result from the strong market linkage with the reliable purchaser of the livestock. In addition, the project would mainly purchase the livestock on a cash basis, while in some cases households currently need to wait for several months before traders complete their payments for livestock purchased.
3. The project would need to pay a wage rate higher than the ongoing market wage rate to attract the required labor force. In addition, the project would also make a social insurance contribution of 8 percent. Both would also result in net benefits to the labor involved to the production process.

4. The traders would also benefit, because the large volume of livestock demanded by the project would increase their transactions. It is very difficult to obtain the exact traders' operational cost, but some of the traders mentioned that the net margin (after deducting the opportunity cost of labor) is about 2 percent of the livestock value. The analysis assumes that the net benefit to the traders is equal to 2 percent of the value of livestock sold.
5. The project would contribute 2.5 percent of its annual operating income to benefit the Faafan village community. In addition to its religious reasons (the Somali region is a Muslim region), this donation would have some business logic as well. For this type of the business, it is important to have a reliable supplier of raw materials. The contribution would allow the facility to develop a culture of trust within the community. The entrepreneur during the interview mentioned that the community may even refuse to sell its livestock to the project if part of the income generated by the project were not directed toward improving the livelihood of the community.
6. The private entrepreneur would benefit due to the financial subsidy from USAID. The subsidy would increase the returns on the investment as well as reduce its overall riskiness.
7. USAID would bear the cost of the intervention.

Table 15, below, presents the value of the stakeholder and beneficiary impacts.

**Table 15. Stakeholder and beneficiary impacts of the project (in US\$ mill)**  
**Net benefits (US\$ mill)**

<b>Economic NPV (FNPV + externalities)</b>	68.82
• <b>Financial NPV (entrepreneur)</b>	10.34
• <b>Externalities</b>	58.48
○ <b>Government</b>	23.95
○ <b>Labor</b>	0.41
○ <b>Community</b>	0.33
○ <b>USAID</b>	-1.38
○ <b>Households</b>	29.31
○ <b>Traders</b>	5.86

The USAID contribution is the amount of the financial subsidy that would be provided by USAID. This figure represents a transfer of resources between the entrepreneur and USAID.

The analysis assumes that the total benefits arising to the government of Ethiopia would be distributed among the Ethiopian population. Ethiopian government spending is reported by the World Bank to be US\$33.79 per capita. The present value of US\$33.79 over the 20-year period analyzed is equal to US\$283.00.

Table 16, below, presents the total number of beneficiaries, the present value of benefits per beneficiary, and the total economic benefits of the abattoir facility.

**Table 16. Impact analysis of the commercial abattoir establishment intervention**

<b>Beneficiaries</b>	<b>Number of households</b>	<b>PV of benefits/household</b>	<b>Total present value of economic benefits (millions)</b>
<b>1. Small holders supplying cattle</b>	63,529	US\$202.35	US\$12.86
<b>2. Small holders supplying small ruminants</b>	211,765	US\$77.68	US\$16.45
<b>3. Livestock traders supplying cattle</b>	1,144	US\$2,248.34	US\$2.57
<b>4. Livestock traders supplying small ruminants</b>	1,144	US\$2,877.18	US\$3.29
<b>5. Recipients of the government expenditures</b>	84,619	US\$283.00	US\$23.95
<b>6. Faafan village community</b>	2,867	US\$116.47	US\$0.33
<b>7. Private entrepreneur (FNPV)</b>	6	US\$1.72 mill	US\$10.34
<b>8. Labor</b>	133	US\$3,069.34	US\$0.41
<b>9. USAID</b>	NA	NA	-US\$1.38
<b>TOTAL</b>	<b>365,857</b>		<b>US\$68.82</b>

The USAID subsidy would represent 31.53 percent of the total investment cost; therefore, 31.53 percent of the total economic benefits generated by the project may be attributed to USAID. Table 17, below, presents the net economic benefits generated by the project due to the financial support of USAID.

