



# Establishing Priorities for SPS Capacity-Building Using Multi Criteria Decision Analysis in Ethiopia.

FINAL

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## Acronyms & Initialisms

CAADP	Comprehensive African Agriculture Development Programme
COMESA	Common Market for Eastern and Southern Africa
DTIS	Diagnostic Trade Integration Study
ESSP II	Ethiopia Strategy Support Program II
EU	European Union
FAO	Food and Agriculture Organization
FMD	foot and mouth disease
GAP	good agricultural practice(s)
GHP	good hygiene practices
GTP	Growth and Transformation Plan
GVP	good veterinary practices
HACCP	hazard analysis and critical control point(s)
HS	Harmonized System
IEC	International Electrotechnical Commission
IF	Integrated Framework
ISO	International Standards Organization
MCDA	multi-criteria decision analysis
MARD	Ministry of Agriculture and Rural Development
MRL	maximum residue level(s)
NGO	non government organization
NPPO	national plant protection organization
OIE	International Organization for Animal Health
PASDEP	Plan for Accelerated and Sustained Development to End Poverty
PCE	Phytosanitary Capacity Evaluation
PPR	<i>Peste des Petit Ruminants</i>
PRA	pest risk assessment
PVS	Performance of Veterinary Services
RASFF	Rapid Alert System for Food and Feed
RCA	Revealed Comparative Advantage
RSA	Republic of South Africa
SADC	Southern African Development Community
SD	standard deviation
SPIMS	Sanitary and Phytosanitary Information Management System
SPS	Sanitary and Phytosanitary
STDF	Standards and Trade Development Facility
TBT	Technical Barriers to Trade
TPC	third party certification
UAE	United Arab Emirates
WHO	World Health Organization
WTO	World Trade Organization

## 1; Executive summary

The Common Market for Eastern and Southern Africa (COMESA) secretariat in collaboration with the Standards and Trade Development Facility (STDF) the latter based at the World Trade Organization, are spearheading the use of an economic analysis; in particular the multi-criteria decision analysis (MCDA) tool for assisting governments and private sector in making investment decisions on Sanitary and Phytosanitary (SPS) capacity building options in the Community. Use of this tool helps to establish more coherent and accountable decisions in the allocation of scarce resources towards competing SPS capacity-building needs. Because the lack of data can seriously impede such analyses the STDF has supported the development of MCDA which enables decisions on prioritizing SPS capacity-building options to be analyzed, even if only in a preliminary way, on the basis of a wide range of decision criteria, without necessarily, having detailed and hard data. MCDA has been applied by the STDF with some success in several countries in Africa with the active participation of COMESA.

This report presents the initial results of a priority-setting exercise for SPS capacity-building in Ethiopia which commenced on 6th August 2012. In this case, 16 distinct SPS capacity-building options were identified and prioritized on the basis of a series of agreed decision criteria to which weights are applied, that were again derived by consulting stakeholders. The end result is a clear ranking of the 16 capacity-building options of which the following five are consistently ranked as top in the analysis:

- Dairy exports to region (COMESA standards)
- Oilseed, cooking oil and cereals good agricultural practices
- Vegetable exports traceability
- good agricultural practices and traceability in coffee
- Livestock management for foot and mouth disease

The prioritization is based not only on the respective costs and predicted trade impacts, but also on the basis of impacts on agricultural productivity, domestic public health, local environmental protection, poverty and vulnerable groups i.e. encompassing, for example, respective government priority development indicators as well as many USAID Feed the Future indicators. Given the robustness of the results, this basic ranking would appear to present a coherent basis on which to start defining a national action plan for SPS capacity-building in Ethiopia.

It is important to recognize, however, that the results of the analysis presented above represent just the starting point in the use of the priority-setting framework in the context of SPS capacity-building in Ethiopia. Indeed, the results must be revisited and revised on an ongoing basis in the light of improvements in the availability and/or quality of data, changes in policy priorities that imply shifts in the decision weights and/or the introduction of new decision criteria, etc. Further, if new capacity-building needs arise, these can be added to the analysis. Likewise, as investments are made in the options included in the analysis above, these can be excluded and the priorities estimated accordingly. The intention is that the prioritization framework will become a routine element of SPS capacity-building planning in Ethiopia. Finally, this analysis can form the economic justification for project applications to the STDF, Enhanced Integrated Framework and other funds/organizations supporting aid for trade in less developed countries.

## 2; Background / Introduction

The analysis presented in this report is a product of collaboration between COMESA and the various structures in Ethiopia, both in the public and private sector that are involved in SPS sensitive trade. A full list of direct participants and their institutions is given in Appendix 2 though a wider participation was solicited through the offices of both COMESA and the STDF as well as by e-mail and direct follow-ups. The underlying motivation/objectives of the initiative as well as the methodology used are described below. While multi criteria decision analysis can use scalar data such as Yes/No the results are enhanced by the use of as much linear data as possible. The analysis used various types of data much of which is difficult to obtain. In order to provide the analysis with as much hard data as a collection of SPS related reviews relating to Ethiopia put together (Appendix 1). In addition a series of reviews have been conducted consisting of an analysis of trade flows and performance (Appendixes 4 and 5) together with an estimation of relative numbers engaged in various economic sectors of interest to the analysis (Appendix 6). Finally a simple Risk Assessment of SPS issues in the context of Ethiopian trade volumes has been carried out (Appendix 6). The draft study was distributed widely in various iterations and after major revisions based on initial feedback a period for comments was left open between November 2012 and March 2013 prior to finalizing the study on 31 March 2013.. In addition a review was carried out between December 2012 and February 2013 on costs and benefits of various options relating to animal health interventions which have provided more detailed data.<sup>1</sup>

The framework employed in this study aims to present a more comprehensive analysis of options for SPS capacity-building that can feed into the development of a prioritised action plan for the enhancement of SPS capacity. Thus, its ultimate objective is to *generate a prioritised schedule of options for SPS-related capacity-building in Ethiopia on the basis of the multiple economic and/or social criteria*. The rationale behind the framework, therefore, is that priorities need to be established on the basis of a range of economic and social considerations that may, at least on the face of it, be difficult to reconcile. In turn, this assumes that the rationale for investments in SPS capacity-building is not compliance with export market SPS requirements *per se*, but the economic and social benefits that might flow from such compliance, whether in terms of enhanced exports, incomes of small-scale producers and/or vulnerable groups, promotion of agricultural productivity and/or domestic public health, etc. The framework provides an approach for different decision criteria to be taken into account, even though they may be measured in quite different ways.

This section provides a more detailed description and rationale for each of the 16 capacity-building options considered in the priority-setting analysis. This information is based on the preliminary analysis of literature on SPS followed by a series of workshops held in Ethiopia held between the 6<sup>th</sup> to 10<sup>th</sup> August 2012 with stakeholders from a number of government Ministries, the private sector and non government organizations (NGO's). A list of participants is shown in Appendix 2. The methodology and data fed into the analysis are described in more detail in Section 3 below.

### **Prior reviews of Sanitary and Phytosanitary requirements and capacity building in Ethiopia in the context of agricultural policy**

National agricultural strategy documents, referred to as Comprehensive African Agriculture Development Programme (CAADP) compacts are published by African Union (AU) countries. Since enhanced trade in

agricultural products is one deliverable of the Regional Economic Communities within the African Union a significant trade promotion component is usually a major part of a national CAADP Compact. The Government of Ethiopia signed their CAADP compact in August 2009. Ethiopia has already exceeded the CAADP budgetary target of 10% to the agricultural sector and agricultural growth target rate of 6% per year. The CAADP Compact in Ethiopia supports a comprehensive agriculture and rural development strategy consistent with the national Plan for Accelerated and Sustained Development to End Poverty (PASDEP).

The Compact targets key sub-sectors like the livestock sub-sector in which Ethiopia leads the region. Within the Pillars of CAADP, the Compact aims at promoting integrated watershed management under Pillar I. Within CAADP Pillar II, the Compact promotes rural-urban linkages, cooperative marketing, agriculture and food policy research, World Trade Organization (WTO) accession and implementation, and the promotion and facilitation of regional and international trade and investment. All existing food security and nutrition programs are being expanded under Pillar III. Areas of focus of Pillar IV include dairy and meat research, camel research, and water resources development and research.<sup>2</sup>

SPS support for national agricultural policy is through a number of tools used for assessing national SPS capacity. In addition to SPS specific toolkits, there are more general trade diagnostic studies including that of the Integrated Framework (IF) and the World Trade Organization. The main SPS and trade evaluation tools are listed and their status in terms of completion and availability in the case of Ethiopia is shown in Table 1.

**Table 1; Existing reviews of Sanitary and Phytosanitary compliance and capacity for Ethiopia:**

Source		Completed
Enhanced Integrated Framework	Ethiopia joined IF in 2002	Yes
	Diagnostic Trade Integration Study	Yes
	Trade Policy Review by WTO	No
CAADP Compact	Plan for Accelerated and Sustained Development to End Poverty (PASDEP).	Yes
Integrated Approach to Food Safety, Plant & Animal Health: National Biosecurity Capacity Evaluation <sup>3</sup>		Yes
o Evaluation of Performance of Veterinary Services (PVS) Tool <sup>4&amp;5</sup>		(Yes)
Pilot of Food and Agriculture Organization Guidelines to Assess Capacity-Building Needs to Strengthen National Food Control		No
Phytosanitary Capacity Evaluation (PCE) Tool <sup>6</sup>		No
Ad hoc and other national case studies		Yes

Key: Yes = Conducted and in public domain;  
 (Yes) = Conducted but not in public domain;  
 No = not aware of any.

Ethiopia joined the IF in 2002 and a Diagnostic Trade Integration Study (DTIS) was validated in November 2003 and the findings were incorporated into PASDEP in September 2006. Identified priorities included improving business climate and targeting high export potential industries, such as leather, textiles, sugar, horticulture and floriculture.<sup>7</sup>

### **Status of Ethiopia in respect of compliance to the World Trade Organization Sanitary and Phytosanitary Agreement and reporting obligations**

The SPS mechanisms put in place by the WTO and allied organizations, including the Food and Agriculture Organization (FAO), the World Health Organization (WHO) and the International Organization for Animal Health (OIE), have been in place for over a decade. The mechanisms are accompanied by a number of

processes to help poorer countries in terms of compliance. However Ethiopia is not currently a member of the WTO and negotiations which were originally started in 2003 were only resumed in 2011, after a long break. Therefore Ethiopia’s international SPS compliance is essentially with the various sub structures of the IPPC, CODEX and OIE. As such Ethiopia has no formal relationship with the WTO Sanitary and Phytosanitary Information Management System (SPIMS) of its SPS Enquiry Points and National Notification Authority as well as any SPS measures.<sup>8</sup> In addition Ethiopia is a signatory to two international treaties (The Convention on Biological Diversity of 5 June 1992 and the Cartagena Protocol on Biosafety which is an Annex to the Convention on Biological Diversity)<sup>9</sup> both of which have some bearing on the workings of the SPS Agreement and have led to the additional requirement for a Biosafety National Focal Point to be set up in countries that are signatories to the convention.<sup>10</sup> & <sup>11</sup> The status as of August 2012 of Ethiopia’s compliance with setting up and notifying of national SPS contact points is shown in Table 2.<sup>1</sup>

**Table 2; Contact information and with various international Sanitary and Phytosanitary organizations for Ethiopia as of June 2012 (Sources: various)<sup>12</sup>**

WTO TBT <sup>2</sup> enquiry point	Biosafety national focal point	WTO SPS national notification authority	WTO SPS enquiry point	Codex contact point <sup>13</sup>	NPPO contact point <sup>14</sup>	OIE contact point <sup>15</sup>	Official website
No	Yes	No	No	Yes	Yes	Yes	No

### 3; Establishing Sanitary and Phytosanitary priorities using a multi-criteria decision-making framework

The structure employed in this study aims to present a more comprehensive analysis of options for SPS capacity-building that can feed into the development of a prioritised action plan for the enhancement of SPS capacity. Thus, its ultimate objective is to *generate a discussion on and to help decision makers in Ethiopia to prioritise national options for SPS-related capacity-building on the basis of the multiple economic and/or social criteria*. The rationale behind the framework, therefore, is that priorities need to be established on the basis of a range of economic and social considerations that are ordinarily difficult to reconcile. In turn, this assumes that the rationale for investments in SPS capacity-building is not only compliance with export market SPS requirements *per se* and thus market access, but also the associated economic and social benefits that might flow from such compliance, whether in terms of enhanced exports, incomes of small-scale producers and/or vulnerable groups, promotion of agricultural productivity and/or domestic public health, etc. The framework provides an approach for different decision criteria to be taken into account, even though they may be measured in quite different ways.

In pursuit of this objective, the framework aims to:

<sup>1</sup> Note that as of March 2013 Ethiopia was not a member of the WTO.

<sup>2</sup> Technical Barriers to Trade

- Identify the current set of SPS-related capacity-building options in the context of existing and/or potential exports of agri-food products. Below this is termed the *choice set*.
- Determine the *decision criteria* that should drive the establishment of priorities between SPS-related capacity-building options and the relative importance (*decision weights*) to be attached to each.
- Prioritize the identified SPS-related capacity-building options on the basis of the defined decision criteria and decision weights.
- Examine the sensitivity of the established priorities to changes in parameters of the framework.

The framework employs a structured process that aims to be applied in a wide variety of contexts and to provide various diagrammatic and numerical outputs. The framework and its practical implementation are described in detail in a draft user's guide.<sup>16</sup> Thus, here only a relatively brief outline of the seven stages of the framework (Figure 1) is provided, with a particular focus on how they were implemented in Ethiopia.

### **Stage 1: Compilation of information dossier**

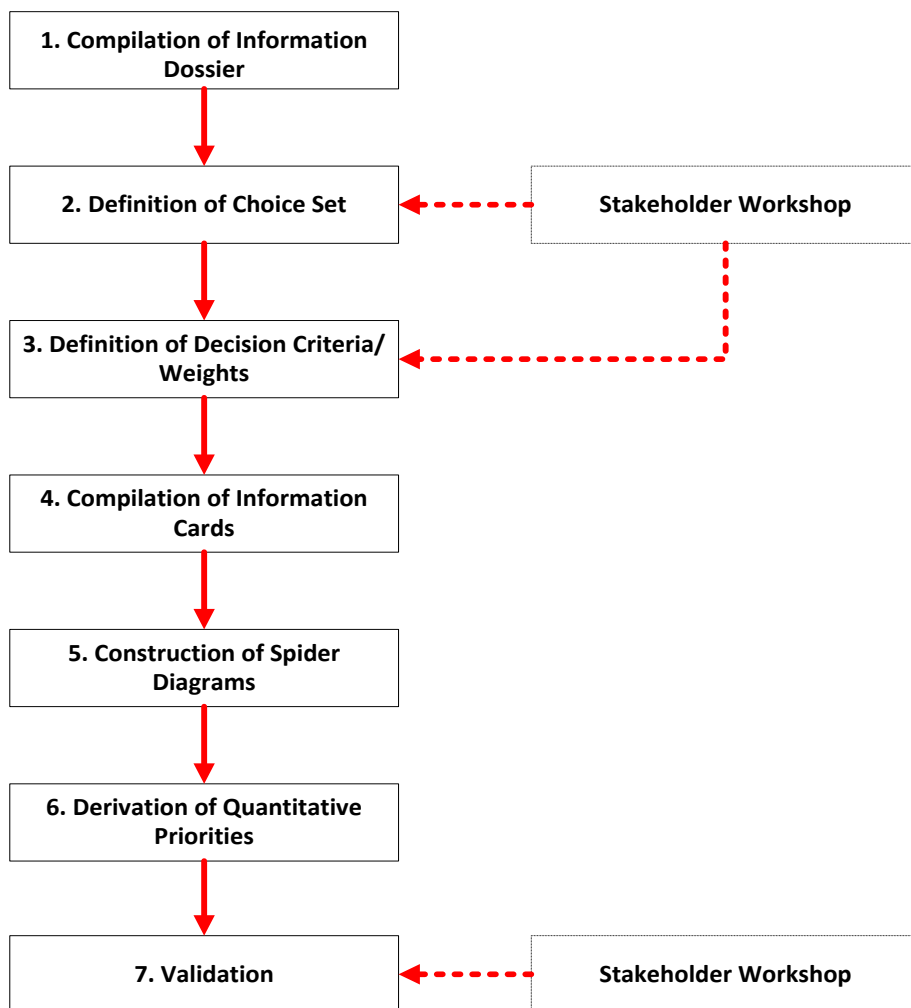
The first stage of the analysis involved the compilation of a comprehensive dossier of existing information on the SPS challenges facing agri-food exports from Ethiopia and the associated capacity-building needs. In so doing, the aim was to ascertain what work had already been undertaken to identify capacity-building options and the definition of priorities for related investments. The documents/information in the dossier are itemised in Appendix 1.

### **Stage 2: Definition of choice set**

In order to identify the SPS capacity-building options to be considered in the priority-setting framework, a one-day stakeholder workshop was held 6<sup>th</sup> August 2012. A total of 23 Ethiopian stakeholders (Appendix 2) attended the workshop, drawn from government and private sector. Participants were presented with a series of cards and asked to identify the SPS capacity-building needs of Ethiopia. Critically, respondents were asked to define a series of mutually-exclusive needs consisting of four key elements (Figure 2). First, the product(s) affected. Second, the specific SPS issue faced by exports of this product(s). Third, the market(s) where these SPS needs were an issue. Fourth, the capacity-building option(s) that would solve the SPS issue being faced. The combination of these four elements defined a distinct capacity-building option. Respondents were free to define as many specific SPS capacity-building needs as they wished.

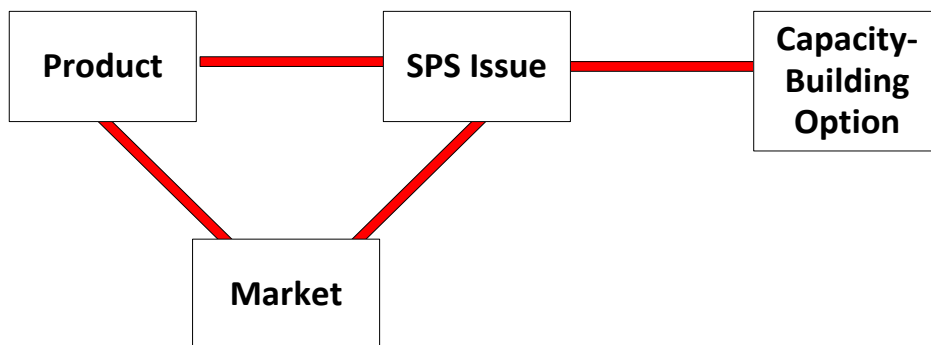


**Figure 1: Stages in multi-factorial prioritisation of Sanitary and Phytosanitary capacity building options**



The cards of all respondents were collected, shuffled and then reported back to the workshop as a whole through listings on flip charts. The collection of items was then discussed in order to remove any ambiguities and to ensure that each represented a mutually-exclusive capacity-building option. A total of 16 SPS capacity-building options were defined through the above process.

