



Partnership
for Aflatoxin
Control in Africa

Partenariat pour
lutter contre
l'aflatoxine en Afrique

Parceria para o
Controle da
Aflatoxina em África

الشراكة من أجل مكافحة
الافلاتوكسين في أفريقيا



PACA

Strategy

2013-2022

September 2013

PACA Strategy

2013 – 2022

Date of publication: September 2013

This document is in the public domain. Users are welcome to download, save, or distribute this document electronically or in any other format, including in foreign language translation without written permission. We do ask that, if you distribute this report, you credit the Partnership for Aflatoxin Control in Africa (PACA) and mention the website <http://www.aflatoxinpartnership.org/> and not alter the text.

Suggested citation: PACA. (2013) PACA Strategy 2013–2022. Partnership for Aflatoxin Control in Africa, African Union Commission, Addis Ababa, Ethiopia.

Contents

Foreword	2
Preface	3
Acknowledgements	4
Acronyms	5
Executive Summary	6
1. Introduction	11
2. Background and Context	12
3. Challenges and Opportunities	14
3.1. Challenges	14
3.2. Opportunities	16
4. Vision, Mission, Guiding Principles and Role	19
5. Strategic Thematic Areas	20
5.1 Theme 1: Research and Technology for the Prevention and Control of Aflatoxins	20
5.2 Theme 2: Policies, Legislation and Standards for the Management of Aflatoxins	25
5.3 Theme 3: Growing Commerce and Trade and Protecting Human Health from Aflatoxins	28
5.4 Theme 4: Enhancing Capacity for Effective Aflatoxin Prevention and Control	31
5.5 Theme 5: Public Awareness, Advocacy and Communication	35
6. Making It Happen	38
7. Conclusion, and PACA Mid-Term Strategic Plan, 2014–2017	50
Appendix 1: Reference List	51
Appendix 2: Stakeholder Consultation Workshop Participant List	53

Foreword

The Partnership for Aflatoxin Control in Africa (PACA) was established in 2011 at the 7th Meeting of the Partnership Platform of the Comprehensive Africa Agriculture Development Programme (7th CAADP PP) where concerned stakeholders appreciated the need for an Africa- wide approach to the prevention and control of aflatoxins. The aflatoxin problem has been recognized as one of the biggest challenges to the achievement of food and nutrition security, trade, and health goals across the African continent. PACA's establishment is therefore in response to the call for concerted actions to address this problem.

This Ten Year Strategy 2013-2022 comes at a critical time as the African Union has declared 2014 the year of agriculture and food security. Also as we commemorate the 50th Anniversary of the OAU/AU this year, food and nutrition security in Africa features among the top priorities in AUC's Strategic Plan 2014-2017, and Africa's Agenda 2063. It is, therefore, pertinent that our efforts under PACA are contributing to this.

The PACA Ten Year Strategy was developed through a consultative process with inputs from over 100 stakeholders representing various constituencies from across the African continent, and is aligned with CAADP priorities in addressing food security and safety as well as the impact of aflatoxin on other sectors such as health and trade. The PACA Steering Committee endorsed the Strategy in August 2013.

The Strategy identifies key areas of focus for PACA and its partners to successfully tackle the issue of aflatoxin contamination and exposure. We, therefore, invite and encourage that all actors involved in prevention and control of aflatoxins make use of this Strategy to align their interventions with the partnership initiative and to work with us to achieve the vision of an Africa free from the harmful effects of aflatoxins. This vision will only be realized when all of us work together towards a healthier, well-nourished, food-secure and poverty free Africa.



Tumusiime Rhoda Peace
Commissioner for Rural Economy and
Agriculture African Union Commission

Preface

The aflatoxin problem constitutes a significant threat to food and economic security, and undermines poverty eradication in Africa. The problem is so complex that it straddles the agriculture and food security, trade and health sectors. The need for coordinated approaches to effectively address the problem is well understood and it is this recognition which led to the establishment of the Partnership for Aflatoxin Control in Africa (PACA).

Soon after the launch of PACA on 01 November 2012, consultations began on the need for a strategic plan that will guide aflatoxin control and prevention activities on the continent. The PACA Strategy, 2013-2022 was formulated based on the broad and inclusive involvement of stakeholders from across Africa and beyond during and after the PACA Strategy Development – Stakeholder Consultation Workshop in April 2013.

This document describes a ten-year strategy for PACA (the entire partnership!) and key entities in Africa addressing aflatoxin. The Strategy outlines needed actions for PACA from 2013 through 2022, to deliver on PACA's mission and contribute to the vision of an Africa free from the harmful effects of aflatoxins.

The PACA Strategy is a call to action for everyone concerned with the ravages of chronic and acute exposure by Africa's people to aflatoxin. It will take true partnership and collaboration to build and sustain the concerted effort required to address this vexing problem. To all who are and will be involved in the effort to deliver the impacts of good practices, technologies, policies, and information: PACA will support you by providing leadership and coordination for Africa's aflatoxin control efforts, acting primarily as catalyst, facilitator, partnership and knowledge broker, project developer and information clearinghouse. PACA will also advocate for the establishment of enabling policies and institutions, increased investment and the mobilization of resources, and should ultimately act as a grant-maker to support priority aflatoxin control activities.

The Strategy provides information on the background and context of the Strategy; challenges and opportunities; PACA's vision, mission, guiding principles and role; the five strategic areas of PACA's work for the next ten years (including Key Results Areas and indicative interventions); and a brief description of implementation areas for the Strategy. This document is available in both English and French.

We look forward to working with all PACA partners on implementing this Strategy and meeting this tremendously important challenge of Africa free from the harmful effects of aflatoxins.

The PACA Secretariat

Acknowledgements

The success of the Partnership for Aflatoxin Control in Africa (PACA) Strategy Development process is rooted in the Stakeholder Consultation Workshop conducted 10–12 April 2013.

Special thanks for the workshop go to the following:

- The African Union Commission
- Workshop co-sponsors, including the Tanzania Food and Drugs Authority, the Nelson Mandela African Institution of Science and Technology and the International Institute of Tropical Agriculture
- The PACA Strategy Development Stakeholder Consultation Planning Group
- PACA Steering Committee members
- Workshop presenters who shared their invaluable knowledge, which provided a common level of understanding and a platform from which to discuss the issues
- All of the 110 workshop participants for their significant expertise, active participation and enthusiasm for sharing ideas and experiences
- The PACA Strategic Plan Task Force Members who contributed additional time and energy for strategy review and revisions
- Dr. Ed Rege and PICOTEAM for tremendous workshop facilitation
- Ms. Monalisa Bangera and the Spearhead Africa staff for excellent logistics support