**Table 17. Impact analysis of the commercial abattoir establishment intervention (USAID share of the benefits)**

<b>Beneficiaries</b>	<b>Number of households</b>	<b>PV of benefits/household</b>	<b>Total present value of economic benefits (millions)</b>
<b>1. Small holders supplying cattle</b>	63,529	US\$63.75	US\$4.05
<b>2. Small holders supplying small ruminants</b>	211,765	US\$24.51	US\$5.19
<b>3. Livestock traders supplying cattle</b>	1,144	US\$708.04	US\$0.81
<b>4. Livestock traders supplying small ruminants</b>	1,144	US\$909.09	US\$1.04
<b>5. Recipients of the government expenditures</b>	26,676	US\$283.00	US\$7.55
<b>6. Faafan village community</b>	2,867	US\$36.72	US\$0.11
<b>7. Private entrepreneur (FNPV)</b>	6	US\$0.54 mill	US\$3.26
<b>8. Labor</b>	133	US\$967.62	US\$0.13
<b>TOTAL</b>	<b>365,857</b>		<b>US\$22.19</b>

## SENSITIVITY ANALYSIS

A sensitivity analysis for the PRIME intervention has been performed using the key variables that are prone to change and therefore likely to influence the project's outcomes. These variables include the average purchase price of the small ruminants, the average purchase price of the large ruminants, the free on board (FOB) price of meat, the small ruminants' carcass proportion relative to their live weight, the large ruminants' beef-cuts proportion relative to their live weight, the production potential utilization after 2015, the impact of the livestock inventories, and the number of major droughts during the evaluation period. It is necessary to determine the joint impact of the average purchase price of the small ruminants and FOB price of meat on the FNPV of the project as well as the joint impact of the large ruminants' purchase price and FOB price of meat on the FNPV of the project. Details related to the sensitivity analysis are outlined in the following tables.

1. The slaughterhouse facility would purchase sheep, goats, and cattle for slaughter. Table 18, below, presents the impact of the changes in small ruminants' purchase price on the FNPV and FIRR of the project.

**Table 18. Impact of the purchase price of the small ruminants on the FNPV and FIRR (US\$ mill)**

Price (ETB, real)	NPV (US\$ mill)	FIRR (%)
650.00	31.76	116.30%
675.00	26.66	101.88%
700.00	21.56	87.08%
755.00	10.34	52.32%
770.00	7.28	41.85%
780.00	5.24	34.39%
790.00	3.20	26.33%
800.00	1.16	17.42%

The baseline scenario assumes that the average purchase price of the small ruminants is ETB755.00. Sales tax of ETB10.00/head is collected for the sale of the small ruminants. The baseline scenario FNPV is US\$10.34 million. The FIRR is 52.32 percent. If the purchase price were to increase by 6 percent (to ETB800.00/head), the FNPV of the facility would still be positive at US\$1.16 million, and the FIRR would decrease to 17.42 percent. On the other hand, if the price were to decrease by approximately 6 percent (to ETB700.00/head), the FNPV would increase to US\$21.56 million, and the FIRR would increase to 87.08 percent.

The sensitivity analysis does not reveal a negative FNPV within the tested range of the small ruminants' purchase price. The break-even point of the purchase price of the small ruminants (holding the other parameters constant) is estimated at ETB805.71. If the price of the small ruminants were to increase beyond this point, the financial returns to the project would become negative.

2. Table 19, below, presents the impact of the large ruminants' purchase price change on the FNPV and FIRR of the project.

**Table 19. Impact of the purchase price of the large ruminants on the FNPV and FIRR (US\$ mill)**

Price (ETB, real)	NPV (US\$ mill)	FIRR (%)
5,250	26.24	96.02%
5,500	21.28	83.36%
5,800	15.31	67.12%
6,050	10.34	52.32%
6,250	6.37	39.09%
6,400	3.39	27.69%
6,500	1.40	18.87%
6,600	-0.59	9.06%

The baseline scenario assumes that the average purchase price of the large ruminants is ETB6,050.00. Sales tax of ETB100.00/head is collected for the sale of the large ruminants. The baseline scenario FNPV is US\$10.34 million. The FIRR is 52.32 percent. If the purchase price were to increase to ETB6,500.00/head, the FNPV of the facility would still be positive at US\$1.40 million, and the FIRR would decrease to 18.87 percent. If, however, the price were to decrease to ETB5,500.00/head, the FNPV would increase to US\$21.28 million, and the FIRR would increase to 83.36 percent.