**Figure 2: Definition of Sanitary and Phytosanitary capacity-building options**



**Stage 3: Definition of decision criteria and weights**

In the second stage of the initial stakeholder workshop, respondents were asked to define an appropriate set of criteria to drive the priority-setting process and to assign weights to these. First, participants were presented with a series of potential decision criteria organized into four categories as set out in Table 3, and asked which (if any) should be excluded and whether any potentially important criteria were missing.

To define the decision weights, the workshop participants were each asked to assign 100 points amongst the nine decision criteria (ten if one includes job creation). The scores of participants were then collated and an average weighting calculated. This average weighting was reported back to the workshop participants to identify any discrepancies. The final agreed weightings are reported in Table 3.

**Stage 4: Construction of information cards**

Having identified the choice set of SPS capacity-building options and the decision criteria and weights to be applied in the priority-setting exercise, information was assembled into a series of information cards. The aim of these cards is not only to ensure consistency in the measurement of each decision criterion across the capacity-building options, but also to make the priority-setting exercise more transparent and open to scrutiny.

**Table 3; Decision criteria and weights for setting priorities of Sanitary and Phytosanitary capacity-building options<sup>3</sup>**

Objectives	Decision Criteria	Live stock weights	Average of all cards	CV
Costs of implementation	Up front investment	7	9.5	0.5
	Ongoing costs	10	10.1	0.7
Trade impacts	Trade impact [Market Access]	15	16.2	0.4
	Trade diversification impact [value addition]	8	10.2	0.4
Direct agri-food impacts	Impact on domestic agricultural/fisheries productivity	7	11.1	0.3
	Impact on domestic public health	10	9.5	0.4
	Impact on local environmental protection	6	8.7	0.4
Social impacts	Impact on poverty	15	15.2	0.6
	Impact on vulnerable groups	10	1.4	4.0
	Job creation	12	1.4	2.6

First, the specific nature of each of the SPS capacity-building options was described in some detail on the basis of existing documentation, consultation with stakeholders, etc and are set out in Section 2 in the main text; (see **Section 2 Sanitary and Phytosanitary capacity-building options**).

The metrics to be employed for each of the nine decision criteria were then defined, taking account of currently available data and the range of plausible ways in which each of the criteria might be represented.<sup>4</sup> Table 4 sets out the final metrics. Note that the choice of metrics involves a sometimes difficult compromise between the availability and quality of data, and the imperative to employ continuous quantitative measures. For the effects of SPS Capacity Building Options (or lack of such) on trade and numbers of households two tables have been constructed to provide a basis for continuous measurements in terms of US\$ and numbers of households affected (Appendix 6). However, it is important to recognise that the aim of the framework is not to provide a final and definitive prioritisation of the capacity-building options. Rather, the priorities that are derived should be revisited on an on-going basis and revised as more and/or better data for the decision criteria become available.

Information cards for each of the 16 SPS capacity-building options were then compiled. These are reported in Appendix 3. Each card presents data for the nine decision criteria, measured according to the scales outlined in Table 4. For each criterion, details are provided of how measures for each of the decision criteria were derived. There is also an indicator of the level of confidence in the measure reported. Where there is a lack of underlying data and/or these data are of dubious quality, a low or medium level of confidence is indicated.

<sup>3</sup> Weights and Criteria as determined in initial workshop 6th August 2012 (%)

<sup>4</sup> Criteria 10 (Job creation) was merged with 'Impact on vulnerable groups' of which it is a subcomponent.

Conversely, where fairly rigorous and comprehensive prior research is available, a high level of confidence is reported. These confidence measures need to be considered in interpreting the results of the prioritisation exercise, and in considering how the analysis might be refined in the future.

**Table 4; Decision criteria measurement**

<b>Criterion</b>	<b>Measurement</b>
<b>Cost of implementation</b>	
Up-front investment	Absolute value (\$)
Annual on-going costs	As % value of exports (2017)
<b>Trade impact</b>	
Absolute change in value of exports	Estimated absolute value in 2017 using risk assessment approach (Appendix 6)
Trade diversification – value addition in terms of product or market	Large negative (-2) Negative (-1) No impact (0) Positive (+1) Large positive (+2)
<b>Domestic agri-food impacts</b>	
Agricultural/fisheries productivity	Large negative (-2) Negative (-1) No impact (0) Positive (+1) Large positive (+2)
Domestic public health	
Environmental protection	
<b>Social impacts</b>	
Poverty impacts	Reported as a number based on number of households involved in the sector
Impact on vulnerable groups/areas	The following groups are listed and the impact or otherwise of the Capacity Building Option entered as between -2 (significant negative impact) to + 2 (significant positive impact) and totaled <ul style="list-style-type: none"> <li>• Women</li> <li>• Children</li> <li>• Vulnerable areas</li> <li>• Smallholders</li> <li>• Unemployed</li> </ul>

### **Stage 5: Construction of spider diagrams**

Through Stages 1 to 4, the inputs to the priority-setting process were collected and then assembled into the series of information cards. The aim of Stage 5 was to present the information in the information cards in a manner that permits easier comparison of the 16 capacity-building options. Thus, spider diagrams were derived that plotted the 16 SPS capacity-building options against a number of the Decision Criteria i.e.;

1. up-front investment
2. on-going costs
3. change in absolute value of exports
4. poverty impact

Scrutiny of these diagrams (Section 3 Results) identified the decision criteria against which each of the capacity-building options performed relatively well/badly compared to the other capacity-building options in the choice set.

### **Stage 6: Derivation of quantitative priorities**

The formal priority-setting analysis involved the use of outranking through the D-Sight V3.5.1 software package. The mechanics of the analysis are described in some detail in the user guide to the framework.<sup>17</sup> The inputs to the model are the data assembled in the information cards. For most of the decision criteria preferences were modelled using a level function since these were measured using categorical scales. However, the up-front investment, on-going cost, absolute change in value of exports and poverty impact criteria were measured continuously and modelled using linear functions. Three models were estimated using D-sight:

- *Baseline model* using decision weights derived in Stage 3.
- *Equal weights model* in which all of the decision criteria are weighted equally.
- *Costs and trade impact model* in which only the cost and trade impact decision criteria are included in the analysis, all of which are equally weighted.

The baseline model is considered to provide the most reliable set of priorities, in that it uses the full set of information derived through Stages 1 to 4. The two subsequent models were estimated in order to examine the extent to which the derived priorities are sensitive to changes in the decision weights; if the broad ranking of the 16 SPS capacity-building options remains broadly the same under the three scenarios presented by these models, we can be reasonably confident that the results of the framework are robust.

### **Stage 7: Validation**

The final stage of the priority-setting analysis started with a second stakeholder workshop on 3rd August 2012 at which the preliminary results were presented to stakeholders and succeeded by a period at which comments were solicited – this period concluding in March 2013.<sup>5</sup> The aim of the validation process is to ensure that the results of the priority-setting framework are broadly in accordance with expectations, or that

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<sup>5</sup> The participants at this workshop are recorded in Appendix 2.

unexpected rankings can be explained through the pattern of data in the information cards. To facilitate this process, the draft report was distributed on 09 July 2012 followed by a second draft report distributed at the end of November 2012 which incorporated major revisions requested by some participants.

## **2; Sanitary and Phytosanitary capacity-building options**

This section provides a more detailed description and rationale for each of the 16 SPS capacity-building options considered in the priority-setting analysis. The data fed into the analysis are described in more detail in the capacity building options in Appendix 3.

### **Option 1; Flower exports, Export certification – particularly in respect of the reliability of the phytosanitary certificates.**

Phytosanitary inspection, certification and control in Ethiopia are the responsibility of the Crop Protection Department of the Ministry of Agriculture and Rural Development. Given the fast growth of export-oriented horticulture in Ethiopia the demands for a reliable phytosanitary inspection and control system are important. It is therefore necessary for the Ethiopian phytosanitary services to be in compliance with international standards and regulations. Assessments have been made of the needs of the inspection services including an assessment and strengthening exercise co-funded by the Royal Netherlands Government and the Federal Republic of Ethiopia.<sup>18</sup> While a consortium of Dutch specialists has been responsible for developing the capacity of the Ethiopian Crop Protection Department some areas need further support including export inspection and certification systems, including facilities at the airport, as well as monitoring and surveillance with diagnostic (taxonomic) support.

Flower growers also have to respect the property rights and pay any required royalties and/or license fees to international breeders, which require traceability and clear paperwork – including shipping documents and phytosanitary certificates.

A related option is the necessity of surveillance systems to be in place for pests of phytosanitary significance including *Thrips palmii* and *Lyriomyza* spp. As a consequence considerable efforts on training, on farm surveillance and export inspections in Ethiopia are necessary in order to address the problem.

### **Option 2; Vegetable exports; Traceability systems – more specifically GlobalGAP, good manufacturing practices, good hygiene practices, and hazard analysis and critical control point systems for European Union markets**

A major constraints regarding smallholders' involvement on horticulture is that of traceability systems as a key component of producer 'due diligence'. Product traceability is a standard requirement for most of Ethiopia's major trading partners, is a key component of good agricultural practices (GAP) and requires the creation and maintenance of a traceability system that can tie any given product to a field with a recorded and certified management system as well as a supply chain management system. Given that most commercial growers invest in such systems as a normal business overhead the capacity building option looks at institutional support for through extension agents and institutional setup for facilitating marketing linkages, technology transfer (extension) and price information for horticulture.

### **Option 3; Meat exports; remedying off colors and odors of meat exported to Saudi Arabia by introducing cold chain.**

The proposed capacity building option is to install full cold chain and a food safety management system to address issues of off color and odors in meat, and which probably have a microbiological component, as well as the certification of Ethiopian meat exports. The option seeks the development of a plan towards improving the country's capacity and competitive advantage for marketing, production and exports of perishable meat products to the neighboring markets in the Middle East, North Africa, and, eventually, to more quality conscious international destinations.

In order to achieve the established goals, the Ethiopian producers need to advance their operations to increase the production of beef in the form of de-boning and vacuum packing chilled and frozen products in cartons. The subsequent challenge is to establish the systems and procedures for product fabrication (de-boning, packaging, boxing & storage), storage, handling and shipping in ocean containers via the Port of Djibouti to regional and worldwide destinations. Some nearby markets for chilled goat carcass could be supplied via air freight.<sup>19</sup>

### **Option 4; Pesticide residue testing; accreditation of laboratories**

Ethiopia has pesticide residue testing facilities but these appear not to be accredited for the testing of exports. This option would accredit the laboratories to international standards. Currently, Ethiopian exporters that are required to have tests for pesticide residues done to internationally acceptable standards need to have these conducted outside the country. Due to the existence of sub-standard laboratories in terms of hardware and human capacity, Ethiopia is currently not able to make scientific assessments of compliance to the pesticide maximum residue levels (MRL's) of export markets. Although there are a few accredited laboratories in the region, particularly in Kenya, there is limited sharing of these resources within and between countries. While the agricultural trade arena is getting increasingly complex and highly technical, there continues to be limited investment in human or other resource capacity for determining pesticide levels in food in Ethiopia.

This option would establish internationally-recognized pesticide residue testing capability in Ethiopia. There are pros and cons of investments in pesticide residue testing capacity. Clearly, credible controls must be in place for exporters to ensure compliance with destination market MRLs, including those of private buyers. Ethiopia's principle exports to fresh produce markets are currently Europe, where such standards are high. At the same time, however, the main mechanism for the control of pesticide residues as required by European Union (EU) buyers also includes the application of certified Good Agricultural Practices (such as GlobalGAP). The implementation of GAP is generally backed-up by the testing of crops on the basis of risk assessment rather than on a consignment basis. This means that relatively few samples require testing, which most exporters can obtain through laboratories in the destination market. At the same time, the limited use of pesticides in Ethiopia suggests that the risk of violating export market and/or buyer MRLs is low.

### **Option 5; Veterinary drug and veterinary remedy testing**

Ethiopia require internationally accredited veterinary testing services for chemicals, including tick dip chemicals which have been problematic in some exported meat. Markets are regional including the Arabian Peninsula. In 2009 the administration and control of veterinary drugs and biological products was transferred to the

Ministry of Agriculture and Rural Development (MARD) but there are no laboratories in the country that can carry out residue testing of veterinary drugs and acaricidal treatments (dip chemicals). The capacity building option is the creation of a laboratory capable of testing meat exports for the presence of animal health remedies.

**Option 6; Mycotoxin testing services for coffee, oil seeds and cereals – the last are not exported.**

Ethiopia appears not to have mycotoxin testing services. The option would develop a mycotoxin testing service which would benefit exports to all of Ethiopia’s markets including regional ones as well as (more obviously) those in Europe. Mycotoxin contamination is generally not appropriately controlled and regulated in Africa unless the product is exported. Aflatoxins are regulated in part per billion (ppb) ranges the measurement of which requires sophisticated equipment. In addition for export certification testing laboratories and tests need to be accredited by an internationally recognized certification body of which there are few in Africa. In Ethiopia there are significant gaps in the status of aflatoxin testing including;

1. Developing mycotoxin testing capacity (laboratories, equipment, personnel)
2. Needed linkages of laboratories to accreditation services
3. Any needed ongoing calibration of equipment and validation of test methods
4. Personnel training and laboratory certification requirements in ISO<sup>6</sup>/IEC<sup>7</sup> 17025.

As it is, Ethiopia appears to have no aflatoxin research and testing facilities so these will have to be developed from scratch.

**Option 7; Animal / livestock traceability system.**

This is becoming a standard requirement for all of Ethiopia’s trading partners. Currently meat and animals are only traced in a limited way and value chain steps prior to the abattoir / country trader are not systematically captured currently. Traceability is a component of good veterinary practices (GVP) and requires the creation and maintenance of an animal and meat traceability system to report and record cattle and small animal movements in selected areas of Ethiopia. Data such as owner’s name, personal ID number, brand, brand position, sex, color, location needs to be recorded. Animal traceability was initiated in 2000 in part as a response to new EU regulations in response to the BSE outbreak i.e. the EU beef-labeling act (EU 820/97 and 1760/2000).

**Option 8; Application of good agricultural practices and traceability systems in coffee**

All coffee markets are demanding increased traceability systems. The requirement is customer driven and in essence the current traceability only starts at some point in the aggregation stage. Third party certification (TPC) is increasingly required by companies importing products to ensure a range of compliances which are not necessarily directly related to SPS issues. These include a range of social, environmental and compliance to International Labor Organization (ILO) and other standards. The capacity building option seeks to develop the

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<sup>6</sup> International Standards Association

<sup>7</sup> International Electrotechnical Commission



capacity within Ethiopia of a traceability system in coffee (probably for selected regions where a premium price can be obtained e.g. the Harar area) and to work towards issue a range of third party certifications such as Rain Forest Alliance, FairTrade, GlobalGAP and so on.

#### **Option 9; Investment in blue leather production**

Green leather (unprocessed hides) is subject to SPS related trade constraints. Processing to 'blue' hides removes SPS related constraints and there are no restrictions on trade even to countries free of foot and mouth disease (FMD).

#### **Option 10; Livestock management of foot and mouth disease, Rift Valley Fever and Lumpy Skin Disease for exports of animals and meat to the United Arab Emirates**

Exports of livestock to the United Arab Emirates (UAE) require surveillance systems to be in place to manage a variety of diseases. The main components of export certification are disease zoning, vaccination and traceability system. In the case of Ethiopia zoning is not practicable or necessary for markets with the same animal disease profiles. However the country, most particularly export zones needs to be patrolled for proactive protection against disease outbreaks. Currently disease surveillance activities were mostly undertaken when there are compulsory situations happens such as the avian influenza pandemic and Rift Valley Fever epizootic. Active surveillance in Ethiopia is constrained by inadequate operational budget and logistical problems as well as inadequate and distant laboratory services. The capacity building option seeks to address these issues in areas where meat and live animal exports to the UAE originate.

#### **Option 11; Oilseeds good agricultural practices /traceability**

The option proposes the development of good agricultural practices guidelines together with product traceability and their extension through a project targeted at growers in cooperatives wanting to export their product. The basic assumption is that with a series of improvements in growing practices growers could improve oilseed productivity through increases in yield and quality of their product. The agricultural requirements, including cultivar, soil, fertilizer, and crop protection practices are well known but there has been some difficulty in extending these to smallholders in a way that ensures that they are adopted in a consistent or sustainable way. Using the framework of GAP's may help with a more sustainable adoption by target groups – particularly smallholders

#### **Option 12; Strawberry exports to South Africa**

An exporter is trying to get market access to South Africa for strawberries. The South Africans have suggested that a South African consultant be hired by the Ethiopian national plant protection organization (NPPO) to do the pest risk assessment (PRA). The option is to do the PRA as a joint exercise by the South African consultant and Ethiopian counterpart(s) so that the capacity to carry out future PRA's is developed within the country.

#### **Option 13; Compliance with Codex standards for milk and dairy products**

Up-front investment is required in adopting COMESA standards for milk quality for the domestic market. A number of activities are required including the introduction of a Public Health Policy and a subsidiary Food Safety Policy and then a revised Food Safety Law with regulations based on COMESA milk standards. Legal

enforcement will have to be backed up by basic laboratory services. These are based on actual costs of a similar service in Rwanda. The legal and other costs are not specific to the dairy sector.

**Option 14; National post-entry quarantine facility for horticulture (vegetative clones of deciduous fruit, vegetables, roses)**

The setting up of a network of post-entry quarantine facilities in various agro-ecological zones. Screen houses, tunnels and open field sites. Probable outcome would be a central facility but using / developing relationships with CGIAR institutes, and other institutes in Ethiopia (universities, research stations, agricultural colleges)

**Option 15; Meat exports from a foot and mouth disease free compartment in Ethiopia to European Union and other countries where the disease is not present**

Exports of livestock and meat to certain countries are not possible because Ethiopia has a number of endemic animal diseases of quarantine significance such as FMD. The option would be to construct a FMD (and other diseases of trade significance) free compartment under new OIE rules so as to export to markets currently closed to Ethiopia. Chapter 8.5 of the TAHC makes provision for the creation of FMD-free compartments in otherwise 'infected' countries or zones (Article 8.5.6), i.e. creation of production enterprises – which can be physically separated and that are managed on the basis of integrated bio-security systems targeting FMD. Theoretically therefore, it would be possible for compartments to be established which contain livestock but exclude neighboring, potentially infected cattle and wildlife. To achieve that in practical terms would require that the compartments be separated by physical barriers (e.g. game-proof fences) from areas where wildlife occur. In other words, domestic livestock in specific locations could be fenced off from FMD-infected wildlife populations. The system entails the initial testing, vaccination and quarantine of animals over a 21-day period in the first phase (Phase 1), followed by a second phase (Phase 2) where quarantined animals are finished in a feedlot system to bring them up to export weight (400 kg). The benefits of this system are the ability to ensure to trading partners of the ability of Ethiopia to produce higher quality, certified, disease-free meat that could be exported to countries that are free of FMD.<sup>20</sup>

**Option 16; Development of capacity in Ethiopia to produce thermostable (i.e. not requiring refrigeration) *Peste des Petit Ruminants* Vaccine.**

Animal exports from the region are threatened by *Peste des Petit Ruminants* (PPR). Improvement of the stability and of the production of the conventional PPR vaccines is needed. An initiative for PPRV thermostabilisation is currently being implemented between NVI (Ethiopia) and IBET (Portugal). The process is an output of the European MARKVAC (MARKer VACCines) project. Because of high mortality and high morbidity rates, PPR is included in the list A of the OIE list of dangerous animal pathogens where extremely contagious animal diseases of high economic importance are grouped<sup>21</sup>). The biggest problem in eradicating the disease is the lack of thermostable vaccine for use in remote areas. The option is to produce/manufacture the vaccine in Ethiopia for national and regional use

### 3; Results

The descriptions presented above, and the results of the stakeholder workshop, suggest all 16 of these options are credible options for SPS capacity-building. However, the associated costs and resulting benefits may differ substantially, such that it is possible to define clear priorities amongst the options on the basis of the defined decision criteria and weights. In this section the results are presented using outranking through the software package D-Sight v3. However, to provide a first scan of the relative strengths and weaknesses of the 16 capacity-building options spider diagrams were constructed of the linear data of Up-front investment (Figure 3), On-going costs (Figure 4), and Trade impact (Figure 5) and on Employment creation (Figure 6).<sup>8</sup> Non linear functions have been left out of this part of the analysis. As such, the spider diagrams are a useful way in which to present some of the information on the SPS capacity-building options to more senior decision-makers.