Acronyms

AMREF	African Medical Research Foundation
AU	African Union
AUC	African Union Commission
BecA	Biosciences eastern and central Africa
CAADP	Comprehensive African Agriculture Development Programme
CDC	Center for Disease Control
CGIAR	Consultative Group on International Agricultural Research
DREA	Department of Rural Economy and Agriculture (of AUC)
EU	European Union
FAO	Food and Agriculture Organization (of the United Nations)
GAP	Good Agricultural Practices
GMP	Good Manufacturing Practices
HACCP	Hazard Analysis and Critical Control Point
HBV	hepatitis B virus
HIV/AIDS	human immunodeficiency virus/acquired immunodeficiency syndrome
IITA	International Institute for Tropical Agriculture
ILRI	International Livestock Research Institute
KRA	Key Results Area
NARS	National agricultural research system
NEHAPs	National Environment and Health Action Plans
NGO	non-governmental organization
NM-AIST	Nelson Mandela-African Institute for Science and Technology
PACA	Partnership for Aflatoxin Control in Africa
RECs	Regional Economic Communities
SC	Steering Committee (of PACA)
SOPs	standard operating procedures
SPS	sanitary and phyto-sanitary
UN	United Nations
USAID	United States Agency for International Development

Executive Summary

Introduction

In 2010, in response to the threat of aflatoxins to consumers and economies in Africa, stakeholders from African governments, the private sector, funding organizations, farmers' organizations and other civil society groups identified the need for an Africa-wide approach to the prevention and control of aflatoxins. Consequently, during the seventh Comprehensive African Agriculture Development Programme (CAADP) Partnership Platform in March 2011, participants urged the African Union Commission (AUC) to oversee the establishment of a Continental SPS Working Group to mainstream sanitary and phyto-sanitary (SPS) matters in the CAADP framework and the establishment of the Partnership for Aflatoxin Control in Africa (PACA).

PACA has since been established as an innovative consortium aimed at coordinating aflatoxin mitigation and management across the health, agriculture and trade sectors in Africa. PACA's overall aim is to support agricultural development, safeguard consumer health and facilitate trade by catalyzing, coordinating and increasing effective aflatoxin control along agricultural value chains in Africa.

In April 2013, more than 100 PACA stakeholders from Africa and beyond attended a consultative meeting in Dar es Salaam, Tanzania, to generate input into an African strategy for the prevention and control of aflatoxins under the PACA initiative. Following the workshop, a small working group was charged with building on the initial work done by an Interim Steering Committee and Secretariat, and the outputs from the Dar es Salaam meeting, to develop a strategy for PACA. After further rounds of stakeholder consultation and validation, the process resulted in this Strategy, which was approved by the SC during its meeting in August 2013 in Johannesburg, South Africa.

This Strategy covers the first ten years of PACA, from 2013 through 2022. The executive summary that follows highlights the background and context; challenges and opportunities; PACA's vision, mission, guiding principles and role; the five strategic areas that will form the core of PACA's work over the next ten years, including Key Results Areas that will underpin the implementation of this Strategy and indicative interventions; and an account of the implementation approach.

Background and Context

Aflatoxins are naturally occurring, highly carcinogenic toxins produced by some fungal species belonging to the genus *Aspergillus*, mainly *Aspergillus flavus*. The fungi are common and widespread in nature, occurring in soils and plant matter, including cereals, oil seeds, nuts and other crops, and under certain circumstances the fungi contaminate food and feed with aflatoxins (USAID and Danya International, Inc. 2012). The Food and Agriculture Organization (FAO) estimates that a quarter of the world's food crops are affected by aflatoxins each year.

Areas situated between 40°N and 40°S of the equator, which includes all of Africa, are most at risk. Exposure to unsafe levels of aflatoxins occurs across much of Africa (Williams et al. 2004). The prevalence of aflatoxins is exacerbated by drought, pests, delayed harvest, insufficient drying and poor post-harvest handling—all of which are common in Africa (Wild and Gong 2010).

Long-term exposure to low to moderate levels of aflatoxins through the consumption of contaminated food—and also occupational exposure, for example by flour-mill workers—causes liver cancer and cirrhosis (IARC 2002). Some studies have also shown an association between aflatoxins and growth retardation in children (Gong et al. 2002; Turner et al. 2003). Preliminary evidence has suggested an interaction between chronic aflatoxin exposure and immune suppression and consequently susceptibility to infectious diseases such as malaria and HIV/AIDS (Jiang et al. 2008; Keenan et al. 2011). Experimental animal evidence suggests that chronic exposure to aflatoxins may also lead to reduced uptake of nutrients from the diet (Williams et al. 2004). Due to these health risks, aflatoxin contamination has wide-ranging impacts on trade, food safety and food security throughout Africa.

Aflatoxin contamination is a complex problem. The prevention and control of aflatoxins therefore requires a comprehensive, systematic, integrated and multi-sectoral approach involving a broad range of stakeholders in Africa and globally. This was the basis for the establishment of PACA as a partnership that seeks to catalyze and marshal efforts across Africa—capturing synergies, avoiding duplication and hence enhancing the effectiveness and efficiency of implementation while also facilitating the mobilization of new resources.

Challenges and Opportunities

To inform the development of this Strategy, PACA first identified challenges that will need to be overcome and opportunities that can be accessed to enhance PACA's efforts to control aflatoxins. The challenges include: food insecurity and limited dietary diversity, economic losses and barriers to trade, lack of aflatoxin awareness, limited aflatoxin regulation and the challenges of enforcement, limited utilization of alternative uses of contaminated foods, impacts of climate change, and problems of putting research into use. The opportunities include: urbanization and an expanding middle class, synergies with global health and nutrition initiatives, availability of intervention technologies, availability of new communications media, high priority given to agriculture globally, leveraging interventions intended for other purposes, African Union (AU) mechanisms for continental and regional integration, and presence of strategic partners.

PACA's analysis of trends, drivers, opportunities and challenges led to the identification of a vision, mission, guiding principles and five complementary, strategic thematic areas that PACA will address during the next decade to deliver on its mission.

PACA's Vision, Mission, Guiding Principles and Role

PACA's Vision: Africa free from the harmful effects of aflatoxins.

PACA's Mission: To support agricultural development, safeguard consumer health and facilitate trade by catalyzing, coordinating and increasing effective aflatoxin control along agricultural value chains in Africa.

PACA's Guiding Principles: In deciding where, when and how it should act, PACA will be guided by the following principles. Interventions should:

- have a high potential for impact, ideally in the short to medium term, and a high likelihood of success
- be based on sound scientific evidence and risk assessments, as appropriate
- be cross-cutting and address the adverse effects of aflatoxins in agriculture, food security and safety, trade and health
- focus on actions that can be uniquely accomplished by PACA
- take advantage of PACA's close linkages to the AUC to achieve high-level political buy-in
- be trans-boundary in nature, such that successful pilot projects can be scaled up to regional or continent-wide levels
- integrate comprehensive approaches from policy and advocacy, capacity building, and pre- and post-harvest measures into regulations and standards
- proactively seek to meet the needs of, engage with and benefit the resource poor, women and children, and youth, among other actors
- be economically and environmentally sustainable

PACA's Role: To provide leadership and coordination for Africa's aflatoxin control efforts, acting primarily as catalyst, facilitator, partnership and knowledge broker, project developer and information clearinghouse. PACA will also advocate for the establishment of enabling policies and institutions, increased investment and the mobilization of resources, and should ultimately act as a grant-maker to support priority aflatoxin control activities.