The sensitivity analysis reveals that the FNPV would become negative (-US\$0.59 million) if the price were to increase to ETB6,600.00/head. The break-even point of the purchase price of the large ruminants (holding the other parameters constant) is estimated at ETB6,570.34.

3. The baseline scenario assumes that the FOB price of lamb is US\$5.20/kg. The results of the sensitivity analysis if the FOB price were to change are presented in table 20, below.

**Table 20. Impact of the lamb FOB price change on the FNPV and the FIRR**

FOB Price (US\$, real)	FNPV (US\$ mill)	FIRR (%)
4.8	-4.01	-3.99%
5.0	3.17	26.23%
5.1	6.75	40.02%
5.2	10.34	52.32%
5.3	13.93	63.79%
5.4	17.52	74.72%
5.5	21.11	85.26%

The sensitivity test reveals that if the FOB price were to drop to US\$4.80, the FNPV and the FIRR of the facility would become negative: the FNPV in that case would be equal to -US\$4.01 million, and the FIRR would be equal to -3.99 percent. However, only a small 1.90 percent increase in the FOB price of the lamb (to US\$5.30) would increase the FNPV by 34.71 percent (to US\$13.93 million). The FIRR in that case would increase to 63.79 percent. The FOB price, therefore, has a significant impact on the financial feasibility of the investment.

- The baseline scenario assumes that the FOB price of beef is US\$4.40/kg. The results of the sensitivity analysis if the FOB price were to change are presented in table 21, below.

**Table 21. Impact of the beef FOB price change on the FNPV and the FIRR**

FOB Price (US\$, real)	FNPV (US\$ mill)	FIRR (%)
4.0	-0.07	11.64%
4.1	2.53	24.11%
4.2	5.14	34.66%
4.3	7.74	43.90%
4.4	10.34	52.32%
4.5	12.95	60.19%
4.6	15.55	67.63%

The sensitivity test reveals that if the FOB price were to drop to US\$4.00, the FNPV of the facility would become negative, but the FIRR would remain positive at 11.64 percent. The FNPV in that case would be equal to -US\$0.07 million. If the FOB price were to increase to US\$4.60/kg, the FNPV would increase to US\$15.55 million. The FIRR in that case would increase to 67.63 percent.

- The baseline scenario of the analysis assumes that the average carcass weight of the small ruminants is 45 percent of the live weight. It is very unlikely that this parameter would change significantly, but small changes are possible. The results of the sensitivity test are presented in the table 22, below.

**Table 22. Impact of the change in the average carcass share of the small ruminants on the FNPV and the FIRR**

Share of the carcass	FNPV (US\$ mill)	FIRR (%)
42.0%	-1.90	3.43%
43.0%	2.18	22.02%
44.0%	6.26	38.24%
45.0%	10.34	52.32%
46.0%	14.42	65.32%
47.0%	18.51	77.65%

The sensitivity test reveals that the carcass weight as a proportion of the live weight is a significant variable in determining the facility's financial feasibility. A mere 1 percent drop in the average proportion of the carcass weight would reduce the FNPV by US\$4.08 million, and the FIRR would be reduced by 14.08 percent. A drop beyond 43 percent would result in a negative FNPV of -US\$1.90 million. However, the FIRR at that level would still be positive, at 3.42 percent.

- The baseline scenario of the analysis assumes that the average proportion of the beef cuts to the live weight of the large ruminants is 32 percent. The share of beef cuts from an approximately 250-265kg bull usually ranges between 30 and 35 percent. It is unlikely that the number would

drop below 30 percent or increase beyond 35 percent. The results of the sensitivity test are presented in table 23, below.

**Table 23. Impact of the change in the average carcass share of the large ruminants on the FNPV and the FIRR**

Share of the carcass	FNPV (US\$ mill)	FIRR (%)
30.0%	3.49	28.21%
31.0%	6.92	41.09%
32.0%	10.34	52.32%
33.0%	13.77	62.57%
34.0%	17.19	72.16%
35.0%	20.61	81.24%

If the beef cuts were to decrease to only 30 percent of the live weight of the large ruminants purchased, the FNPV and the FIRR would still be positive, at US\$3.49 million and 28.21 percent, respectively. However, if the beef cuts were to increase to 35 percent of the live weight of the large ruminants, the FNPV would increase to US\$20.61 million, and the FIRR would increase to 81.24 percent. The sensitivity analysis does not reveal any negative FNPV within the tested range of the values.