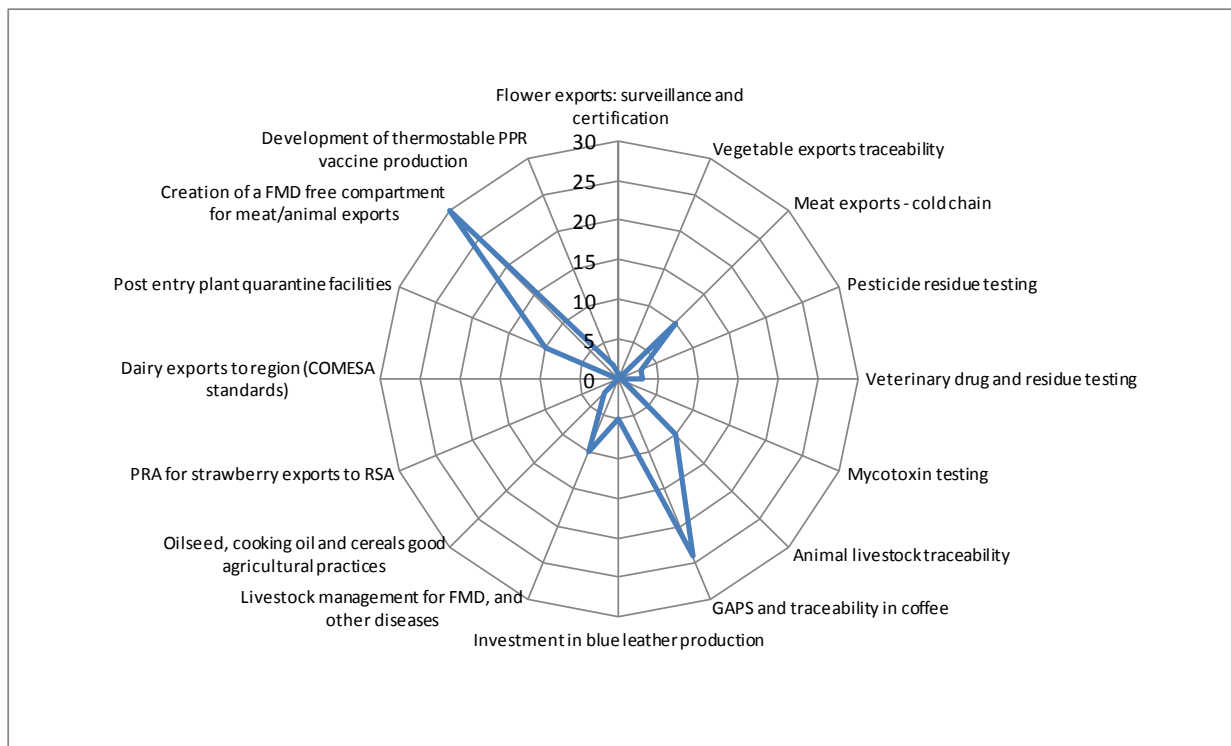
Figures 3 and 4 present the up-front investment and on-going costs profiles of the 16 SPS capacity-building options. It is immediately obvious the development of a foot and mouth disease free compartment involves the highest level of up-front investment (estimated at US\$30,000,000), with the development of a GAP's traceability system for coffee estimated at US\$25,000,000 and the next two (Meat cold chain for exports, Animal/livestock traceability) options costing US\$10,000,000 each. All other options cost \$3,000,000 or lower. In respect of ongoing costs the development of Animal livestock traceability involves on-going costs (just over 14% of the annual value of exports) that far exceed all other options, with the nearest other option, Post entry quarantine facilities, having on-going costs of 7 per cent of exports.

The potential impact on trade of the various SPS Capacity Building Options has been estimated elsewhere and used to populate the data (see Appendices 4, 5 and 6). There are dramatic differences in the predicted impact of the capacity-building options on the absolute value of exports and/or import substitution (Figure 5); in most cases, with the highest impact being that of developing GAP's and traceability for coffee exports which far outweighs the potential impact of other options at around US\$ 650 million. However some of the remaining options are not trivial either, with Livestock management for FMD and that of Oilseeds, cooking oil band cereal good agricultural practices having potential trade impacts in the region of US\$180. The next options have estimated trade impacts over US\$80 million (Veterinary drug testing and Vegetable exports traceability).

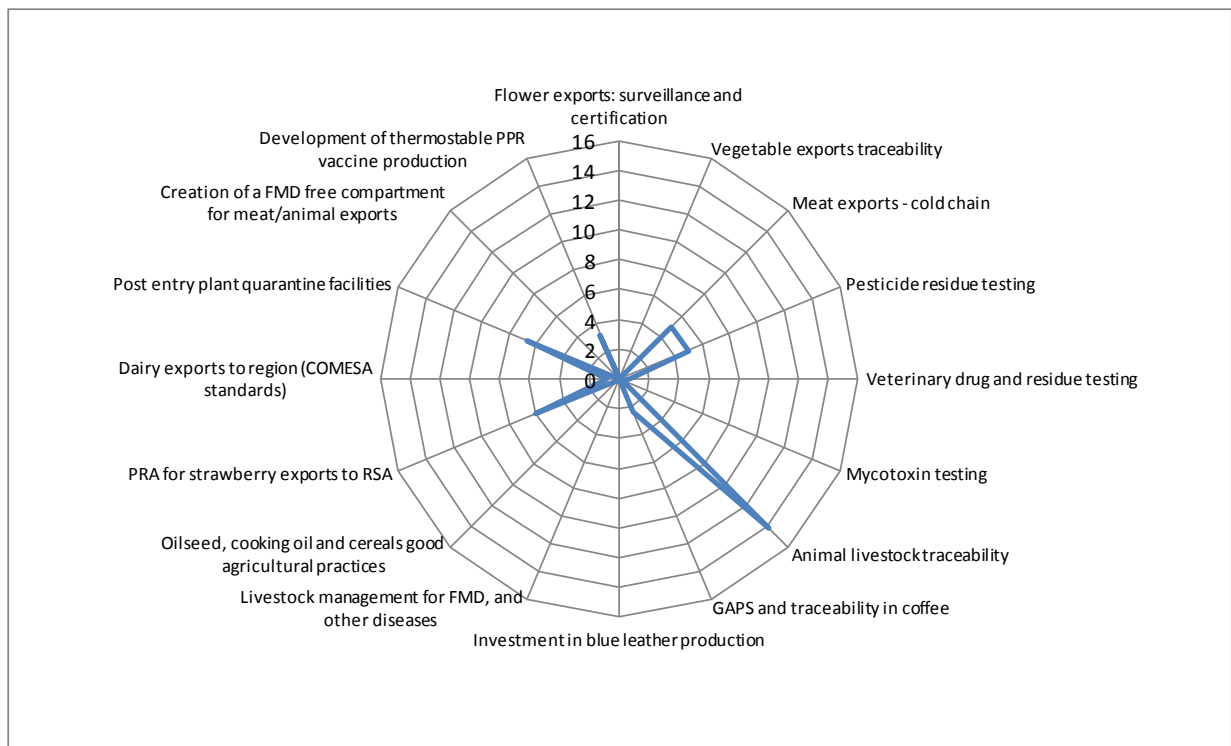
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<sup>8</sup> Appendix 3; Capacity-Building Option Cards

**Figure 3; Decision criteria measures scores for Sanitary and Phytosanitary capacity-building options – up-front investment**



**Figure 4; Decision criteria measures scores for Sanitary and Phytosanitary capacity-building options – on-going costs**



**Figure 5; Decision criteria measures scores for Sanitary and Phytosanitary capacity-building options – change in absolute value of exports (or import substitution)**

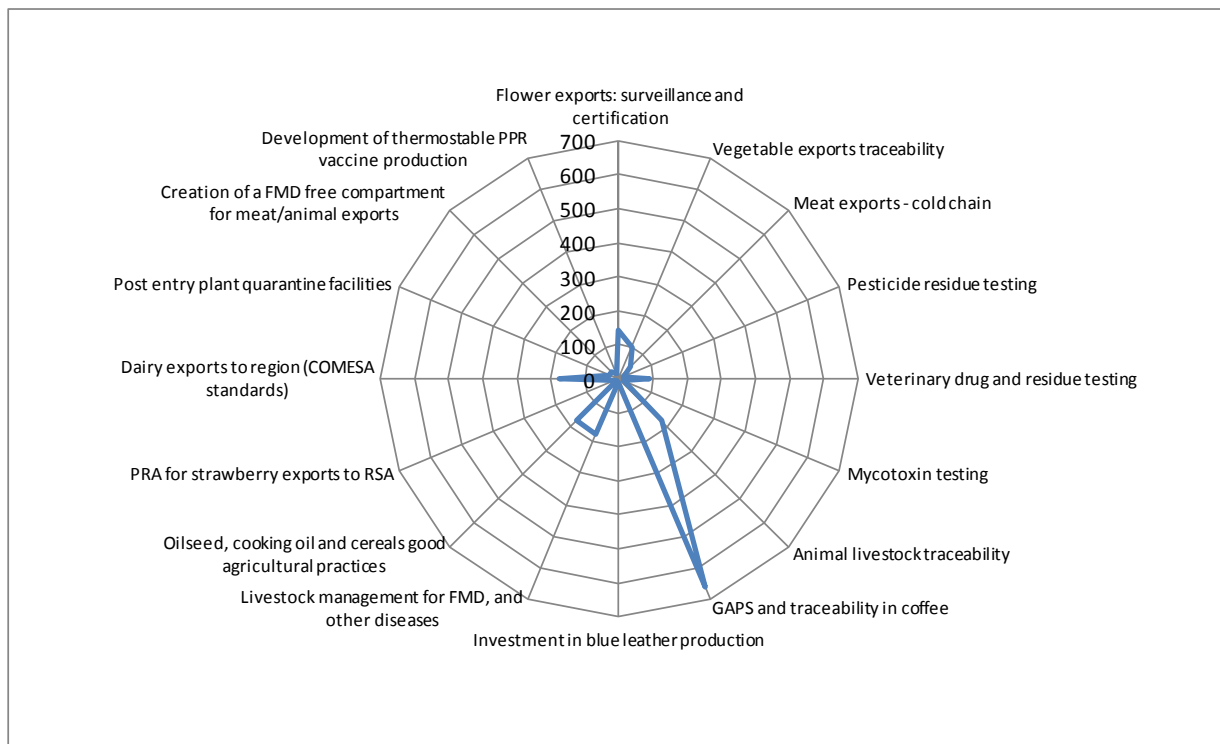
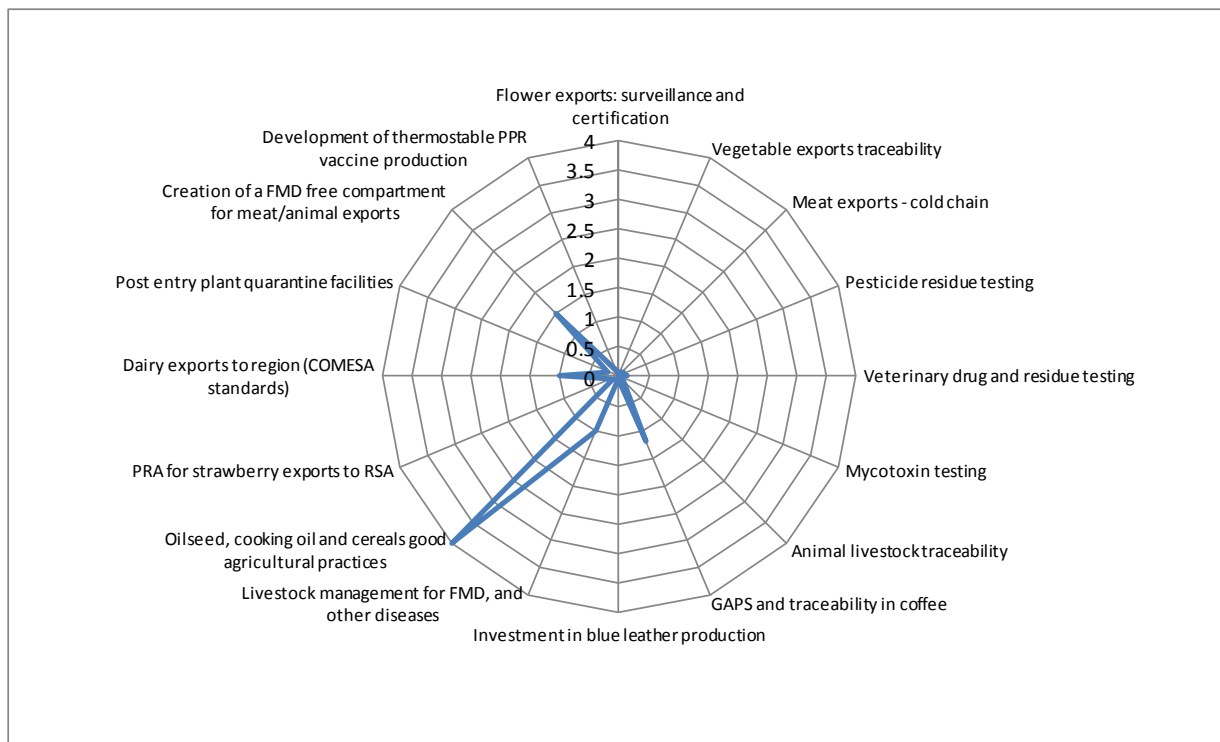


Figure 6 presents the impact of the Capacity Building Options on potential employment generation.<sup>9</sup> The largest impact is on Oilseeds, cooking oil and cereal good agricultural practices because of the large numbers involved in production of these crops though only the ‘early adopters’ are deemed to benefit from the intervention. While smaller numbers of households are involved in animal production a higher proportion seem likely to benefit. While large numbers are involved in the coffee sector the capacity building option is deemed unlikely to generate substantial employment in the envisaged time frame.

<sup>9</sup> The information sources for the numbers employed in the various sectors are shown in Appendix 6

**Figure 6; Decision criteria measures scores for Sanitary and Phytosanitary capacity-building options –impact on employment**



Data for the criteria where the data is non linear i.e. trade diversification, agricultural productivity, domestic public health and local environmental protection and impact on vulnerable groups is not presented as the spider diagrams are not sufficiently differentiated between the various options. There is thus a strong argument in these instances for better data for these criteria in order to enhance the value of the analysis.

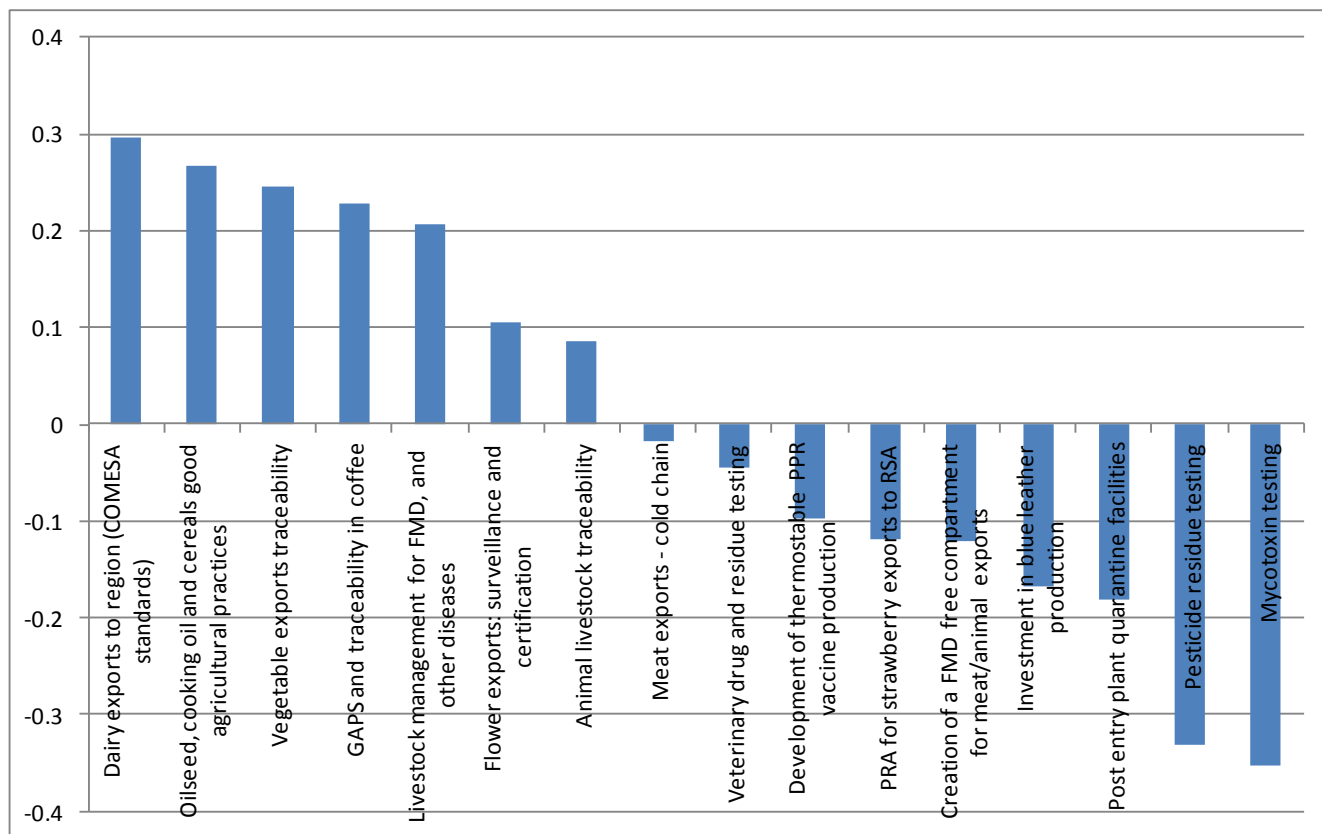
It is apparent that none of the SPS capacity-building options dominates across all or even most of the decision criteria, so it is not immediately clear how these options should be prioritized. That is where the outranking analysis comes in; it compares each of the capacity-building options on a pair-wise basis with respect to each of the nine decision criteria in turn. Each of these comparisons determines whether one option dominates (or is dominated) by another and by how much. The aggregate of all of these comparisons, taking account of the defined decision weights, gives an overall measure of preference, what is termed the net flow. Thus, options with a positive and larger (or negative and smaller) net flow are given a higher priority. Options with a positive net flow, dominate the other options with respect to the nine defined decision criteria. Conversely, options with a negative net flow are generally dominated by other capacity-building options.