PACA's Strategic Thematic Areas of Work

The following thematic areas have been identified as the focus of work for PACA for the next ten years:

1. Research and technology for the prevention and control of aflatoxins
2. Policies, legislation and standards for the management of aflatoxins
3. Growing commerce and trade and protecting human health from aflatoxins
4. Enhancing capacity for effective aflatoxin prevention and control
5. Public awareness, advocacy and communication

Key Results Areas

PACA stakeholders identified Key Results Areas for each strategic thematic area. Interventions to achieve the results described below will be undertaken by PACA, strategic partners and stakeholders at all levels.

Theme 1. Research and technology for the prevention and control of aflatoxins

Theme Goal

To provide evidence that informs interventions; to adapt and promote the application of existing technologies; and to generate new technologies that enhance the control of aflatoxins in Africa

Key Results Areas

KRA 1.1: Generating information and evidence to inform interventions

KRA 1.2: Facilitating the adaptation and wider adoption of available technologies and knowledge

KRA 1.3: Developing new technologies and knowledge to improve aflatoxin prevention and control

KRA 1.4: Enhancing access to research facilities

Theme 2. Policies, legislation and standards for the management of aflatoxins

Theme Goal

To facilitate the development of, and compliance with, policies, regulations and standards for aflatoxin prevention and control

Key Result Areas

KRA 2.1: Enhancing policy analysis and formulation

KRA 2.2: Facilitating policy advocacy

KRA 2.3: Promoting the development of, and compliance with, standards and regulations

Theme 3. Growing commerce and trade and protecting human health from aflatoxins

Theme Goal

To achieve an appropriate balance between facilitating domestic and international trade and reducing risk to human health

Key Results Areas

KRA 3.1: Facilitating growth in trade and commerce in priority aflatoxin-prone commodities

KRA 3.2: Creating incentives that encourage positive behaviors with respect to aflatoxin management

Theme 4. Enhancing capacity for effective aflatoxin prevention and control

Theme Goal

To enhance the human and institutional capacities of actors along priority value chains, including those involved in trade and policymaking for aflatoxin management

Key Results Areas

KRA 4.1: Increasing capacity for risk assessment in African institutions to inform decision making

KRA 4.2: Improving institutional competency and infrastructure for aflatoxin diagnosis in crop and livestock commodities and in humans

KRA 4.3: Improving the capacity of value chain actors, civil society organizations and health practitioners to implement aflatoxin management best practices

Theme 5. Public awareness, advocacy and communication

Theme Goal

To increase awareness of the impacts of aflatoxins and of potential technologies and approaches to address aflatoxins

Key Results Areas

KRA 5.1: Increasing public awareness, information sharing and knowledge of aflatoxin contamination and health risks

KRA 5.2: Improving policy and political will through targeted communication

Making It Happen

The final section of the Strategy outlines PACA governance and management, partnerships, communication, financial planning and project development. The PACA Steering Committee and Secretariat will use the content of this ten-year strategy to develop the first mid-term strategic plan focused on the most-needed, immediate action areas for PACA for the period 2014–2017. This mid-term strategic plan will prioritize Key Results Areas, with justification and implementation activities, under each the five major thematic areas. We look forward to the day when the PACA vision is a reality: Africa free from the harmful effects of aflatoxins.

1. Introduction

In 2010, in response to the threat of aflatoxins to consumers and economies in Africa, stakeholders from African governments, the private sector, funding organizations, farmers' organizations and other civil society groups identified the need for an Africa-wide approach to the prevention and control of aflatoxins. Consequently, during the seventh Comprehensive African Agriculture Development Programme (CAADP) Partnership Platform in March 2011, participants urged the African Union Commission (AUC) to oversee the establishment of a Continental SPS Working Group to mainstream sanitary and phyto-sanitary (SPS) matters in the CAADP framework and the establishment of the Partnership for Aflatoxin Control in Africa (PACA).

PACA has since been established as an innovative consortium aimed at coordinating and supporting aflatoxin mitigation and management across the health, agriculture and trade sectors in Africa. *PACA's overall aim is to support agricultural development, safeguard consumer health and facilitate trade by catalyzing, coordinating and increasing effective aflatoxin control along agricultural value chains in Africa.*¹

PACA's first organizational meeting took place in October 2011, and the first meeting of its Interim Steering Committee—representing interests across relevant sectors in Africa—was held in March 2012. During 2012, the AUC worked with the Interim Steering Committee to develop structures and approaches for the effective functioning of PACA, including a start at articulating the broad objectives of the Partnership. PACA was formally launched and a substantive Steering Committee inaugurated on 31 October 2012.

In April 2013, more than 100 PACA stakeholders from Africa and beyond accepted invitations to attend a consultative meeting in Dar es Salaam, Tanzania. The objective of this meeting was to harness the collective experiences and knowledge of stakeholders to generate an African strategy for the prevention and control of aflatoxins and to identify next steps to operationalize the strategy. Following the Dar es Salaam meeting, members of a small working group built on the outputs from the meeting to develop a strategy for PACA. After further rounds of stakeholder consultation and validation, the process resulted in the Strategy articulated in this document. The Strategy was approved by the SC during in August 2013.

The Strategy outlines needed actions for PACA from 2013 through 2022. This document provides information on the background and context of the Strategy; challenges and opportunities; PACA's vision, mission, guiding principles and role; the five strategic areas of PACA's work for the next ten years (including Key Results Areas and indicative interventions); and a brief description of implementation areas for the Strategy.

¹<http://www.aflatoxinpartnership.org/>

2. Background and Context

Aflatoxins are naturally occurring, highly carcinogenic toxins produced by some fungal species belonging to the genus *Aspergillus*, mainly *Aspergillus flavus*. The fungi are common and widespread in nature, occurring in soils and plant matter, including cereals, oil seeds, nuts and other crops, and under certain circumstances the fungi contaminate food and feed with aflatoxins (USAID and Danya International, Inc. 2012).

The Food and Agriculture Organization (FAO) estimates that a quarter of the world's food crops are affected by aflatoxins each year. Countries situated between 40°N and 40°S of the equator, which includes all of Africa, are most at risk. Exposure to unsafe levels of aflatoxins occurs across much of Africa (Williams et al. 2004). The prevalence of aflatoxins is exacerbated by drought, pests, delayed harvest, insufficient drying and poor post-harvest handling—all of which are common in Africa (Wild and Gong 2010).

Although poor people are at particular risk—in part because of their dependence on staple crops, including maize and groundnuts, which are highly susceptible—wealthier people who enjoy more diverse diets are also at risk. Aflatoxins cannot be detected visually or by smell or taste, making it difficult for consumers to avoid eating foods contaminated with them.