7. The baseline scenario assumes that, starting in 2015, the facility would be able to operate at 100 percent of its production potential (8-hour shifts). There would also be a 5.88 percent increase beyond the full production potential due to the periodic destocking intervention. However, the variable may be prone to change if the project were unable to develop a steady customer base or obtain a reliable supply of livestock. In turn, if the market conditions were sufficiently attractive, the project facility may operate two shifts. The results of the sensitivity analysis of the change in the potential capacity utilization after 2015 are presented in table 24, below.

**Table 24. Impact of the change in the potential capacity utilization in 2015 and after on the FNPV and the FIRR**

Capacity utilization (%)	FNPV (US\$ mill)	FIRR (%)
50.0%	4.02	36.74%
60.0%	5.15	40.28%
70.0%	6.28	43.38%
80.0%	7.42	46.17%
90.0%	8.55	48.70%
105.9%	10.34	52.32%
110.0%	10.81	53.20%
120.0%	11.94	55.23%
130.0%	13.07	57.14%
140.0%	14.20	58.95%
150.0%	15.33	60.66%

If the slaughterhouse facility were able to operate at only 50 percent of capacity, the FNPV and the FIRR of the project would still be positive, at US\$4.02 million and 36.74 percent, respectively. On the other hand, if market conditions were to allow the facility to operate at 150 percent capacity, the FNPV would increase to US\$15.33 million, and the FIRR would increase to 60.66 percent.

8. The facility would need to maintain a significant level of livestock inventories to be relatively isolated from the daily market conditions. The market price for livestock frequently fluctuates in the region, so maintaining a high level of inventory would allow the facility to operate without interruption if the price of livestock on a particular day were too high. The sensitivity test reveals that this variable has a significant impact on the financial returns to the facility. The results are presented in table 25, below.

**Table 25. Impact of the change in inventory levels on the FNPV and the FIRR**

Inventories (%)	FNPV (US\$ mill)	FIRR (%)
2.50%	25.88	90.79%
4.00%	21.22	80.01%
5.00%	18.11	72.54%
6.00%	15.00	64.78%
7.50%	10.34	52.32%
8.00%	8.79	47.85%
8.50%	7.24	43.13%

The baseline scenario assumes that the amount of livestock inventory maintained is 7.5 percent of the livestock purchased. At this baseline inventory level, the FNPV and the FIRR of the project are US\$10.34 million and 52.32 percent, respectively. A small increase of 1 percent in the inventory held by the facility would reduce the FNPV of the project by US\$3.10 million. The FIRR in this case would drop by 9.19 percent.

9. A sensitivity test has also been conducted to determine the impact of the simultaneous change in the purchase price of the small ruminants and the FOB price of lamb, as shown in table 26, below.

**Table 26. Joint impact of the FOB price of lamb and purchase price of the small ruminants on the FNPV (US\$ mill)**

		Purchase price (ETB/head)							
		650	675	700	755	770	780	790	800
FOB price (US\$/kg)	4.8	17.41	12.31	7.21	-4.01	-7.07	-9.11	-11.15	13.19
	5.0	24.58	19.48	14.38	3.17	0.11	-1.93	-3.97	-6.01
	5.1	28.17	23.07	17.97	6.75	3.69	1.66	-0.38	-2.42
	5.2	31.76	26.66	21.56	10.34	7.28	5.24	3.20	1.16
	5.3	35.35	30.25	25.15	13.93	10.87	8.83	6.79	4.75

<b>5.4</b>	38.94	33.84	28.74	17.52	14.46	12.42	10.38	8.34
<b>5.5</b>	42.53	37.43	32.33	21.11	18.05	16.01	13.97	11.93

The baseline scenario assumes that the FOB price of lamb is US\$5.20 and the small ruminants are purchased for ETB755.00/head. The FNPV at this baseline level of prices is US\$10.34 million. However, if the FOB price were to drop to US\$5.10/kg and the purchase price were to increase to ETB790.00/head or more, the FNPV would become negative. If the FOB price were to drop to US\$5.00/kg and the purchase price were to increase to ETB780.00/head or more, the FNPV would also be negative. In the worst-case scenario of the analysis, the FOB price is US\$4.80/kg and the purchase price is ETB800.00/head, resulting in a negative FNPV of –US\$13.19 million. The best-case scenario, where the FOB price is US\$5.50/kg and the purchase price is ETB650.00/head, results in a positive FNPV of US\$42.53 million.