Figure 7 reports the net flows for the sixteen SPS capacity-building options for the baseline model; that is the prioritization derived using the decision weights defined in the stakeholder workshop. The options are prioritized from left to right. Thus, the analysis suggests the top priority options are; Dairy export standards, Oilseed, cooking oil and cereals good agricultural practices, Vegetable exports traceability, and GAP's and traceability in coffee. Other options with positive net flows include; Livestock management for FMD, Flower

exports surveillance and Animal livestock traceability. All other options have either low positive or negative net flows, indicating that they are dominated overall on the basis of the chosen decision criteria and weights.

The prioritization of the sixteen SPS capacity-building options reflects a trade-off or compromise between the nine decision criteria. As discussed above, none of the options dominates all others with respect to every one of the decision criteria. Thus, in choosing an option that is given a high priority, meaning it generally performs well with respect to the chosen decision criteria, there is an inevitable compromise in terms of under-performance with respect to certain of these criteria, relative to other capacity-building options.

**Figure 7; Net flows for baseline model for the sixteen capacity building options**

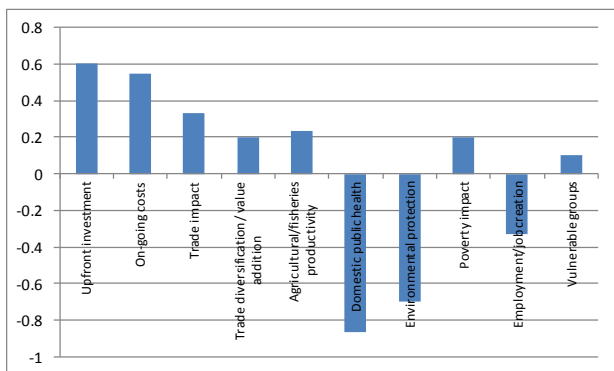


It is possible to examine the performance of each of the SPS capacity-building options through their scores for each of the decision criteria, as reported below in Figures 8 to 23. The criteria are; Up-front investment, Ongoing costs, Trade impact (Market access), Trade diversification (value addition), Agricultural/fisheries productivity, Domestic public health, Environmental protection, Poverty impact, Employment generation and Impact on Vulnerable groups. For example, whilst the scores for five of the decision criteria are strongly positive, the highest ranked option, Oilseed, cooking oil and cereals good agricultural practices, has limited trade diversification impact but scores highly on job creation (Figure 18). Middle ranking options such as Flower exports: surveillance and certification scores relatively well in respect of low up-front costs but relatively less well in terms of impact on domestic public health (Figure 8) and is ranked sixth in the overall analysis. The last ranked option, Mycotoxin testing laboratories scores negatively in most of the criteria but

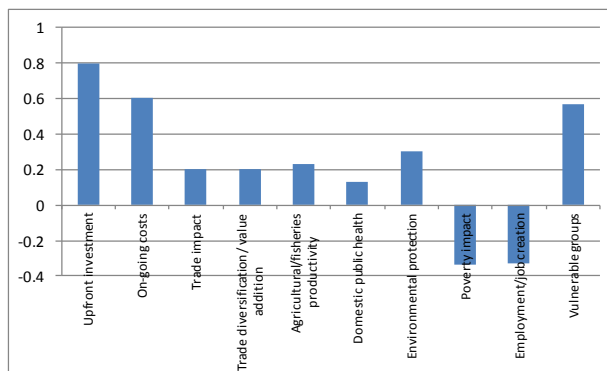
performs well having a relatively low up-front investment and ongoing costs as well as a significant potential impact on public health (Figure 11).

The foregoing discussions presents the core results of the analysis, and application of the prioritization framework and the rankings in Figure 7 are in many ways the key results representing the recommended priorities between the 16 SPS capacity-building options included in the analysis. It is important to recognize, however, that these results, and the established priorities amongst the capacity-building options, reflect the chosen decision criteria and the respective measures derived for each of the 16 options, and the weights attached to the criteria. This begs the question, how does the ranking of the capacity-building options change if any of these key inputs change? To answer this question, sensitivity analysis was applied to the baseline model, the results of which are reported below.

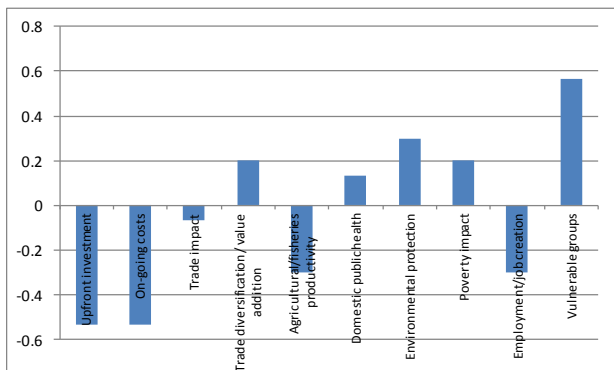
**Figure 8; Criteria scores for flower exports: surveillance and certification**



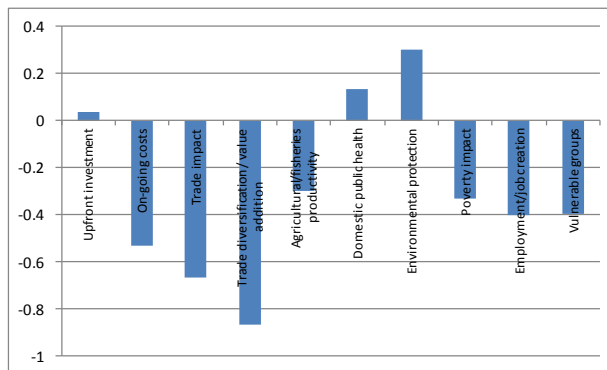
**Figure 9; Criteria scores for vegetable export traceability**



**Figure 10; Criteria scores for meat exports - cold chain**

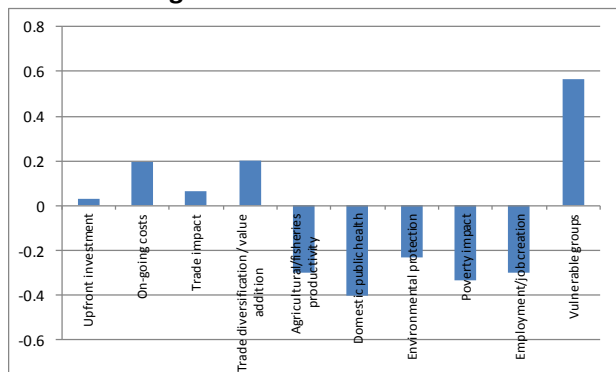


**Figure 11; Criteria scores for pesticide residue testing**

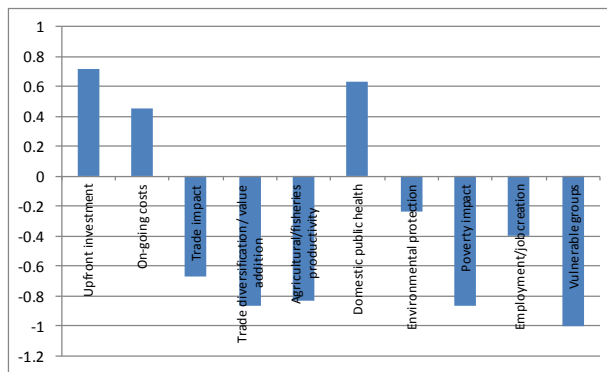




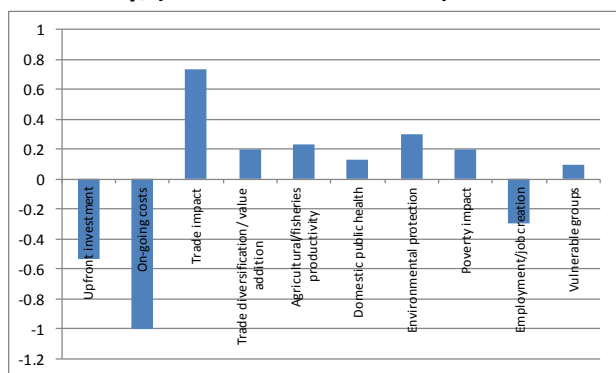
**Figure 12; Criteria scores for veterinary drug and residue testing**



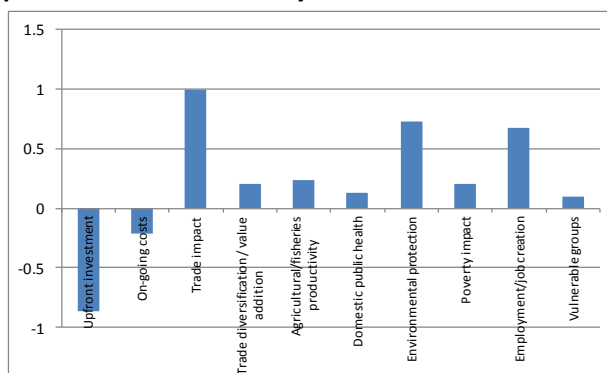
**Figure 13; Criteria scores for mycotoxin testing services**



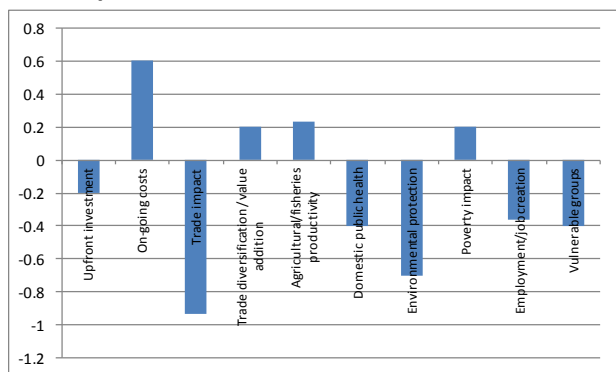
**Figure 14; Criteria scores for animal livestock traceability, (decision criteria scores)**



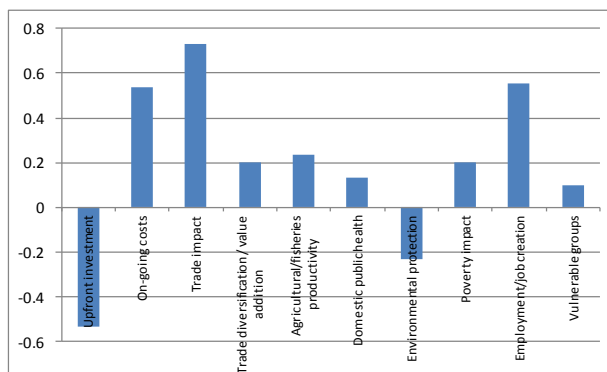
**Figure 15; Criteria scores for good agricultural practices and traceability in coffee**



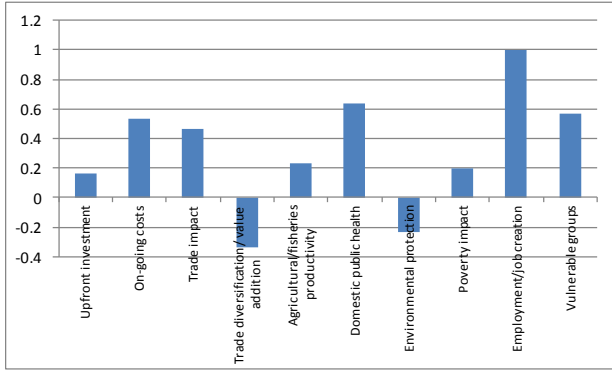
**Figure 16; Criteria scores for investment in blue leather production**



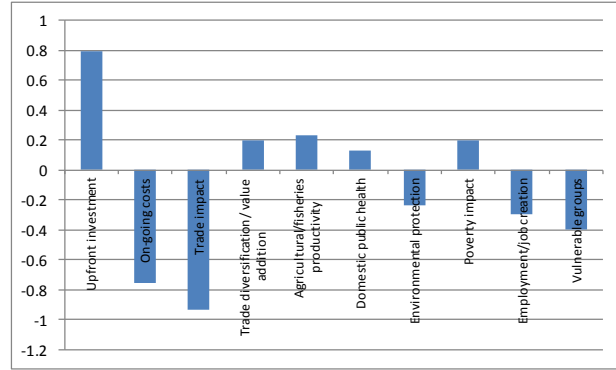
**Figure 17; Criteria scores for livestock management for foot and mouth disease**



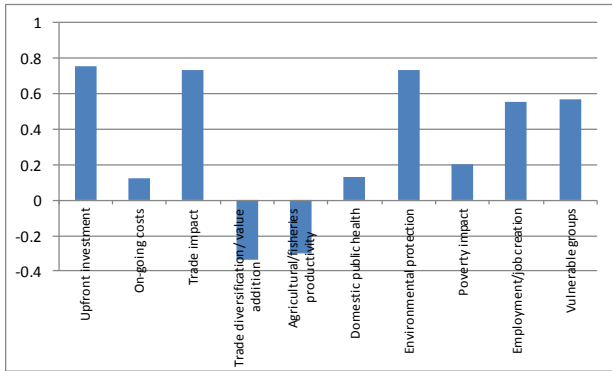
**Figure 18; Criteria scores for oilseed, cooking oil and cereals good agricultural practices**



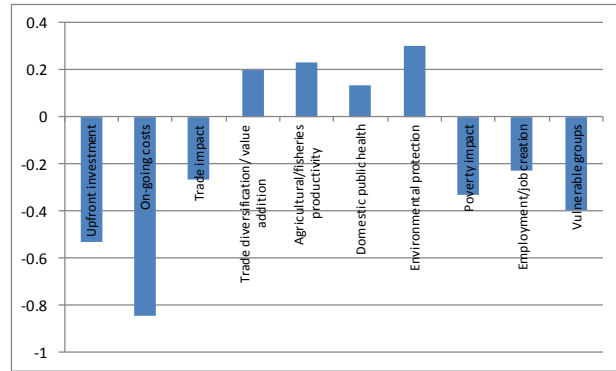
**Figure 19; Criteria scores for Pest Risk Assessment for strawberry exports to South Africa**



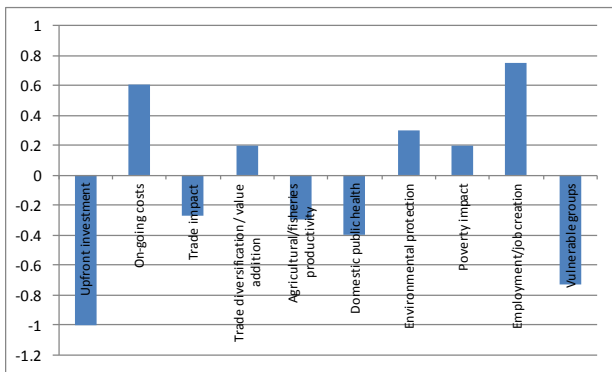
**Figure 20; Criteria scores for dairy exports to region (COMESA standards)**



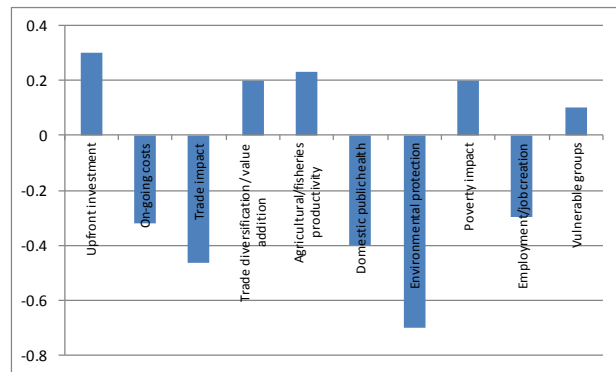
**Figure 21; Criteria scores for post entry plant quarantine facilities**



**Figure 22; Criteria scores for the creation of a foot and mouth disease free compartment for meat/animal exports**



**Figure 23; Criteria scores for the development of thermostable *Peste des Petit Ruminants* vaccine production**



To explore the impact of changing the weights attached to the nine decision criteria, an alternative equal weights model was estimated. This model abandons the weights derived in the stakeholder workshop and assumes all criteria are weighted equally. The results of this model (Table 5) only differ slightly in some respects from those of the baseline model, but there is some stability in that though the top two ranked options change places the remaining top eight are unchanged.

To further explore the sensitivity of the prioritization of SPS capacity-building options to changes in the decision weights, a cost and trade only model was estimated; this assumes that the only criteria driving the ranking of options are costs (up-front investment and on-going costs) and the impact on trade (absolute change in value of exports). In this model, all three decision criteria are weighted equally. The prioritization of options presented by this model is somewhat different (Table 5). That being said, there is much commonality in the various models with positive and negative rankings remaining constant regardless of the model applied i.e.;

- Dairy exports to region (COMESA standards) is 1<sup>st</sup> ranked in the baseline model is demoted to 2<sup>nd</sup> rank in the Equal Weights model and is 3<sup>rd</sup> in the Trade Impact model
- Oilseed, cooking oil and cereals good agricultural practices is 2<sup>nd</sup> ranked in the Baseline Model, 1<sup>st</sup> in the Equal Weights model but is only 5<sup>th</sup> in the Trade Impact model
- Vegetable exports traceability is 3<sup>rd</sup> ranked in both the Baseline and Equal weights Models and is 1<sup>st</sup> ranked in the Trade Impact model
- GAP's and traceability in coffee is 4<sup>th</sup> in both the Baseline and Equal Weights models 4<sup>th</sup> but is only 7<sup>th</sup> in the Trade impact model
- Livestock management for FMD, which is 5<sup>th</sup> ranked in both the Baseline and Equal Weights models is promoted to 4<sup>th</sup> rank in the Trade Impact model

The lower ranked options do not change very much and in most instances excepting the dairy option remain in their original ranks though Animal livestock traceability moves from small positive net flows to negative flows in the Cost and Trade Impact models. These results suggest that the derived priorities are relatively robust to changes in the decision weights with certain qualifications.