Exposure to high doses of aflatoxins through human consumption of contaminated food can cause hemorrhaging, edema and rapid death, mainly due to acute liver damage. During the past four decades, hundreds of deaths have been recorded in Kenya alone due to acute aflatoxicosis (Shephard 2008).

Long-term exposure to low to moderate levels of aflatoxins through the consumption of contaminated food—and also occupational exposure, for example by flour-mill workers—causes liver cancer and cirrhosis (IARC 2002). Some studies have also shown an association between aflatoxins and growth retardation in children (Gong et al. 2002; Turner et al. 2003). Preliminary evidence has suggested an interaction between chronic aflatoxin exposure and immune suppression and consequently susceptibility to infectious diseases such as malaria and HIV/AIDS (Jiang et al. 2008; Keenan et al. 2011). Experimental animal evidence suggests that chronic exposure to aflatoxins may also lead to reduced uptake of nutrients from the diet (Williams et al. 2004). Due to these health risks, aflatoxin contamination has wide-ranging impacts on trade, food safety and food security throughout Africa.

Six forms of aflatoxin occur in plant-based foods or as toxic metabolites found in people or in animal products such as milk, meat, offal and eggs. Of these, aflatoxin B₁ is the most potent naturally occurring liver carcinogen (Leslie et al. 2008; USAID and Danya International, Inc. 2012). Few studies have estimated the regional or global burden of aflatoxin-related disease; however, one study estimated that, globally, 25,000 to 155,000 cases of liver cancer are attributable to aflatoxin exposure annually (Liu and Wu 2010).

Several factors can elevate health risks associated with aflatoxin exposure. For example, people infected with the hepatitis B virus (HBV) who experience chronic exposure to aflatoxins are 30 times more likely to contract liver cancer than people without an HBV infection, although the causal relationships are not fully understood (Liu and Wu 2010).

Due to these health risks, aflatoxin contamination has wide-ranging impacts on trade, food safety and food security throughout Africa. Strict and rigorous aflatoxin regulatory measures are implemented in developed and international markets, protecting consumers from the harmful effects of these toxins. Only 15 African countries have regulations governing aflatoxins, however (FAO 2004). And even in those that do, regulatory enforcement and awareness is often weak. In addition, much of the aflatoxin susceptible products are produced under subsistence farming situations, with households consuming what they have produced without any form of external inspection. The result is that much of the African population is exposed to levels of aflatoxins that are potentially harmful.

Aflatoxin contamination is a complex problem. Contamination can occur before harvest, during harvest and during post-harvest storage. The level of contamination is influenced by agricultural practices and biotic and abiotic factors. Moreover, the health impact of aflatoxins is complicated by exposure to multiple mycotoxins. That is, foods affected by aflatoxins are also susceptible to other types of mycotoxins, and multiple mycotoxins can coexist in the same commodity (Bankole and Mabekoje 2004).

The prevention and control of aflatoxins therefore requires a comprehensive, systematic, integrated and multi-sectoral approach involving a broad range of stakeholders in Africa and globally. This was the basis for the establishment of PACA as a partnership that seeks to catalyze and marshal efforts across Africa, capturing synergies, avoiding duplication and hence enhancing the effectiveness and efficiency of implementation while also facilitating the mobilization of new resources.

3. Challenges and Opportunities

In its efforts to facilitate the management of the aflatoxin problem in Africa, PACA faces a range of challenges and opportunities, summarized below.

3.1. Challenges

Food insecurity and limited dietary diversity

A report on the state of global food insecurity indicated that Africa, with 239 million undernourished people (22.9 percent of the population), has currently the highest concentration of hungry people in the world (FAO et al. 2012). The gap between the supply of food and the demand for food forces people and animals to consume even food that is visibly moldy or organoleptically unacceptable; food they otherwise might reject. This increases the risk of exposure to aflatoxins. Moreover, national food insecurity could reduce attention given to food safety and aflatoxin regulation.

Lack of dietary diversity—with diets based largely on single staple foods that are highly susceptible to aflatoxin contamination, such as maize and groundnuts—also makes the poor especially vulnerable to potentially harmful levels of exposure. Wealthier consumers are also at risk; they eat more food overall than the poor and also consume more of other at-risk products such as milk and meat.

Economic losses and barriers to trade

In addition to causing health problems, aflatoxin contamination causes huge economic losses due to the rejection of exported products (especially peanuts, but also other commodities and products), which exceed thresholds set by importers, such as the European Union (EU).

The lack of harmonized national standards across Africa, including for aflatoxins, is a major source of trade conflict. Global standard-setting bodies tend to be dominated by the interests of developed countries. Africa and other developing regions have little influence over the standards set.

Lack of aflatoxin awareness

A major challenge for better control of aflatoxins is the low level of awareness of the problem—not just among resource-poor farmers and consumers, but also among extension workers, health professionals and decision-makers. There is a clear need for awareness-raising for all stakeholders, as well as comprehensive capacity building along agricultural commodity value chains, including for consumers, health professionals and policy makers. The fact that aflatoxin contamination is invisible adds to the challenge, as even foods that do not appear moldy to the naked eye may still contain aflatoxins.

Advances in science and technology, including diagnostics and more powerful approaches to capture and analyze data, need to be better exploited to enable a compelling case to be made to policy makers and investors for the socioeconomic and health benefits of better mitigation and control of aflatoxins.

Limited aflatoxin regulation and the challenges of enforcement

Only 15 African countries currently have aflatoxin-related regulations. Moreover, the aflatoxin regulations in many of these countries currently do little to protect public health, since there is limited enforcement of food safety regulations, especially in communities where food quality is rarely formally inspected. The problem is exacerbated by a lack of physical and human capacity to monitor aflatoxin levels in at-risk crops and foodstuffs. There is therefore a huge challenge in establishing regulatory regimes and other interventions to protect the public health of the poor living in remote parts of African countries.

Limited utilization of alternative uses of contaminated foods

A major challenge concerns appropriate, safe and economically viable uses for aflatoxin contaminated foodstuffs. Several alternative uses are being practiced in some regions, including use as animal feed (in certain situations), processing to make the food safe and diversion to nonfood uses such as biofuel. However, currently neither the monitoring systems to identify contaminated batches, nor the infrastructure and incentives needed to make these options attractive and practical, exist in most African countries. Lack of viable alternative uses increases the risk that contaminated material will enter the human food chain. An additional challenge is that when contaminated material is transferred from food to other uses, it may reduce the availability of food to poor families who need it. Policies are needed to ensure access to safe food when contaminated food is removed from human consumption.

Impacts of climate change

The increasingly apparent impacts of climate change, in terms of both more-frequent extreme weather events and recurrent drought, could exacerbate the aflatoxin problem. As the climate warms and weather patterns become more erratic, the impact of aflatoxin contamination may increase (Cotty and Jaime-Garcia 2007).