10. The sensitivity test to determine the impact of the simultaneous change in the purchase price of the large ruminants and the FOB price of beef on the FNPV of the project is presented in table 27, below.

**Table 27. Joint impact of the FOB price of beef and the purchase price of the large ruminants on the FNPV (US\$ mill)**

		Purchase price (ETB/head)							
		5,250	5,500	5,800	6,050	6,400	6,500	6,250	6,600
FOB price (US\$/kg)	4.0	15.83	10.86	4.90	–0.07	–7.03	–9.02	–4.05	–11.00
	4.1	18.43	13.47	7.50	2.53	–4.42	–6.41	–1.44	–8.40
	4.2	21.04	16.07	10.11	5.14	–1.82	–3.81	1.16	–5.80
	4.3	23.64	18.67	12.71	7.74	0.78	–1.21	3.76	–3.19
	4.4	26.24	21.28	15.31	10.34	3.39	1.40	6.37	–0.59
	4.5	28.85	23.88	17.92	12.95	5.99	4.00	8.97	2.01
	4.6	31.45	26.48	20.52	15.55	8.59	6.60	11.57	4.62

The baseline scenario assumes that the FOB price of beef is US\$4.40/kg and cattle are purchased for ETB6,050.00/head. The FNPV at this baseline level of prices is US\$10.34 million. The worst-case scenario in this case occurs if the FOB price were to drop to US\$4.00/kg and the purchase price were to increase to ETB6,600.00/head. The FNPV of the worst-case scenario would be –US\$11.00 million. The best-case scenario would be if the FOB price were to increase to US\$4.60/kg and the purchase price were to decrease to ETB5,250.00. The FNPV of the project in the best-case scenario would be US\$31.45 million.

11. The sensitivity analysis has also been conducted to determine the impact of the number of drought years during the evaluation period. The results are presented in table 28, below.

**Table 28. The impact of the change in the number of drought years during the evaluation period on the FNPV (US\$ mill)**

<b>Number of drought years</b>	<b>FNPV (US\$ mill)</b>	<b>FIRR (%)</b>
<b>2</b>	10.01	51.68%
<b>3</b>	10.18	52.00%
<b>4</b>	10.34	52.32%
<b>5</b>	10.51	52.64%
<b>6</b>	10.68	52.95%

The baseline scenario assumes that the region faces a big drought every 5 years; hence, the evaluation period would include four drought years. The FNPV and the FIRR of the baseline scenario are US\$10.34 million and 52.32 percent, respectively. The analysis assumes that there would not be any change in the price of the livestock during a drought year. The pastoralists would destock the grade of the animals demanded by the project and use the financial resources generated to feed the rest of the livestock. However, the project would have to run two production shifts to be able to process the increased supply of livestock. If the FOB price for meat were to remain at the same level, the increase in the number of drought years would increase the financial returns of the project. The sensitivity analysis reveals that if the drought were to hit the region five times during the evaluation period, the FNPV would increase to US\$10.51 million. That being said, if the drought were to hit the region too frequently, the project's viability would be at risk because of the general negative impact of such a natural disaster on the livestock sector. The sensitivity analysis therefore assumes that the number of drought years during the evaluation period of 20 years would not be more than six.

## CONCLUSIONS AND RECOMMENDATIONS

The CBA of the commercial abattoir establishment intervention shows a positive FNPV from the owner point of view. The project also yields a large positive ENPV, indicating that it would be very good for the Ethiopian economy. The stakeholder analysis indicates that the project would improve the livelihood of the pastoralists, thus achieving the main goal of the USAID FtF program.

The field visits to the different market points indicated that the current market for the export of live animals generates a highly volatile path of prices to the pastoralists over time. The project, therefore, would need to create a strong market linkage with the pastoralists and local traders to reduce the volatility of the input prices. In addition, the project would also need to maintain a significant livestock inventory level to be able to wait for the next market day if the livestock prices on any given day were abnormally high.