**Table 5; Sensitivity analysis of the rankings of the capacity building options using an equal weights and costs and trade impact model**

Baseline analysis			Equal Weights model			Costs and trade impact model		
Actions	Ranks	Net Flow	Actions	Ranks	Net Flow	Actions	Ranks	Net Flow
Dairy exports to region (COMESA standards)	1	0.296	Oilseed, cooking oil and cereals good agricultural practices	1	0.324	Vegetable exports traceability	1	0.451
Oilseed, cooking oil and cereals good agricultural practices	2	0.267	Dairy exports to region (COMESA standards)	2	0.316	Flower exports: surveillance and certification	2	0.421
Vegetable exports traceability	3	0.246	Vegetable exports traceability	3	0.238	Dairy exports to region (COMESA standards)	3	0.319
GAP's and traceability in coffee	4	0.228	GAP's and traceability in coffee	4	0.219	Livestock management for FMD, and other diseases	4	0.234
Livestock management for FMD, and other diseases	5	0.207	Livestock management for FMD, and other diseases	5	0.192	Oilseed, cooking oil and cereals good agricultural practices	5	0.209
Flower exports: surveillance and certification	6	0.105	Flower exports: surveillance and certification	6	0.032	Veterinary drug and residue testing	6	0.124
Animal livestock traceability	7	0.086	Animal livestock traceability	7	0.007	GAP's and traceability in coffee	7	0.030
Meat exports - cold chain	8	-0.018	Meat exports - cold chain	8	-0.033	Development of thermostable PPR vaccine production	8	-0.072
Veterinary drug and residue testing	9	-0.046	Veterinary drug and residue testing	9	-0.050	Investment in blue leather production	9	-0.083
Development of thermostable PPR vaccine production	10	-0.097	Creation of a FMD free compartment for meat/animal exports	10	-0.064	Mycotoxin testing	10	-0.091
PRA for strawberry exports to Republic of South Africa (RSA)	11	-0.119	PRA for strawberry exports to RSA	11	-0.106	Creation of a FMD free compartment for meat/animal exports	11	-0.116
Creation of a FMD free compartment for meat/animal exports	12	-0.121	Development of thermostable PPR vaccine production	12	-0.115	Animal livestock traceability	12	-0.150
Investment in blue leather production	13	-0.169	Post entry plant quarantine facilities	13	-0.174	PRA for strawberry exports to RSA	13	-0.173
Post entry plant quarantine facilities	14	-0.181	Investment in blue leather production	14	-0.176	Meat exports - cold chain	14	-0.233
Pesticide residue testing	15	-0.331	Pesticide residue testing	15	-0.303	Post entry plant quarantine facilities	15	-0.361
Mycotoxin testing	16	-0.354	Mycotoxin testing	16	-0.306	Pesticide residue testing	16	-0.508

## 4; Conclusions

This report has presented the initial results of a priority-setting exercise for SPS capacity-building in Ethiopia. The priorities are defined using a prioritization framework based on MCDA, which provides a structured and transparent approach to ranking capacity-building options on the basis of predefined and agreed criteria. Thus, the options to be considered are identified through a process of stakeholder consultation that is informed by a review of prior assessments of SPS capacity. In this case, 16 distinct SPS capacity-building options were identified. These options are then prioritized on the basis of a series of decision criteria to which weights are applied, that are again derived by consulting stakeholders. The end result is a clear ranking of the 16 capacity-building options which, in many cases appears robust to changes in the weights attached to the decision criteria. Of 16 capacity-building options identified, the following five are consistently ranked as top priority:

- Dairy exports to region (COMESA standards)
- Oilseed, cooking oil and cereals good agricultural practices
- Vegetable exports traceability
- GAP's and traceability in coffee
- Livestock management for FMD

This prioritization is based not only on the respective costs and predicted trade impacts, but also on the basis of impacts on agricultural productivity, domestic public health, local environmental protection, poverty and vulnerable groups. Given the robustness of the results, this basic ranking would appear to present a coherent basis on which to start defining a national action plan for SPS capacity-building in Ethiopia. It is important to recognize, however, that the results of the analysis presented above represent just the starting point in the use of the priority-setting framework in the context of SPS capacity-building and the results must and should be revisited and revised on an ongoing basis in the light of improvements in the availability and/or quality of data, changes in policy priorities that imply shifts in the decision weights and/or the introduction of new decision criteria, etc. Further, if new capacity-building needs arise, these can be added to the analysis. Likewise, as investments are made in the options included in the analysis above, these can be excluded and the priorities estimated accordingly.

It is possible that some stakeholders will be concerned about the priorities presented above. It is important to recognize that the aim of the framework is not to make decisions over investments in SPS capacity-building, but to provide an input into established systems of decision-making. Indeed, the framework aims to facilitate a coherent and transparent debate over priorities between capacity-building options. Thus, if a particular stakeholder is unhappy about the priority given to a particular option, they should be invited to present new evidence (in the form of revised data to support measures of particular decision criteria in the capacity-building option information cards/profiles) and/or to suggest how and why distinct decision criteria or differing decision weights should be employed. Such changes can then be employed and the model re-estimated accordingly. The framework is easy to apply and accessible to decision analysts and/or decision makers with little or no prior knowledge of MCDA and the preliminary prioritization reported above could be revisited at regular intervals.

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### Appendix 3; Capacity-Building Option Information cards

**Table A3-1; Flower exports: surveillance and certification**

Export certification – particularly phytosanitary certificates and reliability of these. Traceability in respect of plant breeder’s rights. Markets are to the Middle East, United Kingdom and European Union. A related option is the necessity of surveillance systems to be in place for pests of phytosanitary significance including *Thrips palmii* and *Lyriomyza* spp.

Decision Criterion	Value	Details	Confidence
<b>Cost</b>			
Up-front investment	US\$0.6 million	Based on a similar intervention in Zambia but at a larger scale as the Ethiopian cut flower export sector has more than ten times as many producers.	Low
On-going cost	0.09%	There would be a component of public sector investment in this area until 2017 but the long term aim would be that this service would be paid by the exporters. Ongoing costs are estimated at US\$0.13 million annually	Low
<b>Trade impacts</b>			
Trade impact [Market Access]	US\$142 million	Based on the Risk and Severity estimates impact on sales between 2009 and 2011 with a forecast doubling of sales between 2012 and 2017. For details of the calculation method see Appendix 6	Medium
Trade diversification impact [value addition]	+2	The cut flower sector represents a very high technology form of horticulture – one that is based on low margins, high volumes, and high levels of intellectual property. The impact on Ethiopia is already marked	High
<b>Domestic agri-food impacts</b>			
Agricultural/fisheries productivity	+2	Floriculture is an extremely productive use of land and water resources	High
Domestic public health	-1	Intensive use of agrochemicals by flower workers. Investments by exporters in worker health care in flower sector uncertain and unknown. There are both negative and positive reports on the sector by NGO’s and the media.	Medium

Decision Criterion	Value	Details	Confidence
Environmental protection	-1	Contamination of soil and ground water by fertilizers and agrochemicals. About 300 hectares are under bio-control agents and this is increasing. There are several reports on the environmental impact of the floricultural industry on the environment. The industry seems to be mostly a responsible one and many producers are compliant with a number of third party certification schemes	Medium
<b>Social impacts</b>			
Poverty impact	+2	While sector wages are not particularly good there seems to be a significant impact on poverty through increased income generating opportunities.	
Employment generation	85000	Unskilled labour is not paid well, semi-skilled and skilled workers are paid well. There is a high demand for any jobs created by the sector. The number represents the estimated number of workers in 2011.	
Impact on vulnerable groups:		Many workers are women and the work opportunities are in rural and/or peri-urban areas. Currently there are limited opportunities for smallholders to become involved in the sector and in general input providers are very specialist in nature though this may change in time.	
• Women	1		
• Children	0		
• Vulnerable areas	1		
• Smallholders	1		
• Unemployed	1		
	Total +4		

**Table A3-2; Vegetable exports – developing traceability systems – more specifically GlobalGAP, GMP, good hygiene practices, and hazard analysis and critical control point systems for European Union markets**

Decision Criterion	Value	Details	Confidence
<b>Cost</b>			
Up-front investment	0	Traceability systems in food production and marketing are a normal overhead in a business environment. The costs are therefore borne by companies engaged in exports to markets that require such food safety systems to be in place. The training of government extension agents and food safety inspectors in such systems should not be necessary as they are essentially third party in nature	High
On-going cost	0%	As for up-front investments the maintenance of traceability and third party certifications is a normal overhead and can be regarded as cost of doing business	High
<b>Trade impacts</b>			
Trade impact [Market Access]	US\$98.6 million annually	A requirement for EU access. The data is based on the Risk and Severity estimates impact on sales between 2009 and 2011 with a forecast doubling of sales between 2012 and 2017. For details of the calculation method see Appendix 6. Sales are generally to regional markets (US\$296 million annually) and as these markets do not have strict TPC requirements so figure is set at 30% of total exports. Note that this is an estimated figure based on potential future sales to Europe	High
Trade diversification impact [value addition]	+2	Export vegetable production least to many opportunities for value addition such as light processing and 'cluster' service industries	High
<b>Domestic agri-food impacts</b>			
Agricultural/fisheries productivity	+2	Improved control of business operationally	High
Domestic public health	+1	Improved safety of vegetables on domestic market and better worker protection	High
Environmental protection	+1	Higher control of fertilizer and pesticides and better use of them by workers	High
<b>Social impacts</b>			
Poverty impact	+1	Work opportunities for unskilled labour	High

Decision Criterion	Value	Details	Confidence
Employment generation	85000	There are significant employment opportunities in sector and those for an export sector targeting Europe would easily be equivalent to that in the cut flower sector	High
Impact on vulnerable groups: <ul style="list-style-type: none"> <li>• Women</li> <li>• Children</li> <li>• Vulnerable areas</li> <li>• Smallholders</li> <li>• Unemployed</li> </ul>	1 1 1 1 1 Total +5	Increased disposable income and employment	

**Table A3-3; Meat exports; Off colors and odors of meat exported to Saudi Arabia. Requirement to install full cold chain and a food safety management system to address these issues which probably have a microbiological component as well.**

Decision Criterion	Value	Details	Confidence
<b>Cost</b>			
Up-front investment	US\$10 million	Need to get better information from private sector on developing cold chain. The investment is in cold storage / freezing facilities and cold chain logistics	
On-going cost	5%	Need to get information from private sector. The depreciation on capital investments combined with running cost are estimated at 25% of the up-front investment – S\$2.5 million	
<b>Trade impacts</b>			
Trade impact [Market Access]	US\$ 50 million	The figure is based on the doubling of average annual exports between 2009-2011 by 2017	
Trade diversification impact [value addition]	+2	There is a considerable amount of value addition in marketing chilled and frozen meat as well as in other by products	High
<b>Domestic agri-food impacts</b>			
Agricultural/fisheries productivity	+1	Increased prices for livestock and some investment of increased income in production	Medium
Domestic public health	+1	Improved food safety, increased incomes from premium meat prices also contributing to general well being	Low
Environmental protection	+1	The African environment is conducive for grazing animals	Medium
<b>Social impacts</b>			
Poverty impact	+2	Food and income source for the poor and less privileged	High
Employment generation	120000	Value addition and cold chain systems encourages employment. For details of the calculation method see Appendix 6.	High
Impact on vulnerable groups:		The sector has many positive ripple effects on women, children nutrition, vulnerable areas and smallholders	Medium
• Women	+1		
• Children	0		
• Vulnerable areas	+1		
• Smallholders	+1		
• Unemployed	+1		
	Total +5		



**Table A4-4; Pesticide residue testing**

Ethiopia has pesticide residue testing facilities but these are apparently not accredited for the testing of exports. This option would accredit the laboratories to international standards (European Union)

Decision Criterion	Value	Details	Confidence
<b>Cost</b>			
Up-front investment	US\$3 million	The cost would be for equipment, training and certification of staff, and basic consumables	Medium
On-going cost	5	Running and depreciation costs are estimated at US\$600,000 per annum. There is generally a weak linkage between export performance and in-country pesticide residue testing services as they can be sourced in third countries such as Kenya and Uganda.	Medium
<b>Trade impacts</b>			
Trade impact [Market Access]	US\$12 million	The option relates mainly to coffee exports to Japan which averaged US\$24 million annually between 2009 and 2011. A generous assumption is that about half this value would be at risk.	Low
Trade diversification impact [value addition]	0	Current products are differentiated by origin and market so no additional benefit foreseen	Medium
<b>Domestic agri-food impacts</b>			
Agricultural/fisheries productivity	+1	Limited effect by allowing growers to access premium markets	Medium
Domestic public health	+1	Small effect by raising awareness of potential contamination by pesticides	Medium
Environmental protection	+1	Small effect due to more care taken with type and quantity of pesticide use on coffee	Medium
<b>Social impacts</b>			
Poverty impact	+1	Small poverty impact based on premium prices paid for Ethiopian coffee in Japan	Medium
Employment generation	0	No new jobs created	Medium
Impact on vulnerable groups:		Small impact on vulnerable groups due to slightly higher income.	Medium
• Women	1		
• Children	0		
• Vulnerable areas	1		
• Smallholders	1		
• Unemployed	0		
	Total +3		

**Table A3-5; Veterinary drug and veterinary remedy testing**

Ethiopia requires internationally accredited veterinary testing services for chemicals, including tick dip chemicals which have been problematic in some exported meat. Markets are regional including the Arabian Peninsula

Decision Criterion	Value	Details	Confidence
<b>Cost</b>			
Up-front investment	US\$ 3 million	The cost would be for equipment, training and certification of staff, and basic consumables	Medium
On-going cost	0.68%	Running and depreciation costs are estimated at US\$600,000 per annum. There is generally a weak linkage between export performance and in-country pesticide residue testing services as they can be sourced in third countries such as Kenya and Uganda.	Low
<b>Trade impacts</b>			
Trade impact [Market Access]	US\$ 25 million (meat) and US\$ 63 million (live animals)	Increased exports of livestock and livestock products due to increased confidence by importers on health standards. These figures represent incremental sales between 2012 and 2017 assuming a 50% increase of over the average sales that occurred between 2009 and 2011. The source data on exports and risk is shown in Appendix 6.	Low
Trade diversification impact [value addition]	+2	Increased value added products possible including by products and meat (chilled and frozen)	High
<b>Domestic agri-food impacts</b>			
Agricultural/fisheries productivity	+1	Some indirect impact is expected from increased market access as a result of meat / animals that are certified as being residue free	Medium
Domestic public health	0	Veterinary drug use has little or no direct impact on human public health	High
Environmental protection	0	Veterinary drug use has little or no direct impact on the environment	Medium
<b>Social impacts</b>			
Poverty impact	+1	Increased exports and market access will enable more income generation and thus some poverty reduction.	High
Employment generation	120000	Increased market access resulting into employment generation to meet demand. The source material for this figure is shown in Appendix 6.	High

Decision Criterion	Value	Details	Confidence
Impact on vulnerable groups: <ul style="list-style-type: none"> <li>• Women</li> <li>• Children</li> <li>• Vulnerable areas</li> <li>• Smallholders</li> <li>• Unemployed</li> </ul>	+1 +1 +1 +1 +1 Total +5	Increased market access and higher incomes which will translate into better livelihoods for the vulnerable groups.	High

### A3-6; Mycotoxin testing services

The option is for coffee, oil seeds and cereals – the latter are not exported but are imported in significant quantities. The option would benefit exports to all of Ethiopia’s markets including regional ones as well as (more obviously) those in Europe

Decision Criterion	Value	Details	Confidence
<b>Cost</b>			
Up-front investment	US\$250,000	These costs are for upgrading an existing laboratory with the estimated cost of additional testing equipment and training of personnel.	Low
On-going cost	0.25%	Costs of maintaining laboratory accreditation \$25,000/year. Annual maintenance costs \$5,000. Costs of retesting in EU avoided. On balance, will be little or no additional on-going costs.	Low
<b>Trade impacts</b>			
Trade impact [Market Access]	US\$ 12 million	Ethiopia is net importer of cereals; No major issues with coffee on export market; oil seeds are largely for domestic consumption. All the affected crops represent about US\$1220 million in annual trade value. (average between 2009 and 2011). Mycotoxins do not seem to be a significant trading issue with only two reports from the RASSF database since 2004. Therefore the impact is estimated at 1% or less of the value of trade.	Low
Trade diversification impact [value addition]	0	No significant impact on short term as testing can be outsourced to a third country	Low
<b>Domestic agri-food impacts</b>			
Agricultural/fisheries productivity	0	No known impact on productivity other than an indirect one on quality.	Medium
Domestic public health	+2	Testing will improve domestic public health through highlighting problems and issues that are currently poorly understood	Medium
Environmental protection	0	No obvious linkage	Medium
<b>Social impacts</b>			
Poverty impact	0	No direct impact on poverty	Medium
Employment generation	0	No significant job creation.	Medium

Decision Criterion	Value	Details	Confidence
Impact on vulnerable groups: <ul style="list-style-type: none"> <li>• Women</li> <li>• Children</li> <li>• Vulnerable areas</li> <li>• Smallholders</li> <li>• Unemployed</li> </ul>	0 0 0 0 0 Total 0	No linkage	Medium

**Table A3-7; Animal / livestock traceability system.**

This is becoming a standard requirement for all of Ethiopia's trading partners. Currently meat and animals are only traced in a limited way but value chain steps prior to the abattoir / country trader are not captured currently. Includes good veterinary practices.

Decision Criterion	Value	Details	Confidence
<b>Cost</b>			
Up-front investment	US\$ 10 million	No cost estimates are forthcoming in this instance. A sub-component of a similar project in Zambia has been used to estimate this cost	Low
On-going cost	14%	The ongoing costs have been estimated at US\$ 0.75 per animal and given the numbers of head involved this would amount to annual costs of US\$ 25 million for the scheme	Low
<b>Trade impacts</b>			
Trade impact [Market Access]	US\$ 176 million	The estimated value represents the average annual exports of live animals and animal products between 2009 and 2011 weighted for severity and likelihood that exports could be interrupted by the SPS constraint. Given that all importing countries are likely to require an animal traceability system in trading partners the trade value of the capacity building option is set at this value assuming a doubling of exports with the introduction of animal traceability.	Low
Trade diversification impact [value addition]	+2	Significant value addition would be possible given that abattoirs and processors could invest with more confidence once such a traceability system was implemented	Medium
<b>Domestic agri-food impacts</b>			
Agricultural/fisheries productivity	+2	Increased market access, impact along value chain	
Domestic public health	+1	Some impact – some issues with zoonotic diseases	Low
Environmental protection	+1	Better use of natural resources is encouraged from implementing a traceability system	Medium
<b>Social impacts</b>			
Poverty impact	+2	Increased market access, impact along value chain resulting into reduction of poverty	High
Employment generation	120000	Increased market access, impact along value chain leading to increased employment	Medium

Decision Criterion	Value	Details	Confidence
Impact on vulnerable groups: <ul style="list-style-type: none"> <li>• Women</li> <li>• Children</li> <li>• Vulnerable areas</li> <li>• Smallholders</li> <li>• Unemployed</li> </ul>	+1 0 +1 +1 +1 Total 4	Positive impact from increased incomes	High

**Table A3-8; Application of good agricultural practices and traceability systems in coffee**

All coffee markets are demanding increased traceability systems. The requirement is customer driven and in essence the current traceability only starts at some point in the aggregation stage. Crop is not really traceable to farmer

Decision Criterion	Value	Details	Confidence
<b>Cost</b>			
Up-front investment	US\$ 24 million	Complex value chain in Ethiopia; revisit analyses in this area in order to estimate the cost of this investment [key players include private actors, cooperatives, government: pulpers, drying tables, auctioning] important to note that in Ethiopia coffee is named after the region where it is produced. Geographical indicators of origin are also necessary. The estimate of US\$ 25 million is based on an estimate of approximately US\$ 20 per smallholder to implement the system	Low
On-going cost	2.4%	Recertification based on 10% of costs of initial setting up of the scheme	Low
<b>Trade impacts</b>			
Trade impact [Market Access]	+US\$660 million	Positive impact through increased trade via increased sales and increased value of sales based on an estimated doubling of the value of those sales between 2009 and 2011	Medium/ Low
Trade diversification impact [value addition]	+2	Obvious positive impact from value addition and traceability	High
<b>Domestic agri-food impacts</b>			
Agricultural/fisheries productivity	+2	Strong positive impact on productivity from GAP's and traceability	High
Domestic public health	+1	No direct impact on public health though there may be an indirect one base on better health with higher income.	Medium
Environmental protection	+2	Strong positive impact such as from forest coffee production and with market linkage to origin there will be a need to produce in an environmentally conscious way	High
<b>Social impacts</b>			
Poverty impact	+2	The sector is small holder dominated and high employment along the value chain	High