Problems of putting research into use

A significant constraint to improving agriculture in Africa is the failure to translate promising research findings into application through working technologies, practices and approaches. All too often, expensive, publicly funded research remains on the shelf. Reasons for this include weak linkages between research organizations, on the one hand, and extension services, farmers' organizations and the private sector, on the other. Promising approaches for putting research into use include the formation and facilitation of multi-stakeholder platforms that bring together all the actors needed to ensure that promising research findings are exploited and achieve lasting impact. Additional constraints to the uptake of research are the risk-averse nature of poor farmers and their lack of access to credit, and also the difficult business environment for many small and medium-sized companies.

3.2. Opportunities

Urbanization and an expanding middle class

Among developing regions, Africa has experienced the highest urban growth during the last two decades at 3.5 percent per year, and this rate of growth is expected to hold into 2050. In 2010, the share of the urban population in Africa was about 36 percent; this is projected to increase to 50 percent by 2030 and 60 percent by 2050 (UN 2012).

With the emergence of a rapidly growing African middle class, consumers on the continent are becoming more discerning. Demand for safe, nutritious food has increased, even among the poor. At the same time, supermarkets are rapidly gaining ground in the African food market, taking over from less-formal food outlets such as kiosks, wet markets and small shops.

The overall result of rising populations, increased urbanization and a growing middle class is increased demand for food, including a growing demand for safer and more nutritious foodstuffs. This increased demand is likely to spur aflatoxin control on the continent.

Synergies with global health and nutrition initiatives

Recently there has been a particular focus by the global development community on nutrition during the first 1,000 days of life, starting from conception through to the second birthday. Chronic exposure to aflatoxins is associated with stunting and immune suppression. Studies carried out in Benin and Togo (Gong et al. 2002, 2003, 2004), and also The Gambia (Turner et al. 2003), have shown that elevated levels of aflatoxins in the blood are associated with stunting and children being underweight for their age. Thus aflatoxins are not only important and potent causes of liver cancer in the long term, but also serious and widespread threats to the normal development of children. Exposure to potentially harmful levels of aflatoxins begins in the womb and continues through to breastfeeding, baby-weaning foods and beyond. This is an opportunity for communications specialists to work with epidemiologists, pediatricians and other health professionals to make a compelling case linking better aflatoxin control and prevention to improved health and physical development outcomes for children, especially during the critical period of the first 1,000 days of life. This approach will complement recent major global initiatives, such as the 1,000 Days Partnership (an advocacy hub that champions new investment and partnerships to improve nutrition during the critical 1,000 days from conception to a child's second birthday as a way to achieve long-term progress in global health and development) and Scaling Up Nutrition (a global push for action and investment to improve maternal and child nutrition). This approach has the potential to increase both willingness to change behaviors in ways that can reduce aflatoxin contamination or exposure and also (given the explicit long-term impact on children) how seriously policy makers take this problem.

Availability of intervention technologies

Established technologies, such as post-harvest drying techniques, are available and can be adapted for use in different geographies and scales. Many scientists assert that the surest way to prevent economic and health losses from aflatoxins is to improve the implementation of Good Agricultural Practices (GAPs) and Good Manufacturing Practices (GMPs) such as selective irrigation (where possible), spacing, weeding, pest control, timely harvesting, removal of moldy or shriveled grains and nuts, proper drying, dry storage, oil testing and so forth (Waliyar et al. 2008).

Relatively inexpensive and rapid diagnostic tools are being developed that can detect aflatoxins in foods for people, feeds for animals and samples collected from patients. The challenge now is to make these diagnostic tools widely available at low cost, so as to enable entire value chains to be monitored, traded commodities to be screened and suspect human and livestock cases to be rapidly and accurately diagnosed.

In addition, advances in science and technology, especially biotechnology, can be better exploited to facilitate the creation of new and improved technologies, practices and approaches—especially in areas such as the development of aflatoxin resistant crops; the development of bio-control agents to prevent contamination in the field; improved storage and handling practices, both pre-and postharvest; improved diagnostics for contaminated crops and for people exposed to aflatoxins; and alternative and safe uses for contaminated crops. The development and testing of bio-controls for use in farmers' fields are well underway, with an example being the AflaSafe™ product.²

Availability of new communications media

The now-widespread access to mobile phones and rapidly increasing access to the internet and television—together with more traditional communication channels such as radio, newspapers and hoardings/billboards—provides the opportunity for highly creative, cost-effective and targeted information and awareness-raising campaigns to be conducted in ways and at scales hitherto unimaginable.

High priority given to agriculture globally

Rapid population growth, which is occurring against the backdrop of diminishing natural resources and increasingly apparent impacts of climate variability, has increased global attention on agriculture and food. The sudden increases in food prices that occurred in 2007 and 2008, which have persisted since then, served as a major wake-up call to national governments and the international community, both of which have now begun to prioritize agriculture and food production more highly on their agendas.

²http://www.mycored.eu/page/news/70/aflasafe:_the_new_website_by_iita/

Leveraging interventions intended for other purposes

In addition to specific programs, projects and activities designed to prevent and control aflatoxins, a huge opportunity exists to piggyback onto other initiatives that have different primary objectives. For example, initiatives that aim to improve smallholder farming practices, or practices in the storage, transportation and processing of food and feed, will result in, as a largely unintended consequence, reduction in aflatoxin levels.

African Union (AU) mechanisms for continental and regional integration

The AUC plays a central role in the day-to-day management of the AU. This role includes the elaboration, promotion, coordination and harmonization the programs and policies of the AU with those of the Regional Economic Communities (RECs). Consequently, the AUC has high-level convening power and a powerful array of organs, institutions and mechanisms to facilitate integration, harmonization and joint action. Having PACA hosted within the AUC provides an excellent opportunity to utilize these organs, institutions and mechanisms to further the cause of improved mitigation and control of aflatoxins across the continent.

Presence of strategic partners

There is a high level of interest in addressing the aflatoxin problem in Africa—with leadership being provided by the AUC and CAADP, expertise being provided by a large community-of-practice in Africa and beyond and significant initial funding being provided by donors. Total funding received or pledged for PACA exceeded US\$33 million by April 2013. All of these key actors have been actively involved in the development of this Strategy, which is likely to increase their sense of ownership and level of commitment to the Strategy. This bodes well for the realization of PACA's vision and the execution of its mission, which are outlined in the next section.

4. Vision, Mission, Guiding Principles and Role

PACA's Vision: Africa free from the harmful effects of aflatoxins.

PACA's Mission: To support agricultural development, safeguard consumer health and facilitate trade by catalyzing, coordinating and increasing effective aflatoxin control along agricultural value chains in Africa.