The presence of a local abattoir facility would also allow the pastoralist households to destock their herds during drought years. The financial returns to the project during such periods may increase because of the general decrease in the cost of the raw materials and the higher utilization of the plant. The households would also benefit, because the revenue from the sale of livestock could be used to buy feed for the rest of the herd, thereby to some extent minimizing livestock losses. The project, however, would also be vulnerable to drought because of the high cost of feeding the livestock inventory. The project has obtained a significant quantity of land that can be used, under normal circumstances, to produce fodder and livestock concentrates. The slaughtering facility has already finished construction of the boreholes to stabilize its water supply.

Overall, the project is potentially sustainable and desirable for private investors and for the Ethiopian economy. However, some potential risks are associated with the project:

1. If the USAID assistance were unavailable for the investors, the entrepreneur would need to seek financing from the Islamic bank in Kenya. In this case, a number of risks associated with the debt burden may develop for the project. The nature of this business is rather volatile; hence, having a repayment schedule based on financing obtained from abroad may, under a range of uncertain circumstances, put the project at risk. Obtaining equity financing from alternative sources is likely to constrain the facility operations.
2. The Somali region was politically unstable for a long period of time. Its close location to the border with Somalia produces a range of ongoing political risks for the project. Security is always questionable for industrial facilities operating in this border area.
3. Significant risks are associated with livestock disease outbreaks. If an embargo of Ethiopian meat exports were to happen, it would cause the project to face significant financial problems.
4. The project also needs to find a way to cope with pastoralists' negative attitude toward selling small ruminants as lambs and kids. Because of the difficulty involved with bringing live lambs and kids to the international market, the current view of the pastoralists is that they are better off raising the small animals for another year or so. Doing so enables them to receive a higher price per animal because of the increased weight, even though the meat is inferior. As the facility creates a demand for these small animals, it may result in a price increase for lambs and kids, thus squeezing the abattoir's profit margin.

## REFERENCES

A dugna, T., Alemu, Y., and Dawit, A. (2012). *Livestock feed resources in Ethiopia*.

Assefa, H., and Tamir, S. (2012) *Challenges, opportunities and the need for transformation*. Ethiopian Animal Feeds Industry Association.

Dickson, M. N., Makau, Boniface F., Wellington, N. E., and Joseph, M. G. (2005). *Guidelines for emergency livestock off-take handbook*.

Jenkins, G. P., Kuo, C. Y., and Harberger, A. C. (2011, August). *Cost-benefit analysis for investment decision*.

Kuo, C. Y. (2011). *Estimates of the foreign exchange premium and the premium for non-tradable outlays for countries in Africa*. John Deutsch International, Department of Economics, Queen's University, Canada.

The Sphere Project. (2011). *Humanitarian charter and minimum standards in humanitarian response*.

Morton, J., Barton, D., Collinson, C., and Heath, B. (2002). *Comparing drought mitigation interventions in the pastoral livestock sector*.

## APPENDIX

**Table A. Summary of conversion factors used for the economic analysis of the commercial abattoir establishment intervention of PRIME project**

<i>Summary of conversion factors</i>	
Carcass of small ruminants (exports)	1.07
Red meat of large ruminants (exports)	1.07
Skins	1.07
Hides	1.07
Edible offal of small ruminants	1.07
Edible offal of large ruminants	1.07
Changes in accounts receivable	1.07
Land	1.00
Buildings	1.00
Machinery and equipment	1.06
Motor vehicles	1.06
USAID contribution to cover the investment cost	0.00
Government support	0.00
Livestock (small ruminants)	0.94
Livestock (large ruminants)	0.94
Livestock feed	1.07
Transportation	0.92
Packaging of small ruminants	1.07
Packaging of large ruminants	1.07
Electricity	0.90
Fuel for generator	0.79
Cost of uniforms	1.00
Telephone and postage	1.00
Printing and stationery	0.71
Cost of chemicals	0.97
Certifications and licenses	0.00
Health insurance for employees	1.00
Site insurance	1.00
Bank charges (TT transactions)	0.00
Other office expenses	1.00
Unskilled workers	0.67
Managerial staff	0.79
Administrative staff	0.83
Other personnel	0.86
Annual labor wages overrun during destocking	0.67
Changes in accounts payable	1.07
Changes in cash balance	1.00
Corporate income tax	0.00
Contribution to the community	0.00