Decision Criterion	Value	Details	Confidence
Employment generation	1.2 million coffee smallholders in Ethiopia	The sector is smallholder dominated and high employment along the value chain	High
Impact on vulnerable groups: <ul style="list-style-type: none"> <li>• Women</li> <li>• Children</li> <li>• Vulnerable areas</li> <li>• Smallholders</li> <li>• Unemployed</li> </ul>	+1 0 +1 +1 +1 Total +4	The production process involves a majority of small farmers/family units resulting into direct benefits from increased trade/incomes	High

**Table A3-9; Investment in blue leather production**

Green leather (unprocessed hides) is subject to SPS related trade constraints. Processing to 'blue' hides removes SPS related constraints and there are no restrictions on trade even to countries free of FMD. All markets

Decision Criterion	Value	Details	Confidence
<b>Cost</b>			
Up-front investment	US\$ 5 million	The figure is a rough estimate of the package of government and/or donor incentives that would leverage private investment in the sector. Private investors would make up the bulk of investment	Low
On-going cost	0	Once the incentive / investments have been made there are no ongoing costs anticipated	High
<b>Trade impacts</b>			
Trade impact [Market Access]	US\$ 10.5 million	Ethiopia exported US\$ 2.9 million worth of processed hides in 2011 and about 0.7 million of manufactured leather goods. Off take of hides into processing is estimated at 6.6 % of those available (Source Eco Research, Japan). The assumption is that investment in the sector could increase output fourfold in the period between 2012 and 2017 so the value given is the estimated potential incremental increase in exports.	Medium
Trade diversification impact [value addition]	+2	There is good evidence that the leather goods sector in Ethiopia is thriving and working on value added goods such as shoes and fashion accessories	Medium
<b>Domestic agri-food impacts</b>			
Agricultural/fisheries productivity	+2	Premium prices as an incentive to invest in productivity enhancing technologies; increased availability of hides.	High
Domestic public health	0	No direct impact.	Medium
Environmental protection	-1	Potential for environmental degradation through toxic waste, other discharges from tanneries	Medium
<b>Social impacts</b>			
Poverty impact	+2	Increased incomes as a result of value addition	High
Employment generation	46000	Very significant increase but base data is weak. The number represents those currently employed in the sector (2011) and could be close to the additional numbers if exports grow fourfold - given that much production is for domestic consumer goods.	High

Decision Criterion	Value	Details	Confidence
Impact on vulnerable groups: <ul style="list-style-type: none"> <li>• Women</li> <li>• Children</li> <li>• Vulnerable areas</li> <li>• Smallholders</li> <li>• Unemployed</li> </ul>	+1 0 0 +1 +1 Total +3	Some positive ripple effects to vulnerable groups from increased value addition and incomes	Medium

**Table A3 10; Livestock Management of foot and mouth disease, *Peste des Petit Ruminants* and Lumpy Skin Disease**

Exports of livestock to the UAE require surveillance systems to be in place to manage a variety of diseases.

Decision Criterion	Value	Details	Confidence
<b>Cost</b>			
Up-front investment	US\$10 million	Public good: trans-boundary diseases are controlled by government and vaccination is free. [increased facilitation for training and management of these diseases including compartments; Surveillance; thermo stable vaccination for PPR; quarantine station], laboratory, trained technicians etc.	
On-going cost	0.11%	Estimated at US\$200,000 annually once the systems are set up	
<b>Trade impacts</b>			
Trade impact [Market Access]	+US\$ 176 million	Improved market access. The trade number represents the average annual trade in live animals and meat products between 2009 and 2011 all of which could be at risk if the lack of FMD surveillance in Ethiopia becomes an issue with trading partners. The base assumption is this number could double by 2017.	High
Trade diversification impact [value addition]	+2	There are considerable opportunities for the value addition of animals and the production of a wide range of by-products	High
<b>Domestic agri-food impacts</b>			
Agricultural/fisheries productivity	+2	Good disease control and reduced overhead costs will result in increased productivity	High
Domestic public health	+1	Indirect positive impacts from increased incomes	Medium
Environmental protection	0	No much changes	Medium
<b>Social impacts</b>			
Poverty impact	+2	High positive impacts from reduced overheads and mortality rates	High
Employment generation	120000	Positive impact expected as a result of increased employment along the value chain including jobs created and/or preserved in pastoralist communities	Medium

Decision Criterion	Value	Details	Confidence
Impact on vulnerable groups: <ul style="list-style-type: none"> <li>• Women</li> <li>• Children</li> <li>• Vulnerable areas</li> <li>• Smallholders</li> <li>• Unemployed</li> </ul>	+1 0 +1 +1 +1 Total +4	Women are heavily involved in keeping small animals; direct impact on nutrition and employment. Overall very positive	high

**Table A3-11; Oilseeds and cereals good agricultural practices/traceability**

Decision Criterion	Value	Details	Confidence
<b>Cost</b>			
Up-front investment	\$2,500,000	The development of good agricultural practices guidelines and their extension through a project targeted at growers in cooperatives wanting to export their product. Costs are based on similar projects in Mozambique, Zambia and Malawi as well as the World Bank Land Husbandry Water Harvesting and Hillside Irrigation Project in Rwanda but are deemed to somewhat larger in terms of geographic scope and thus costs.	Low
On-going cost	6%	There will be a continued necessity for extension of GAP's by the Ethiopian Ministry of Agriculture and the private sector amounting to US\$ 200,000 annually.	Low
<b>Trade impacts</b>			
Trade impact [Market Access]	US\$ 175 million	Ethiopia is a net importer of oil seeds and cereals; impact will come from decreased imports of cereals/oil seeds. The value is derive from a net gain in quality and thus give a net trade effect of 25% (increased exports and import substitution)	Low
Trade diversification impact [value addition]	+1	Increased production of oil seeds call for value addition	Medium
<b>Domestic agri-food impacts</b>			
Agricultural/fisheries productivity	+2	GAP's improves productivity	High
Domestic public health	+2	Reduced contamination, improved nutrition	high
Environmental protection	0	No or very small impact (pesticides not used)	
<b>Social impacts</b>			
Poverty impact	+2	Improved access to food and basic needs from incomes	High
Employment generation	4,000,000	Estimated number of smallholders in the sector is 12 million – realistically the project may influence 30% of the early adopters	Low

Decision Criterion	Value	Details	Confidence
Impact on vulnerable groups: <ul style="list-style-type: none"> <li>• Women</li> <li>• Children</li> <li>• Vulnerable areas</li> <li>• Smallholders</li> <li>• Unemployed</li> </ul>	+1 +1 +1 +1 +1 Total +5	Very significant positive impacts on women, children and vulnerable areas	High

**Table A3-12; Pest Risk assessment for strawberry exports to South Africa**

An exporter is trying to get market access to South Africa for strawberries. The South Africans have suggested that a South African consultant be hired by the Ethiopian NPPO to do the pest risk assessment (PRA). The option is to do the PRA as a joint exercise by the South African consultant and Ethiopian counterpart(s) so that the capacity to carry out future PRA's is developed within the country.

Decision Criterion	Value	Details	Confidence
<b>Cost</b>			
Up-front investment	US\$12,000	The cost is at the high end of a quote for a private contractor in South Africa to carry out a PRA on behalf of the South African national plant protection organization (NPPO)	High
On-going cost	0	The PRA is a stand-alone document and would not require further work. However the Ethiopian based strawberry exporter would be expected to put in place pest and disease surveillance systems which would be regarded as a normal cost of doing business.	High
<b>Trade impacts</b>			
Trade impact [Market Access]	US\$ 2 million	This figure is based on the estimated market for out-of-season strawberries in South Africa where there are few locally available strawberries between November and May.	High
Trade diversification impact [value addition]	+2	The total trade impact is small but the crop is a relatively new one in Ethiopia and requires a high level of technical inputs	High
<b>Domestic agri-food impacts</b>			
Agricultural/fisheries productivity	+2	Intensive horticulture which high quality inputs required (skills, type of inputs and very good cold chain and logistics.	High
Domestic public health	+1	Limited impact – mostly on directly employed labour and their families	High
Environmental protection	0	Neutral. Areas involved are small and they are managed to a high standard in line with retailer standards – which are stringent in South Africa	High
<b>Social impacts</b>			
Poverty impact	+2	Labour intensive hence job creation for the majority poor	Medium
Employment generation	1000	Positive impact. The number represents the high estimate of additional workers needed for this market opportunity.	High



Decision Criterion	Value	Details	Confidence
Impact on vulnerable groups: <ul style="list-style-type: none"> <li>• Women</li> <li>• Children</li> <li>• Vulnerable areas</li> <li>• Smallholders</li> <li>• Unemployed</li> </ul>	+1 0 +1 0 +1 Total +3	Women employment, based in a rural area and labour intensive	High

**Table A3-13; Compliance with Codex standards for milk and dairy products**

Decision Criterion	Value	Details	Confidence
<b>Cost</b>			
Up-front investment	US\$140,000	Up-front investment is required in adopting COMESA standards for milk quality for the domestic market. A number of activities are required including the introduction of a Public Health Policy and a subsidiary Food Safety Policy and then a revised Food Safety Law with regulations based on COMESA milk standards. Legal enforcement will have to be backed up by basic laboratory services. These are based on actual costs of a similar service in Rwanda. The legal and other costs are not specific to the dairy sector	High
On-going cost	0.8%	On-going costs for domestic milk standards as a percentage of exports cannot be estimated as essentially the capacity building option is based on import substitution. Net imports of dairy products into Ethiopia are at US\$ 10 million annually (average net imports for years between 2009 and 2011). Investment by dairy farmers, transporters, and processors will be in GAP's, traceability, and testing.	Low
<b>Trade impacts</b>			
Change in absolute value of exports	US\$ 5 million	The dairy sector in Ethiopia is much larger that trade data suggests. The trade impact is an estimate of increased quality and efficiencies in the industry as a result of implementing standards resulting in a net gain in trade balance of US\$ 5 million in 2017	Low
Trade diversification impact [value addition]	+1	Increased opportunities for value addition with increasing quality of milk (milk powder, nutritionally dense foods, confectionary, UHT).	Medium
<b>Domestic agri-food impacts</b>			
Agricultural/fisheries productivity	+1	The smallholder dairy sector in many African countries underperforms, in-part, due to lack of quality control systems and non-adherence to standards.	High
Domestic public health	+1	Improvements in quality will lead to better microbiological standards	High
Environmental protection	+2	Believed to have a high environmental impact	Low

Decision Criterion	Value	Details	Confidence
<b>Social impacts</b>			
Poverty impact	+2	Dairying is carried out in poor rural and peri-urban areas and employs significant numbers of people	High
Employment generation	1,000,000	See Appendix 6 for the basis of this calculation	Low
Impact on vulnerable groups:		Very significant positive impacts on women, children and vulnerable areas	High
• Women	+1		
• Children	+1		
• Vulnerable areas	+1		
• Smallholders	+1		
• Unemployed	+1		
	Total +5		

**Table A3-14; National post-entry quarantine facility for horticulture (vegetative clones of deciduous fruit, vegetables, roses)**

Decision Criterion	Value	Details	Confidence
<b>Cost</b>			
Up-front investment	US\$ 10 million	A network of post-entry quarantine facilities in various agro-ecological zones. Screen houses, tunnels and open field sites. Probable outcome would be a central facility but using / developing relationships with CGIAR institutes, and other institutes in Ethiopia (universities, research stations, agricultural colleges)	Medium
On-going cost	6.67%	Running costs estimated at US\$ 2 million annually. Figures provided by Ethiopian NPPO	Medium
<b>Trade impacts</b>			
Trade impact [Market Access]	US\$ 30 million	Fruits, vegetables, and flowers, are all impacted by this facility. The facility will ensure that crops are protected from the accidental introduction of harmful organisms. Most will affect productivity but some (notably fruit flies) will halt exports. Between 2009 and 2011 fruit exports averaged 1 million US\$ annually (100% at risk) Vegetable exports averaged 286 million US\$ annually (5% at risk) Flower exports averaged 142 million US\$ annually (10% at risk)	Low
Trade diversification impact [value addition]	+2	Bring in a variety of plant material. Avoid import of diseases and pests	High
<b>Domestic agri-food impacts</b>			
Agricultural/fisheries productivity	+2	Significant impact on productivity	High
Domestic public health	+1	Some pests/diseases affect public health	High
Environmental protection	+1	Some impact expected from the project. Exotic pests and diseases have effect on native flora and fauna	High
<b>Social impacts</b>			
Poverty impact	+1	The intervention reduces the risk of crop failure hence mitigating poverty	High
Employment generation	200,000	The project encourages / protects employment creation	Low

Decision Criterion	Value	Details	Confidence
Impact on vulnerable groups: <ul style="list-style-type: none"> <li>• Women</li> <li>• Children</li> <li>• Vulnerable areas</li> <li>• Smallholders</li> <li>• Unemployed</li> </ul>	+1 0 +1 0 +1 Total +3	There is significant impact through increased productivity and reduced risk for crop failure on the vulnerable groups	High

**Table A3-15; Meat exports from a foot and mouth disease free compartment in Ethiopia to European Union and other countries where the disease is not present**

Decision Criterion	Value	Details	Confidence
<b>Cost</b>			
Up-front investment	US\$30 million	Based on calculations done in Namibia which estimated the capital costs for a single compartment at US\$10 million. However there were certain additional costs which had already been incurred in the case of Namibia. The sum is for the creation of two similar compartments in Ethiopia	Medium
On-going cost	0%	Basic assumption is that these will be borne by the abattoir and producers as part of the cost of doing business though these have been estimated as being around 20% of capital costs	Low
<b>Trade impacts</b>			
Trade impact [Market Access]	US\$30 million	Annual sales of live animals are in the region of US\$200 million annually. With value addition for chilled beef and increased offtake due to better prices the assumption is that \$ sales will increase by US\$ 30 million due to increased margins for a portion if all exports.	Low
Trade diversification impact [value addition]	+2	With value addition for chilled beef and increased offtake due to better prices the assumption is that \$ sales will triple in 2017	Medium
<b>Domestic agri-food impacts</b>			
Agricultural/fisheries productivity	+1	Investments in feedlot will increase productivity	High
Domestic public health	0	The intervention mainly targets the export market with little or 0 on domestic public health	High
Environmental protection	+1	Attention on stock disease and general management practices will ensure environmental protection	Medium
<b>Social impacts</b>			
Poverty impact	+2	Increased returns from meat exports will have positive ripple effects on poverty	
Employment generation	1,500,000	This is the number of households that are involved in the keeping of beef cattle.	Medium

Decision Criterion	Value	Details	Confidence
Impact on vulnerable groups: <ul style="list-style-type: none"> <li>• Women</li> <li>• Children</li> <li>• Vulnerable areas</li> <li>• Smallholders</li> <li>• Unemployed</li> </ul>	0 0 1 1 0 Total +2	Small impact distributed over a large number of beneficiaries	Low

**Table A3-16; Development of capacity in Ethiopia to produce thermostable *Peste des Petit Ruminants* Vaccine<sup>10</sup>**

Decision Criterion	Value	Details	Confidence
<b>Cost</b>			
Up-front investment	US\$ 2.0 million	According to the International livestock Research Institute in Kenya the development of a thermostable vaccine for <i>Peste des Petits Ruminants</i> involves the following; <ul style="list-style-type: none"> <li>• thermostabilization</li> <li>• vaccine delivery</li> <li>• generic platforms</li> <li>• epidemiology</li> <li>• control programs</li> </ul> Costs of such a program in 2011 were US\$ 1.76 million (Toye, 2006) <sup>22</sup>	High
On-going cost	3.2%	Running costs estimated at US\$ 0.5 million annually based on assumption that part of the ILRI costs are concerned with first year delivery of vaccine	Low
<b>Trade impacts</b>			
Trade impact [Market Access]	US\$ 15.8million	The disease affects ovines and caprines (sheep and goats) and is becoming one of major concern in North Africa, and Southern Europe. Ethiopia's exports of live animals and meat and animal products to neighboring regions in North Africa and the Middle East were in excess of US\$268 million in 2011 (of which goats were US\$1.6 million and sheep were US\$14.3 million).	Medium
Trade diversification impact [value addition]	+2	Allow the further development of a meat and animal products sector	Medium
<b>Domestic agri-food impacts</b>			
Agricultural/fisheries productivity	+2	Significant impact on productivity	High
Domestic public health	0	No direct effect on public health	High

<sup>10</sup> i.e. not requiring refrigeration



<b>Decision Criterion</b>	<b>Value</b>	<b>Details</b>	<b>Confidence</b>
Environmental protection	-1	Some impact expected from the project as goat and sheep numbers may increase without increases in land carrying capacity	Medium
<b>Social impacts</b>			
Poverty impact	+2	The intervention reduces the mortality rate of goats and sheep and will thus mitigate poverty	Medium
Employment generation	120000	Possibly on the high side given the size of the national sheep and goat herds. Likely that more people would be affected in the dairy and beef sectors but there is no easily accessible firm data	Low
Impact on vulnerable groups:		There is significant impact through increased productivity and high numbers of small animal keeping by vulnerable groups in rural areas	High
• Women	+1		
• Children	0		
• Vulnerable areas	+1		
• Smallholders	+1		
• Unemployed	+1		
	Total +4		

## **Appendix 4; Analysis of Ethiopia's trade data**

### **Trade in Sanitary and Phytosanitary sensitive agri-food products**

Table A4-1 provides an overview of the key SPS requirements associated with Ethiopia's traditional and non-traditional agri-food exports. Agricultural and agri-food exports from Ethiopia have averaged just over 1000 million US\$ annually in the period between 2002 and 2011 though growth in this period has been remarkable averaging nearly 17% annually since 2003. Exports are largely dominated by coffee which is responsible for well over 40% of agri-food exports during this period. Exports of oilseeds vegetables, cut-flowers and live animals account for much of the remainder of SPS sensitive exports. Categories losing export share both in terms of relative and absolute importance are sugar and cereals.