PACA's Guiding Principles: In deciding where, when and how it should act, PACA will be guided by the following principles. Interventions should:

- have a high potential for impact, ideally in the short to medium term, and a high likelihood of success
- be based on sound scientific evidence and risk assessments, as appropriate
- be cross-cutting and address the adverse effects of aflatoxins in agriculture, food security and safety, trade and health
- focus on actions that can be uniquely accomplished by PACA
- take advantage of PACA's close linkages to the AUC to achieve high-level political buy-in
- be trans-boundary in nature, such that successful pilot projects can be scaled up to regional or continent-wide levels
- integrate comprehensive approaches from policy and advocacy, capacity building, and pre- and post-harvest measures into regulations and standards
- proactively seek to meet the needs of, engage with and benefit the resource-poor, women and children, and youth, among other actors
- be economically and environmentally sustainable

PACA's Role: To provide leadership and coordination for Africa's aflatoxin control efforts, acting primarily as catalyst, facilitator, partnership and knowledge broker, project developer and information clearinghouse. PACA will also advocate for the establishment of enabling policies and institutions, increased investment and the mobilization of resources, and should ultimately act as a grant-maker to support priority aflatoxin control activities.

5. Strategic Thematic Areas

PACA's analysis of trends, drivers, opportunities and challenges led to the identification of five complementary thematic areas. Together these define the main areas that PACA will address during the next decade to deliver on its mission *to support agricultural development, safeguard consumer health and facilitate trade by catalyzing, coordinating and increasing effective aflatoxin control along agricultural value chains in Africa*. The five thematic areas are:

1. Research and technology for the prevention and control of aflatoxins
2. Policies, legislation and standards for the management of aflatoxins
3. Growing commerce and trade and protecting human health from aflatoxins
4. Enhancing capacity for effective aflatoxin prevention and control
5. Public awareness, advocacy and communication

This section describes the content of each of these thematic areas and provides indicative interventions within priority Key Results Areas.

5.1 Theme 1: Research and Technology for the Prevention and Control of Aflatoxins

5.1.1 Theme Goal

To provide evidence that informs interventions; to adapt and promote the application of existing technologies; and to generate new technologies that enhance the control of aflatoxins in Africa

5.1.2 Problem Statement

Current efforts to put existing research into use, generate new technologies and provide a solid evidence base to support informed decision making with regard to better aflatoxin prevention and control are inadequate. Initiatives are often fragmented and uncoordinated across the continent, and only weak linkages exist between those who develop technologies and those who could use them or make them available to end-users. There is therefore a need for more research overall that is better targeted and coordinated and that involves end-users from the outset. Such enhancements will help to ensure the relevance of research, embed a sense of ownership in the research and ensure that viable routes to market exist.

Specific research is needed on how to prevent aflatoxin contamination; detect contamination in foods (i.e., diagnostics for food products); prevent human exposure to contamination; detect human exposure (i.e., diagnostics for humans); and minimize health impacts post-exposure. Research is also needed to provide evidence for advocacy that can influence policy—for example, to make a compelling case to African policymakers that supporting appropriate pre- and post-harvest management interventions is critical to increasing food production and ensuring food safety. In particular, research evidence is needed to inform decisions about the

establishment of appropriate facilities and infrastructure for the surveillance, safe storage, handling and transport of food, as well as about awareness-raising targeting agricultural value chain actors and consumers. Availability of information on existing technologies, including empirical evidence on their performance and potential for adoption, could expand the use of these technologies.

In all of its interventions under this Theme, PACA will facilitate “adoption promotion” partnerships that involve private-sector technology developers.

5.1.3 Key Results Areas

KRA 1.1: Generating information and evidence to inform interventions

Objective: *To generate data and information that informs the choice and design of aflatoxin prevention and control interventions*

There is a critical need for reliable and systematic data on an ongoing basis to inform decision making. Because data collection is resource intensive, it is essential that there be confidence in the data being collected and in the information produced from these data. This calls for serious thought in the standards, design and execution of data collection, analysis and storage protocols—from the perspective of cost as well as reliability and usability. And, specific attention is needed to define what data is needed for what purpose. For example, data are needed:

- regarding aflatoxin prevalence along high-priority value chains,
- regarding consumption patterns,
- regarding producer, trader and consumer behavior,
- to quantify the economic impacts on livelihoods—including on health consequences, income and trade,
- on the impact of control measures on aflatoxin prevalence,
- to enhance understanding of value chain actors’ knowledge, attitudes, perceptions and practices regarding aflatoxin control and decision making—for example, willingness to pay for risk reduction strategies, and
- for risk analyses, including risk assessments and cost/benefit analyses, of alternative control strategies.

The availability, quality, coherence, standardization and accessibility of these kinds of data (and of systems of data collection, storage and use) in the developed world indicate what is possible for Africa, and represent an opportunity for Africa to leapfrog ahead in aspects of data collection, analysis and access. PACA will facilitate collaborative partnerships between African institutions and their counterparts in the North that can help to fast-track the establishment of these systems and standards.

Indicative Interventions

- *Conduct baseline studies and literature reviews* as appropriate to put together accurate data and information on the aflatoxin prevalence, consumption and exposure patterns, behavior and attitudes of value chain actors, and economic and public health impacts. Such studies should also generate information on effective or promising technologies and approaches and the conditions under which they have been demonstrated to work.
- *Generate evidence that informs policies and actions* around food safety, including trade. In particular:
 - Develop epidemiological surveillance systems. PACA will help countries to establish or strengthen systems for reporting aflatoxin cases (as input into the early prediction of potential outbreaks) as well as early warning systems to monitor aflatoxin levels in food sources or human subjects and associated response protocols.
 - Support national efforts to target monitoring or surveillance systems for high-risk areas or populations based on appropriate specimens (food, urine or serum) suitable for the specific contexts, including attention to local capacity to collect and analyze samples.
- *Undertake modeling* to develop predictive tools and support risk analyses, so as to forecast potential aflatoxin outbreaks in different parts of Africa. These tools can become useful decision-support systems, for instance to inform intervention targeting. Models and forecasting tools can build on assumptions around biophysical and socioeconomic variables from elsewhere in Africa, spatially and temporally.
- *Establish an aflatoxin database* with critical data and information on the various dimensions of aflatoxins, including prevalence, technologies, policy issues, capacities, initiatives and so forth.

KRA 1.2: Facilitating the adaptation and wider adoption of available technologies and knowledge

Objective: *To adapt and scale-up the use of existing knowledge and technologies for the prevention and control of aflatoxins in Africa*

Although there is clearly a need for new knowledge and technologies to address specific challenges, there is also a wide gap between knowledge and practice in aflatoxin prevention and control in Africa. In addition to facilitating investments in the identification of new technologies and catalyzing their development, PACA will facilitate partnerships that enable the wider deployment of existing knowledge and technologies.

Indicative Interventions

- *Develop cost-effective bio-control strategies.* Significant research progress has been made by the global scientific community in the area of bio-control. Atoxigenic strains of *Aspergillus* have been identified and used to develop biological control agents (Cleveland et al.2003).The atoxigenic strains can outcompete closely related, toxigenic strains in field situations, thus reducing levels of the problem fungi and therefore of aflatoxins in crops. New research will build on the available knowledge base to generate strategies that can be cost-effective for smallholder farmers.

- *Profile other promising approaches and technologies and promote their adaptation by the African aflatoxin research community for wider use.* In addition to focusing on bio-controls, PACA will facilitate the documentation of other promising approaches and technologies and promote relevant applied and adaptive research for wider use. In particular, PACA will support “research into use” methods—i.e., the piloting of new approaches or technologies in specific contexts (be they countries, regions or sets of circumstances), with a focus on improving the efficacy, effectiveness and efficiency of the technologies to better fit those contexts. PACA will also provide information and knowledge, in appropriate formats, on those approaches and technologies that prove most promising, to support their promotion and enhance adoption.
- *Identify barriers to adoption, and support developers of promising solutions.* PACA will identify and facilitate support new and established businesses that are seeking innovative ways to stimulate their entry into the marketplace, by helping them to identify and remove aflatoxin-related constraints and thereby improve their chances of success. This can be done by engaging and encouraging development partners and others to provide support to overcome barriers, for example through public-private partnerships
- *Conduct studies to understand factors affecting the choice between “no action” and the use of available technologies in agriculture, health and trade.*

KRA 1.3: Developing new technologies and knowledge to improve aflatoxin prevention and control

Objective: *To catalyze the generation of new technologies and knowledge that contributes to aflatoxin prevention and control in Africa*

The fight against aflatoxins requires a range of technologies: new crop varieties that resist fungal infection, bio-control technologies and strategies to reduce the field infection of crops, post-harvest handling technologies to prevent contamination, improved diagnostics to detect contamination and infection, and technologies that can facilitate safe alternative uses of contaminated products.

Indicative Interventions

- *Develop resistant crop varieties.* Potential biochemical and molecular markers of resistance have been identified in crops elsewhere, particularly in maize. These are being used in breeding for resistance to invasion by aflatoxin producing fungi or to aflatoxin contamination. PACA will facilitate the exploration of promising breeding approaches.
- *Improve storage, handling and agronomic technologies and knowledge to reduce pre- and post-harvest contamination.* Currently, aflatoxin contamination is prevented with tools such as proper post-harvest drying, storage, shelling, de-hulling and sorting, as well as early harvest, locally or regionally adjusted planting dates and insect pest control. However, even where storage conditions are generally good, aflatoxins frequently form prior to harvest, while the crop is maturing and/or awaiting harvest, which can result in significant losses. Moreover, all of these tools need to be refined and tailored to suit specific socioeconomic and biophysical contexts. PACA will facilitate research that aims to develop technologies

that prevent or reduce contamination in the field and post-harvest. This will include the development and testing of alternative drying and storage options.

- *Develop improved diagnostics* for the timely and reliable identification of contaminated foods and for the detection of exposure in human subjects. Currently available diagnostics are expensive and generally involve offsite laboratories, which present a major challenge in Africa. Affordable, simple and fit-for-purpose diagnostic test kits are needed for various situations—e.g., for testing food and feed samples and human subjects. PACA will broker and support partnerships to develop new diagnostics, building on ongoing research within and outside Africa.
- *Develop technologies and knowledge that facilitate alternative uses of contaminated materials.* Foods and animal feed contaminated by aflatoxins can be detoxified using a range of approaches—for example, through the use of inorganic salts, organic acids, ammoniation or aflatoxin B₁ binding agents. PACA will explore support for efforts that build on progress elsewhere to develop technologies and approaches that can work in local contexts.

KRA 1.4: Enhancing access to research facilities

Objective: *To facilitate access by the African aflatoxin research community to facilities and technologies that support priority research*

Research on the prevention and control of aflatoxins requires a comprehensive, systematic approach, involving a broad range of stakeholders and multiple disciplines. The continent's research institutions, however, lack the facilities and tools needed for quality research. Some efforts have been made—for example, in agricultural research—to establish shared labs and broker South–North and South–South collaboration, so as to facilitate access to shared, state-of-the-art facilities at affordable costs, avoiding a situation where each institution has its own expensive but sub optimally used equipment or lab setup. An example of this model is Biosciences eastern and central Africa (BecA), which is hosted at the International Livestock Research Institute (ILRI) in Nairobi. Other international and regional research facilities also exist, including those of the Centre for Disease Control and the African Medical and Research Foundation, among others. The brokerage of bilateral, collaborative partnerships between specific institutions is another commonly used strategy for addressing specific facility and institutional capacity gaps; these partnerships are often also linked to human capacity development.

Indicative Interventions

- *Establish or strengthen shared research facilities.* Based on needs identified by partners, PACA will help to establish and/or strengthen facilities, building primarily on existing institutions in Africa and focusing on specific needs for aflatoxin work.
- *Help aflatoxin research teams to access existing facilities within or outside Africa.* PACA will facilitate the “matchmaking” of African institutions or projects with potential collaborators in the North and the South, based on identified needs, and will support African scientists and scientific teams to access these facilities.

5.2 Theme 2: Policies, Legislation and Standards for the Management of Aflatoxins

5.2.1 Theme Goal

To facilitate the development of, and compliance with, policies, regulations and standards for aflatoxin prevention and control

5.2.2 Problem Statement

Policies, regulations and standards for aflatoxins in Africa are inadequate and in many cases wholly lacking. The regulations and standards that do exist are often not enforced; they also vary between countries, which complicates regional and continental trade. In addition, at a global level, Africa's voice is weak, and any standards set tend to be designed to meet the needs and interests of developed rather than developing countries. Where aflatoxin regulations do exist in Africa, they do little to protect public health, since there is limited enforcement of food safety regulations, especially in rural communities where food quality is rarely formally inspected. It is thus a significant challenge to establish regulatory regimes and other interventions that will protect the health of the poor who live in remote parts of the continent.

Comprehensive policies and regulation are needed that set acceptable thresholds of tolerance relevant to local contexts; facilitate the establishment of affordable and accessible testing facilities; help to reduce contamination (e.g., through the use of incentives such as price-differentiation systems based on contamination levels); and support alternative uses of contaminated foods.

In the majority of cases in Africa, a lack of data and analytical capacities limits the extent to which health risks and trade losses can be meaningfully quantified. Weak aflatoxin testing capabilities also limit the enforcement of aflatoxin regulations.

5.2.3 Key Results Areas

This Theme seeks to undertake analyses to provide evidence that can influence the policy and regulatory environment to support aflatoxin prevention and control and promote public health and trade at national, regional, continental and international levels. PACA will use existing mechanisms, such as the Continental SPS Working Group that is tasked with mainstreaming SPS issues into the CAADP (including regional and national SPS authorities), to engage in policy and regulatory issues.

KRA 2.1: Enhancing policy analysis and formulation

Objective: *To understand the policy environment relevant to aflatoxin management in Africa and enhance the continent's capacity for policy analysis and formulation*

An understanding of the current policy environment in Africa and the development of policy analysis capacity to support aflatoxin management is critical. Specific interventions here include understanding national policies across sectors in order to identify gaps, duplications and inter-sectoral contradictions, as well as assessing policy analysis and formulation capacities and taking actions to improve these.