**Table A4-1; Ethiopian agri-food exports and attendant Sanitary and Phytosanitary requirements - average annual exports between 2003 and 2010. (Source: COMTRADE)**

Category (Harmonized System 1992 2 Digit)	Average Annual Exports (000,000 US\$)	Proportion of Total SPS Sensitive Exports (%)	Sensitivity <sup>23</sup>				
			Plant Health	Animal Health	Food Safety	Environmental standards	Private standards
01 Live animals	53.5	5.0		XXX		X	
02 Meat and edible meat offal	24.6	2.3		XXX		X	
03 Fish, crustaceans, molluscs, aquatic invertebrates, nes	0.3	0.0		XXX	XXX	XXX	XX
04 Dairy products, eggs, honey, edible animal product, nes	12	0.1		XX	XX	X	XXX
05 Products of animal origin, nes	1.0	0.1		X		XX	
06 Live trees, plants, bulbs, roots, cut flowers etc	77.4	7.2	XX			XX	
07 Edible vegetables and certain roots and tubers	164.6	15.3	XX				XXX
08 Edible fruit, nuts, peel of citrus fruit, melons	2.6	0.3	XXX				XXX
09 Coffee, tea, mate and spices	439.3	40.8	X		X	X	XXX
10 Cereals	9,3	0.9	XX		XX	X	
11 Milling products, malt, starches, inulin, wheat gluten	0.7	0.1	X		XX		
12 Oil seed, oleagic fruits, grain, seed, fruit, etc, nes	207.9	19.3	XXX		XX		XXX
13 Lac, gums, resins, vegetable saps and extracts nes	7.4	0.7			XXX		XXX
14 Vegetable plaiting materials, vegetable products, nes	49.6	4.6	X			X	
15 Animal, vegetable fats and oils, cleavage products, etc	1.5	0.1			XX		
16 Meat, fish and seafood food preparations, nes	0.1	0.0		X	XXX	X	XXX
17 Sugars and sugar confectionery	10.3	1.0			X	X	
18 Cocoa and cocoa preparations	2.5	0.2			X	X	
19 Cereal, flour, starch, milk preparations and products	1.3	0.1			X		
20 Vegetable, fruit, nut, etc. food preparations	1.8	0.2			XX		XX
21 Miscellaneous edible preparations	0.6	0.0			X		
22 Beverages, spirits and vinegar	1.0	0.1			X		
23 Residues, wastes of food industry, animal fodder	1.0	0.1	XX	XX		X	
24 Tobacco and manufactured tobacco substitutes	0.1	0.0			X		
44 Wood and articles of wood, wood charcoal	1.8	0.2	X				X
46 Manufactures of plaiting material, basketwork, etc.	0.0	0.0	X				
48 Paper & paperboard, articles of pulp, paper and board	0.1	0.0			X	XX	X
50 Silk	0.0	0.0			X	XX	
51 Wool, animal hair, horsehair yarn and fabric thereof	0.0	0.0		X			
52 Cotton	15.7	1.5		X			
TOTAL	1,077.2						

SPS requirements as illustrated in Table A4-1 show that private sector standards are particularly an issue for coffee exports and plant health and food safety is important for oilseeds, fruits, cut flowers and vegetables and finally that animal health is important in the case of trade in live animals. It is important to recognise, however, that there are wide differences in the application and enforcement of SPS requirements across markets and segments within markets. Ethiopia's agri-food trade is predominantly with Europe, neighbouring countries including Kenya and other African countries with widely varying SPS standards and level of enforcement. The European Union Rapid Alert System for Food and Feed (RASFF) Portal lists 11 Notifications for Ethiopian imports between 2004 and 2011 which indicate that aflatoxin and microbiological contamination are significant issues in that market (Table A4-2).

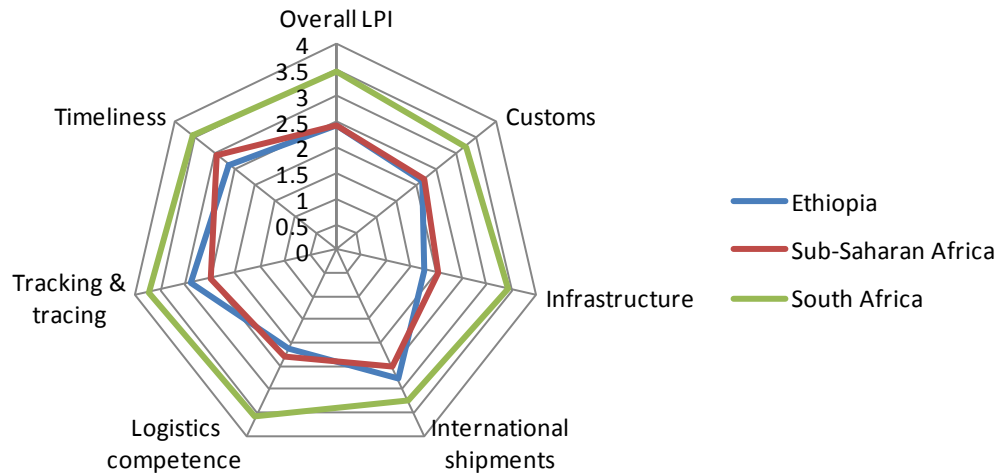
**Table A4-2; Rapid Alert System for Food and Feed alerts for Ethiopian imports 2004 to June 2012 (Source RASFF Database)**

Product	Year	2004	2005	2006	2007	2008	2009	2010	2011
Herbs and spices	Chemical MRL	1							
	Aflatoxin		1	2					
Fruits	Microbiology					3			1
Nuts, nut products and seeds	Microbiology				2			1	
Animal feed	Exceeding MRL								1
TOTAL		1	1	2	2	3	0	1	1

Given the overall composition of Ethiopia's agri-food exports and experiences to date, SPS requirements are a particularly major issue with spice exports (which are classified under Harmonized System (HS) 09) and other exports where microbiology is a concern. Other competitiveness factors, such as primary producer and processor productivity, continuity/reliability of supply, logistical costs, macroeconomic factors and international commodity price trends have arguably played a more leading role in explaining Ethiopia's agri-food trade performance to date including the remarkable growth in most agri-food crops in the period since 2002.

A look at the data in Table A4-2 shows that Ethiopia's performance in more perishable and more SPS sensitive agri-food exports, notably animals, fresh vegetables, cut flowers, and animal products are suggestive that supply chain problems, logistics and seasonality have been overcome to some extent despite the country's landlocked status and poor ranking in the world logistics performance index (LPI) as shown in Figure A4-1 below. Ethiopia's major trading partners, particularly in the region, are as concerned about SPS requirements and anecdotal evidence in that traders circumvent these relatively easily either through informal trade across borders or by certification / testing by outside service providers.

Ethiopia imports a range of foods mostly cereals and edible oils. Most of these imports can generally be considered of low to moderate risk from an SPS standpoint though mycotoxins in cereals do pose some risk. The standards for traded items of most interest to Ethiopia are being largely addressed through the development of regional standards by the East African Community (and thus by extension to COMESA and the Southern African Development Community [SADC]).



**Figure A4-1; Spider diagram showing Ethiopia's (blue) relative Logistics Performance Index scores against sub-Saharan Africa (maroon), and South Africa (green). (Source; World Bank June 2011)**

Ethiopia's net trade performance in terms of SPS sensitive Exports minus Imports at the HS two figure level is shown in Table A4-3 which shows that Ethiopia's exports, particularly of live plants (HS 06), vegetables (HS 07), coffee/tea/spices (HS 09) and oilseeds (HS 12) are large and growing whereas imports of cereals and cereal products (HS 10 and HS 19), animal fats (HS 15) and sugar (HS 17) are rapidly increasing. However in terms of trade balance in US\$ terms Ethiopia enjoys a healthy trade surplus in SPS sensitive products.

**Table A4-3; Net trade flows of Sanitary and Phytosanitary sensitive trade for Ethiopia – 2002 to 2009 (Source COMTRADE)\*.**

Year	2006	2007	2008	2009	2010	2011	Average 2002 - 2009
01 Live animals	28955953	40063601	43145656	61773264	131774414	188449607	52211261
02 Meat and edible meat offal	17321304	13623823	28010972	25889664	49328534	76912359	24556822
03 Fish, crustaceans, molluscs, aquatic invertebrates, nes	175085	482778	3401	-23267	73113	-111012	48213
04 Dairy products, eggs, honey, edible animal product, nes	-7461464	-4468174	-8374064	-8722381	-14649994	-7388436	-6881084
05 Products of animal origin, nes	801972	707284	627945	787149	1104606	1962090	866256
06 Live trees, plants, bulbs, roots, cut flowers etc	2395807	73484913	88213804	140432602	160197835	186470820	65003347
07 Edible vegetables and certain roots and tubers	32596071	92457891	177805360	255679106	373151897	388742521	140005069
08 Edible fruit, nuts, peel of citrus fruit, melons	328704	200721	-176950	514930	1640561	1125438	798324
09 Coffee, tea, mate and spices	345102751	429131349	486378750	380988639	725576346	884772701	420281886
10 Cereals	-95638565	-148329281	-576020122	-368129465	-356268570	-449501332	-285992431
11 Milling products, malt, starches, inulin, wheat gluten	-22794208	-25719723	-57157030	-53776454	-32838502	-80049812	-35059776
12 Oil seed, oleagic fruits, grain, seed, fruit, etc, nes	152242173	157388528	178723702	365999367	339126988	356969364	192664764
13 Lac, gums, resins, vegetable saps and extracts ne	3814668	3575272	5036463	7137538	11264121	10278992	5308163
14 Vegetable plaiting materials, vegetable products, nes	68737184	107248327	26842354	36698	-30540	-682427	47406699
15 Animal, vegetable fats and oils, cleavage products, etc	-66592594	-104027419	-246179493	-238622860	-258635458	-389796999	-151538851
16 Meat, fish and seafood food preparations, nes	-1236652	-956743	-1670863	-1182942	-1357010	-494530	-904565
17 Sugars and sugar confectionery	-49446269	-23090296	-57976023	-25492735	-115687095	-182788473	-44832901
18 Cocoa and cocoa preparations	2681546	-1167445	-1367107	-2099611	-1942074	-3443519	1050731
19 Cereal, flour, starch, milk preparations and products	-17529280	-8454590	-35684187	-31626897	-28636799	-42652098	-25695535
20 Vegetable, fruit, nut, etc. food preparations	291885	-5196595	-14819836	-8327447	-7531449	-18045196	-5734210
21 Miscellaneous edible preparations	-7355919	-8954542	-10274884	-9938908	-12536475	-17116326	-8995311
22 Beverages, spirits and vinegar	-9258322	-10997153	-7554885	-11209052	-8331679	-7290618	-7638885
23 Residues, wastes of food industry, animal fodder	-255264	-13276	29560	81416	3062677	2311480	555189
24 Tobacco and manufactured tobacco substitutes	-8918680	-11802787	-8914925	-12008215	-16243851	-12435406	-9407531
44 Wood and articles of wood, wood charcoal	-25982418	-31762250	-33006189	-38334933	-35888328	-35254816	-25793480
46 Manufactures of plaiting material, basketwork, etc.	-616300	-278190	-88567	-117013	-288807	-407926	-554851
48 Paper & paperboard, articles of pulp, paper and board	-65786533	-73493487	-101348705	-86868787	-85282192	-105623371	-68208734
50 Silk	14925	-307	-16488	-4012	-55399	-52546	-12232
51 Wool, animal hair, horsehair yarn and fabric thereof	-541213	-530998	-6697	-89508	-1300872	-3172421	-658872
52 Cotton	8394470	15747274	12636075	15863739	19369685	10723134	12821010

\*Key

Red = lowest 10% (i.e. net imports)

Yellow = mid 80%

Green = highest 10% (best export performers)

## **Cross referencing Revealed Comparative Advantage data with other studies for Ethiopia**

Revealed Comparative Advantage (RCA) only reflects comparative advantage for a given industry and time period across countries. Where, trade costs are higher, the smaller the country and the lower the national average technological position, the less reliable the RCA as a measure.<sup>24</sup> The analysis is limited to those product groupings that represent more than 5% of SPS sensitive exports as shown in Table A4-3 i.e.;

1. 01 Live animals
2. 06 Live trees, plants, bulbs, roots, cut flowers etc
3. 07 Edible vegetables and certain roots and tubers
4. 09 Coffee, tea, mate and spices
5. 12 Oil seed, oleagic fruits, grain, seed, fruit, etc, nes

### **Revealed Comparative Advantage in Ethiopia's agri-food exports**

Data for the RCA for Ethiopia's live animal, cut flower/vegetable and coffee/tea/spice exports have been extracted from World Bank WITS Database<sup>25</sup> at the HS6 level (statistical data and results are shown in Appendix 5). The following observations are the conclusions of an analysis of the extracted data for the period 2002-2011. Technically a positive RCA is any value above 1. Because of the variability of year to year trade data the Coefficient of Variation (CV) is included to reflect the stability or otherwise of exports.

*i. Sectors which have revealed comparative advantages (RCA) at the HS6 level are the following;*

- Broad beans, horse beans
- Chickpeas
- Coffee, not roasted, not decaffeinated
- Unrooted cuttings and slips
- Kidney beans, incl. white pea beans
- Ginger
- Vegetables, nes, fresh/chilled
- Dried leguminous vegetables,
- Turmeric
- Seeds of cumin
- Cut flowers & flower buds
- Pepper (genus Piper), crushed/ground
- Small red (Adzuki) beans
- Beans (Vigna spp., Phaseolus spp.)
- Live goats
- Beans of *Vigna mungo* (L.)/ and Hepper *Vigna radiata* (L.)
- Live bovine animals other than pure-bred breeding animals
- Seeds of coriander
- Live sheep
- Lentils, dried, shelled, whether or not skinned/split
- Beans

- Coffee, not roasted, decaffeinated
- Seed potatoes, fresh/chilled
- Cabbages, kohlrabi, kale & similar edible brassicas
- Dried vegetables, and mixtures of dried vegetables
- Pepper (genus Piper), neither crushed/ground
- Cardamoms
- Onions & shallots, fresh/chilled
- Potatoes other than seed potatoes, fresh/chilled
- Salad beetroot, salsify, celeriac, radishes and similar edible roots
- Cabbage lettuce (head lettuce), fresh/chilled
- Tomatoes, fresh/chilled
- Peas (*Pisum sativum*), dried, shelled, whether or not skinned/split
- Peas (*Pisum sativum*), shelled/unshelled, uncooked/cooked
- Carrots & turnips, fresh/chilled
- Cabbages, kohlrabi, kale and similar edible brassicas
- Ground-nuts, not roasted or otherwise cooked
- Ground-nuts shelled, not roasted or cooked
- Linseed
- Oil seeds and oleaginous fruits nes
- Sesamum seeds
- Oil seeds and oleaginous fruits, nes
- Flour or meal of oil seed, fruit, except mustard, soya
- Hop cones, fresh or dried, lupulin
- Hop cones, not ground, powdered or pelleted
- Plants, plant parts for perfumery, pharmacy, etc,
- Plants & parts, pharmacy, perfume, insecticide use nes

ii. *Sectors which have “increasing” revealed comparative advantages in the time period under review;*

- Dried leguminous vegetables, nes, shelled, whether or not skinned/split
- Seeds of cumin
- Vegetables, nes, fresh/chilled
- Unrooted cuttings and slips
- Turmeric (curcuma)
- Cut flowers & flower buds
- Live goats
- Ginger
- Live bovine animals other than pure-bred breeding animals
- Beans (*Vigna* spp., *Phaseolus* spp.), shelled/unshelled, fresh/chilled
- Live sheep
- Live animals
- Seed potatoes, fresh/chilled
- Cabbage lettuce (head lettuce), fresh/chilled
- Pepper (genus Piper), neither crushed/ground
- Potatoes other than seed potatoes, fresh/chilled
- Cardamoms



- Onions & shallots, fresh/chilled
- Peas (*Pisum sativum*), shelled/unshelled, uncooked/cooked
- Tomatoes, fresh/chilled
- Carrots & turnips, fresh/chilled
- Vegetables (excl. olives/capers/cucumbers & gherkins/mushrooms), provisionally preserved
- Linseed
- Sesamum seeds
- Hop cones, not ground, powdered or pelleted
- Plants & parts, pharmacy, perfume, insecticide use nes

iii. *Sectors which have “decreasing” revealed comparative advantages in the time period*

- Broad beans and horse beans
- Chickpeas (garbanzos), dried, shelled, whether or not skinned/split
- Coffee, not roasted, not decaffeinated
- Kidney beans, incl. white pea beans (*Phaseolus vulgaris*),
- Pepper (genus Piper), crushed/ground
- Small red (Adzuki) beans (*Phaseolus/Vigna angularis*)
- Seeds of coriander
- Spices, nes.
- Salad beetroot, salsify, celeriac, radishes and similar edible roots.
- Leeks and other alliaceous vegetables, fresh/chilled
- Tea, black (fermented) & partly fermented tea, whether or not flavored
- Lentils, dried, shelled,
- Peas (*Pisum sativum*), fresh/chilled
- Beans (*Vigna* spp., *Phaseolus* spp)
- Leguminous vegetables (excl. of 0708.10 & 0708.20).
- Beans of *Vigna mungo* (L.)/ and Hepper *Vigna radiata* (L.)
- Ground-nuts shelled, not roasted or cooked
- Oil seeds and oleaginous fruits, nes
- Flour or meal of oil seed, fruit, except mustard, soya

iv. *Sectors which have revealed comparative advantages at present and had revealed comparative disadvantages in 2002*

- Unrooted cuttings and slips
- Live goats
- Vegetables (excl. olives/capers/cucumbers & gherkins/mushrooms)
- Roses, grafted/not, incl. their roots
- Horses, live, purebred breeding
- Vegetables, nes, uncooked/cooked by steaming/boiling in water, frozen
- Chicory (excl. witloof chicory), fresh/chilled
- Dried leguminous vegetables, nes, shelled, whether or not skinned/split
- Linseed
- Plants & parts, pharmacy, perfume, insecticide use nes

## Stability of the revealed comparative advantage indices

Mean and CV have been calculated for each commodity group at the HS6 level for the years 2002 to 2011 for RCA and trade values as expressed in US\$ (statistical data and results are shown in Appendix 5).

- v. *Coefficients of Variation for both RCA and export volumes at the HS 6 level are all <1 for the following (in order of increasing values);*
- Sesamum seeds
  - Ginger
  - Kidney beans, including white pea beans (*Phaseolus vulgaris*)
  - Oil seeds and oleaginous fruits, nes
  - Coffee, not roasted, not decaffeinated
  - Chickpeas
  - Onions & shallots, fresh/chilled
  - Broad beans and horse beans
  - Salad beetroot, salsify, celeriac, radishes and similar edible roots
  - Small red (Adzuki) beans and dried, shelled beans (*Phaseolus/Vigna angularis*),
  - Tomatoes, fresh/chilled
  - Ground-nuts shelled, not roasted or cooked
  - Pepper (genus Piper), crushed/ground
  - Beans (*Vigna* spp., *Phaseolus* spp.)
  - Unrooted cuttings and slips
- vi. *Exports where coefficients of variation at the HS 6 level for both RCA and export values are all >1 are shown in order of increasing values;*
- Beans (*Vigna* spp., *Phaseolus* spp.), shelled/unshelled, fresh/chilled
  - Cut flowers & flower buds
  - Potatoes other than seed potatoes, fresh/chilled
  - Turmeric (curcuma)
  - Plants & parts, pharmacy, perfume, insecticide use nes
  - Linseed
  - Dried vegetables and mixtures of dried vegetables
  - Vegetables, -fresh/chilled
  - Coffee, not roasted, decaffeinated
  - Dried leguminous vegetables
  - Cabbage lettuce (head lettuce), fresh/chilled
  - Pepper (genus Piper), neither crushed/ground
  - Live goats
  - Peas (*Pisum sativum*), dried, shelled, whether or not skinned/split
  - Peas (*Pisum sativum*), shelled/unshelled, uncooked/cooked
  - Cabbages, kohlrabi, kale and similar edible brassicas

## **Appendix 5; Statistical data**

In order to inform the relative importance of both the data being entered into the capacity building options as well as the capacity building options themselves the following table has been constructed using selected Ethiopian export trade data at the HS 2 and 4 digit level. Trade data has been extracted from the World Bank WITS database on Revealed Comparative Advantage and from the United Nations COMTRADE database for total exports. Average Revealed Comparative Advantage and total exports for the period between 2002 and 2010 have been calculated together with the Coefficient of Variation so as to provide an estimation of stability for the period under review. In addition the trade data has been regressed and a slope and intercept (in US\$) for each has been calculated so that the relative importance to Ethiopia of each commodity can be assessed in US\$ terms (Table A5-1).

**Table A5-1; Statistical analysis of Ethiopian trade data between 2002 and 2010**

Export code (HS six figure of export trade flows only)	HS Code	Revealed Comparative Advantage			Trade data (US\$)			
		Average	SD	CV	Average	CV	Slope	Intercept
Coffee, not roasted, not decaffeinated	090111	294.57	159.17	0.54	372788207	0.76	8.00E+07	7.00E+07
Sesamum seeds	1207 40	1747.47	599.71	0.34	180584293	0.62	4.00E+07	2.00E+07
Vegetables, -fresh/chilled	070990	168.63	226.79	1.34	81839685	1.31	4.00E+07	9.00E+07
Live bovine animals other than pure-bred breeding animals	010290	47.06	36.24	0.77	36162472	1.17	1.00E+07	3.00E+07
Kidney beans, including white pea beans ( <i>Phaseolus vulgaris</i> )	071333	221.67	92.25	0.42	28499905	0.76	6.00E+06	7.00E+06
Chickpeas	071320	442.82	240.21	0.54	23976022	0.48	2.00E+06	9.00E+06
Oil seeds and oleaginous fruits, nes	1207 99	801.92	348.77	0.43	21977273	0.60	3.00E+06	8.00E+06
Cut flowers & flower buds	060310	89.16	92.01	1.03	18027409	1.48	1.00E+07	2.00E+07
Broad beans and horse beans	071350	506.27	298.85	0.59	16359179	0.79	4.00E+06	7.00E+06
Unrooted cuttings and slips	060210	260.90	230.19	0.88	14228276	0.64	3.00E+06	8.09E+05
Ginger	091010	194.02	72.92	0.38	9131436	0.84	2.00E+06	3.00E+06
Lentils, dried, shelled, whether or not skinned/split	071340	30.62	28.99	0.95	5252579	1.09	1.00E+06	2.00E+06
Live sheep	010410	30.70	29.91	0.97	3804118	1.17	1.00E+06	3.00E+06
Beans ( <i>Vigna</i> spp., <i>Phaseolus</i> spp.), shelled/unshelled, fresh/chilled	070820	54.87	55.34	1.01	3619858	1.06	9.21E+05	2.00E+06
Dried vegetables and mixtures of dried vegetables	071290	10.99	14.68	1.34	3038598	1.01	1.00E+06	2.00E+06
Dried leguminous vegetables	071390	142.95	210.58	1.47	2706235	1.46	9.63E+05	3.00E+06
Tomatoes, fresh/chilled	070200	3.01	2.09	0.70	2135855	0.94	5.09E+05	7.98E+05
Potatoes other than seed potatoes, fresh/chilled	070190	6.56	7.37	1.12	2093657	1.55	8.04E+05	2.00E+06
Seeds of cumin	090930	114.70	177.46	1.55	1767143	0.98	4.47E+05	8.27E+05
Onions & shallots, fresh/chilled	070310	6.78	3.72	0.55	1403278	0.67	2.41E+05	2.65E+04
Coffee, not roasted, decaffeinated	090112	20.52	29.87	1.46	1331563	1.59	2.75E+05	4.44E+04
Seed potatoes, fresh/chilled	070110	12.38	13.34	1.08	1296874	0.97	4.21E+05	8.07E+05
Beans ( <i>Vigna</i> spp., <i>Phaseolus</i> spp.)	071339	30.47	25.26	0.83	1217496	0.97	1.15E+05	7.00E+05
Pepper (genus <i>Piper</i> ), crushed/ground	090412	86.56	63.68	0.74	1072631	0.64	7.32E+04	6.15E+05
Beans of <i>Vigna mungo</i> (L.)/ and Hepper <i>Vigna radiata</i> (L.)	071331	47.83	55.69	1.16	1055722	0.98	3.61E+04	1.00E+06
Turmeric ( <i>curcuma</i> )	091030	128.35	144.97	1.13	864454	1.04	2.22E+05	4.32E+05
Cabbages, kohlrabi, kale and similar edible brassicas	070490	11.10	24.78	2.23	838410	2.20	5.37E+04	4.67E+05
Small red (Adzuki) beans and dried, shelled beans ( <i>Phaseolus/Vigna angularis</i> ),	071332	62.33	42.65	0.68	625672	0.65	1.12E+05	6.55E+04
Pepper (genus <i>Piper</i> ), neither crushed/ground	090411	9.09	14.46	1.59	557748	1.67	8.14E+04	9.69E+04
Peas ( <i>Pisum sativum</i> ), dried, shelled, whether or	071310	2.80	4.77	1.70	454932	1.20	5.63E+04	1.74E+05

Export code (HS six figure of export trade flows only)	HS Code	Revealed Comparative Advantage			Trade data (US\$)			
		Average	SD	CV	Average	CV	Slope	Intercept
not skinned/split								
Live goats	010420	51.86	86.18	1.66	428360	1.30	1.12E+05	1.85E+05
Flour or meal of oil seed, fruit, except mustard, soya	120890	50.68	36.19	0.71	368038	1.07	2.55E+04	2.28E+05
Linseed	120400	7.18	9.02	1.26	365409	1.39	6.11E+04	2.95E+04
Plants & parts, pharmacy, perfume, insecticide uses	121190	2.00	2.38	1.19	359642	1.13	1.00E+05	1.90E+05
Cabbage lettuce (head lettuce), fresh/chilled	070511	4.23	6.44	1.52	326316	1.36	9.96E+04	2.41E+05
Cardamoms	090830	8.97	7.15	0.80	264806	1.31	7.53E+04	1.59E+05
Seeds of coriander	090920	32.83	38.11	1.16	240282	0.52	1.24E+04	1.51E+05
Hop cones, not ground, powdered or pelleted	121010	50.45	47.01	0.93	238695	1.32	7.73E+04	1.87E+05
Salad beetroot, salsify, celeriac, radishes and similar edible roots	070690	5.10	3.40	0.67	156777	0.73	2.50E+04	1.49E+04
Carrots & turnips, fresh/chilled	070610	1.35	1.00	0.74	140346	1.24	4.13E+04	9.48E+04
Ground-nuts shelled, not roasted or cooked	120220	1.62	1.13	0.70	136953	0.57	2.73E+03	1.22E+05
Peas (Pisum sativum), shelled/unshelled, uncooked/cooked	071021	1.37	2.49	1.81	102654	1.79	5.16E+04	1.30E+05

## **Appendix 6; Tables of risk assessment of trade impacts and smallholders/households involved in activities related to Sanitary and Phytosanitary capacity building options**

While the use of multiple criteria including substituting ranking systems where data is lacking allows an analysis to proceed there are a number of problems with the method. These mainly relate to weaknesses in the use of the Likert scale.<sup>11</sup> For instance capacity building option may be agreed as having large impacts on smallholders engaged in the sector but the scale does not necessarily account for the numbers engaged in that activity. Therefore information has been gleaned from a number of studies and sources to derive Table A6-1 which shows the numbers of households that might be affected by various capacity building options. A review of the sources has revealed that much of the available data on household activities and income sources is in fact quite weak. Nevertheless Table A6-1 below does provide a basis for estimating relative impact of capacity building options in terms of households involved in the activity. In most instances the relative impact of a capacity building option has not been assessed in this study. A further elaboration would be needed to determine whether an option that lightly impacts on a large number of households would be better than one that impacts significantly on a smaller number. In the context of the current study the analysis can only go so far using existing data but it does highlight areas where stronger data will help in refining the analysis.

A further issue that was discussed at length in the workshops that were held in Addis Ababa between the 6<sup>th</sup> and 10<sup>th</sup> of August 2012 was that of deriving credible numbers for trade impact of SPS related constraints. The issue is that while values for exports of SPS sensitive goods and the nature and potential severity of SPS measures had been made for the workshops in Ethiopia (Table A4-1 in Appendix 4) and net trade flows (which are shown in Table A4-3 in Appendix 4) these do not necessarily translate easily into the potential impact of a SPS capacity building option. In order to some basis for the estimation of the potential trade impact of investing in a capacity building option Table A6-2 has been constructed in the form of a basic Risk Assessment. The starting point of the Risk Assessment is gauging the traded values. Net trade flows of goods at the HS 2 level are used as this captures both important imports such as cereals as well as important exports such as fish and coffee (designated A). The next steps in the analysis are determining likelihood and severity of an SPS issue on trade. These have been estimated and are shown in the columns designated B and C. A number has been calculated in the column entitled 'Effect on exports from a SPS constraint assessed by likelihood and severity (US\$)' using the numbers in columns A, B and C. This derived number is the potential impact in US\$ of an SPS related event on exports. The number is to some extent arbitrary but does allow the inclusion of data for trade impact into the capacity building option cards in Appendix 3 in a more transparent way and allows for discussion on the impacts of interventions to be debated in a more formal context. The data in Table A6-2 is both positive and negative, reflecting trade flows, but has been entered only as a positive number in the capacity building option cards.

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<sup>11</sup> The Likert scale as used in this analysis is a multi-item scale indicating the level of agreement or disagreement with a series of statements, for example the impact of a capacity building option on vulnerable groups which in this context would be women, children and unemployed is scaled at; Large negative (-2), Negative (-1), No impact (0), Positive (+1), Large positive (+2)

**Table A6-1; Sanitary and Phytosanitary capacity building options in Ethiopia and potential impact on smallholders/households**

Capacity building option	Number of smallholder households potentially affected	Sources and assumptions	
Flower exports: surveillance and certification	85000	Labor Patterns in Export Floriculture: The Case of the Ethiopian Flower Industry, Ben Taylor, July 2010.	USD \$200 million trade zone with some-more than 85,000 jobs created.
Vegetable exports traceability	None or 85000	Development envisaged as primarily/exclusively by commercial farms	The vegetable sector is targeted for strong government support as a parallel sector to the existing flower industry. In Kenya it is much larger than the flower sector in terms of values and employment.
Meat exports - cold chain	120000	Growth and Transformation Plan ( <i>GTP</i> )	Ethiopia is the richest country in the livestock inventories in Africa with the total of about 41 million heads of cattle, 25 million heads of sheep 23 million of goats 41million of chicken, 5.7million of equines (donkey, horses and mules) and 2.3 million of camels. The richness of the country is both in terms of large number and diversity of livestock population.
Pesticide residue testing	None	Growth and Transformation Plan ( <i>GTP</i> )	
Veterinary drug and remedy testing	120000	Growth and Transformation Plan ( <i>GTP</i> )	The <i>GTP</i> targets in this area foresee a quantum jump in activity levels, as seen from the planned export increase in livestock exports (from 334,000 cattle heads in FY 2009/10 to 2.3 million cattle heads in FY 2014/15) and in meat exports (from 10,182 tons in FY 2009/10 to 111,000 tons in FY 2014/15)
Mycotoxin testing	None	No direct linkage	
Animal livestock traceability	120000	Growth and Transformation Plan ( <i>GTP</i> )	
GAP's and traceability in coffee	1200000	Credit guarantee scheme to promote enhanced coffee quality and trade in Ethiopia & Rwanda, Charles Agwanda, CABI Africa, 15 February 2011, CABI Review Conference, London	
Investment in blue leather production	46000	Data weak - numbers are those currently involved in work in leather industry	
Livestock management for FMD,	120000	Growth and Transformation Plan ( <i>GTP</i> )	
Strawberry exports to RSA	1000	Estimate based on South African farms and estimated size of market	

Capacity building option	Number of smallholder households potentially affected	Sources and assumptions	
Oilseed, cooking oil and cereals good agricultural practices	12000000	Crop Production in Ethiopia, Regional patterns and trends, Alemayehu Seyoum Taffesse, Paul Dorosh and Sinafikeh Asrat, Development Strategy and Governance Division, International Food Policy Research Institute, Ethiopia Strategy Support Program II, Ethiopia Strategy Support Program II (ESSP II) ESSP II Working Paper No. 0016 March 2011	
Dairy exports to region (COMESA standards)	1000000	National dairy herd is 10 million, with average herd size varying between 5 and 15 head	The NEXT STAGE IN DAIRY DEVELOPMENT FOR ETHIOPIA, Dairy Value Chains, End Markets and Food Security, Cooperative Agreement 663-A-00-05-00431-00, Submitted by Land O'Lakes, Inc. P.O. Box 3099 code 1250, Addis Ababa, Ethiopia
Post entry plant quarantine facilities	None	No direct linkage	



**Table A6-2; Estimated impact of not addressing Sanitary and Phytosanitary issues in relation to trade based on severity (high SPS impact) and likelihood (estimate of how likely an SPS trade issue is to arise in the future)**

Exports or imports at HS 2 figure level	Average of net trade flows between 2009 and 2011	Severity of SPS constraint*	Likelihood*	Effect on exports from a SPS constraint assessed by likelihood and severity
	A	B	C	= A-(A x B x C)
01 Live animals	127332428	0.01	0.50	636662
02 Meat and edible meat offal	50710186	0.01	0.50	253551
04 Dairy products, eggs, honey, edible animal product, nes	-10253604	0.25	0.50	-1281700
05 Products of animal origin, nes	1284615	0.25	0.50	160577
06 Live trees, plants, bulbs, roots, cut flowers etc	162367086	0.25	0.50	20295886
07 Edible vegetables and certain roots and tubers	339191175	0.25	0.50	42398897
08 Edible fruit, nuts, peel of citrus fruit, melons	1093643	0.25	0.50	136705
09 Coffee, tea, mate and spices	663779229	0.50	0.01	3318896
10 Cereals	-391299789	0.50	0.25	-48912474
11 Milling products, malt, starches, inulin, wheat gluten	-55554923	0.50	0.50	-13888731
12 Oil seed, oleagic fruits, grain, seed, fruit, etc, nes	354031906	0.50	0.75	132761965
13 Lac, gums, resins, vegetable saps and extracts nes	9560217	0.50	0.75	3585081
15 Animal, vegetable fats and oils, cleavage products, etc	-295685106	0.75	0.50	-110881915
17 Sugars and sugar confectionery	-107989434	0.05	0.05	-269974
19 Cereal, flour, starch, milk preparations and products	-34305265	0.50	0.25	-4288158
48 Paper & paperboard, articles of pulp, paper and board	-92591450	0.05	0.05	-231479

## Endnotes

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- <sup>1</sup> Cassidy, D., Thomson, G., Barnes, J., 2013, Establishing Priorities through use of Multi-criteria Decision Analysis for a Commodity Based Trade approach to Beef Exports from the East Caprivi Region of Namibia. FINAL REPORT February 25, 2013
- <sup>2</sup> Jilombo, C., 2009, Ethiopia signs CAADP Compact on 28 August, <http://www.caadp.net/news/?m=200908>. Website accessed 15 June 2012
- <sup>3</sup> Manzella, D., and Vapnek, J., 2007, Chapter 5. Ethiopia Country Study, in Development of an, analytical tool to assess, Biosecurity legislation, Development Law Service, FAO Legal Office
- <sup>4</sup> OIE, 2012, PVS Evaluation missions, State of play - as at 6 February, 2012 <http://www.oie.int/support-to-oie-members/pvs-evaluations/status-of-missions/>. Website accessed 15 June 2012
- <sup>5</sup> <http://www.oie.int/support-to-oie-members/pvs-pathway/>, Website accessed 22 12 2011
- <sup>6</sup> Phytosanitary.info <http://www.phytosanitary.info/search/?q=ethiopia>, Website accessed 15 June 2012
- <sup>7</sup> Enhanced Integrated Framework, 2012, Ethiopia, country profile, <http://www.enhancedif.org/EN%20web%20pages/Where%20we%20work/Ethiopia.htm> Website accessed 15 June 2012
- <sup>8</sup> World Trade Organization, 2012, SPS Information Management System, 13 June 2012, National Enquiry Points List of national enquiry points foreseen in Paragraph 3 of Annex B of the SPS Agreement
- <sup>9</sup> The Convention on Biological Diversity was finalized in Nairobi in May 1992 and the Cartagena Protocol was finalized and adopted in January 2000
- <sup>10</sup> Anon 2012, Ethiopia's national report on the implementation of the Cartagena Protocol on Biosafety (undated), <http://www.cbd.int/doc/world/et/et-nr-cpbi-en.pdf>, website accessed 14 June 2012
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- <sup>12</sup> <http://spsims.wto.org/> website accessed 13 June 2012.
- <sup>13</sup> [http://www.codexalimentarius.org/members-observers/members/detail/ru/?dyna\\_fef\[uid\]=15699](http://www.codexalimentarius.org/members-observers/members/detail/ru/?dyna_fef[uid]=15699) website accessed 13 June 2012.
- <sup>14</sup> Not on the WTO SPS website but on the IPPC website; [https://www.ippc.int/index.php?id=234&type=contact&subtype=&category\\_id=&tx\\_contact\\_pi1\[pointer\]=0&showAll=1#contact](https://www.ippc.int/index.php?id=234&type=contact&subtype=&category_id=&tx_contact_pi1[pointer]=0&showAll=1#contact), website accessed 13 June 2012.
- <sup>15</sup> <http://www.oie.int/en/about-us/our-members/delegates/> website accessed 13 June 2012
- <sup>16</sup> Henson and Masakure (2011).
- <sup>17</sup> Henson and Masakure (2011).

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<sup>18</sup> Advance Consulting, 2012, Phytosanitary services in the Ethiopian export-oriented horticulture, [http://www.advanceconsulting.nl/ethiopian\\_phytosanitary\\_services](http://www.advanceconsulting.nl/ethiopian_phytosanitary_services), website accessed 09/10/2012

<sup>19</sup> Martinsen, A. J., 2007, Ethiopia Meat Export Marketing & Logistics, TAES Ethiopia Cold Chain Technologies Meat Processing, Packaging, Transportation, WFLO (mimeo)

<sup>20</sup> Rich, K. M., Perry, B. D., Kaitibie, S., Gobana, M., Tewolde, N, 2008, Enabling livestock product exports from Ethiopia: understanding the costs, sustainability and poverty reduction implications of sanitary and phytosanitary compliance Final report for the Texas Agricultural Experiment Station, Texas A&M University Sanitary and Phytosanitary Livestock and Meat Marketing Program

<sup>21</sup> Anonymous, 2011, Appendix VI; Report of the meeting of the OIE *ad hoc* group on *Peste des Petits Ruminants*, Paris, 14–16 June 2011

<sup>22</sup> Toye, P., 2011, Update on animal health component 1.1. CGIAR Research Program on Livestock and Fish Planning Meeting, ILRI Nairobi 27-29 September 2011. Powerpoint presentation 25 pp.

<sup>23</sup> Key to sensitivity of SPS issues on trade

- XXX high influence
- XX some influence
- X little influence
- Blank no influence

<sup>24</sup> Moenius, J., 2006, Measuring Comparative Advantage: A Ricardian Approach. Mimeo 33pp

<sup>25</sup> Accessed from <http://wits.worldbank.org>, 25 November 2012