Indicative Interventions

- *Conduct scoping studies* (where these have not yet been done) to understand the current policy landscape; what policies, regulations and standards are in place; to what extent they are being implemented; and what the compliance levels and challenges are.
- *Undertake a gap analysis* to identify policy gaps as a basis for policy reforms. PACA's work here will include promoting availability of data and evidence related to aflatoxins to inform the development or revision of National Environmental Health Action Plans and other instruments and plans relating to food and trade.
- *Develop capacity for policy analysis*. Based on the gap analysis, PACA will support action to fill the capacity gaps. Specifically, PACA will help embed capacity development in policy projects and organize policy training seminars and short courses for specific audiences, including policy analysts, researchers and policymakers.

KRA 2.2: Facilitating policy advocacy

Objective: *To improve the policy environment for aflatoxin management through proactive and coordinated advocacy*

Policy deliberations and actions in Africa that specifically address aflatoxin management have been sponsored, but to a limited degree. The few policy discourses to date have been *ad hoc*, with limited follow-up actions. Experiences in other sectors show that the institutionalization of policy dialogues can substantially change the quality and effectiveness of policy engagement. PACA will institutionalize policy dialogues as part of its Partnership Platforms at the national, regional and continental levels. Specifically, PACA will facilitate the establishment of nonpartisan, credible, multi-stakeholder forums for sharing information and knowledge. These dialogues will provide space for research evidence and a multiplicity of stakeholder voices to interface with public-sector agencies. A combination of “hard” platforms (e.g., conferences, workshops and seminar series) and “soft” platforms (e.g., websites, other web tools, databases, radio programs, television programs, electronic interactive sessions, regular publications, etc.) will be explored. To leverage resources from other initiatives, forums will be aligned to the extent possible with the calendars of other regional and global events that bring together cross-sections of relevant stakeholders.

Indicative Interventions

- *Develop policy briefs* based on emerging evidence from the policy analyses and research results from Theme 1.
- *Establish ongoing policy platforms at various levels* within the broader PACA Partnership Platform approach, which aims to progressively transform the policy landscape based on

experience sharing (from within and outside of Africa), learning from new evidence and case studies.

- *Organize themed policy advocacy workshops*, taking advantage of convenings by other initiatives and targeting specific audiences at the national, regional and continental levels. Some advocacy interventions may involve targeted individuals and institutions critical in the policy-making value chain, for the purposes of gaining their support by helping them understand specific issues and why these issues matter.

KRA 2.3: Promoting the development of, and compliance with, standards and regulations

Objective: *To strengthen Africa's capacity to develop and comply with standards and regulations for aflatoxin management*

While the aspiration to have more African farmers take part in high-value export markets is worthwhile, it is clear that, in the short to medium term, the greatest gains for Africa—especially for smallholder producers—will take place through domestic and regional markets within the continent. The greatest market opportunity, in fact, lies in the rising demand for quality produce by the growing urban consumer population, whose level of awareness about food quality and safety standards is increasingly comparable to that of international consumers. Consequently, even as Africa's initial emphasis is thought to be on markets within Africa, standard setting for these markets needs to be benchmarked against international best practices. Thus, the participation of African institutions in international standard-setting processes will remain important.

At the same time, as national standards and regulations are established, they could represent major barriers for farmers who are unable to comply with them. Furthermore, private standards (such as those imposed by food processors and supermarkets) could also restrict access by smallholder producers to domestic markets. Therefore, stakeholders along the value chain should take part in standards-development processes—not only so those stakeholders can influence the resulting standards, but also so they can better understand the benefits of compliance, thus fostering better adoption. Also, the harmonization of standards across RECs will facilitate increased inter-regional trade on the continent and enhance the collective capacity for engagement in international standard-setting processes.

Indicative Interventions

- *Strengthen Africa's capacity to contribute to and influence standard setting.* Increasing the participation of African institutions in international standard-setting processes is important for Africa. Currently, standard-setting bodies are dominated by the developed world. Strengthening the capacity of African countries and RECs to contribute effectively in these processes through informed and coordinated engagement is critical. However, a key issue is that standard-setting processes rarely include African data, because such data are lacking.
- *Harmonize standards* relevant for aflatoxin management across RECs, to facilitate increased inter-regional trade on the continent and enhance African capacity for collective engagement in international standard-setting processes.

- *Build the capacity of countries to implement standards and monitor compliance, and facilitate support of national SPS coordinating mechanisms for this purpose.*
-

5.3 Theme 3: Growing Commerce and Trade and Protecting Human Health from Aflatoxins

5.3.1 Theme Goal

To achieve an appropriate balance between facilitating domestic and international trade and reducing risk to human health

5.3.2 Problem Statement

Currently, awareness of the threat posed by aflatoxin contamination of foods for people and feed for livestock is generally low. The vast majority of African consumers—poor and wealthy alike—are not aware that they might be consuming aflatoxin contaminated foods, or that these foods could be exposing them to risks of cancer and other serious diseases and causing irreversible damage to their children. Although larger agribusinesses are usually aware of the problems associated with aflatoxins, small and medium-sized businesses may not be. And, there are few (or no) well-developed incentives to source raw materials that contain safe levels of aflatoxins (such as higher prices for certified aflatoxin-safe products), nor systems to provide such materials.

It should be possible to create demand for aflatoxin-safe foods by enhancing awareness among consumers of the health risks posed by aflatoxins (see Theme 5). It should also be possible to engender willingness to pay a premium (for those who can afford it) for foods that are certified safe. In general in Africa, demand for safe and nutritious foods is increasing, even among the poor. Clearly the poor have fewer resources, however, and are often forced to make difficult choices, such as between cheaper food and safer or more nutritious food. There is a risk that, in creating a two-tier market—made up of more expensive, certified aflatoxin-safe foods and cheaper foods that might contain unsafe levels of aflatoxins—the exposure of poor people to contaminated foods might increase.

In addition, if effective systems were in place that enabled millers and other agribusinesses to preferentially purchase aflatoxin-safe raw materials, there is a risk that producers who are unable to meet such standards will be disadvantaged by receiving a lower price or being excluded from these markets. Poor and small-scale producers, especially women, are likely to lose out more than medium-sized or large-scale ones, as they will be less able to invest in new technologies and better practices.

The EU's strict limits on aflatoxin levels, along with their rules on other quality issues, have reduced exports by African countries of cereals, nuts and other foodstuffs. Although it would clearly be worthwhile for exporting countries in Africa to target the European market, it is

arguably more appropriate—given the rapid economic and population growth in Africa—to target regional markets in Africa rather than more distant markets in Europe and elsewhere.

Expected growth from interventions in this KRA is targeted to domestic and regional markets, as well as to more distant, high-value export markets. This KRA will be complemented by efforts under Theme 2 to harmonize standards and regulations across African countries.

This analysis points to a critical need to develop and promote a combination of incentives, harmonized standards that are rigorously enforced, and alternative uses for contaminated material that safeguard health while facilitating trade.

5.3.3 Key Results Areas

KRA 3.1: Facilitating growth in trade and commerce in priority aflatoxin-prone commodities

Objective: To develop and promote industry-wide approaches to facilitate growth in the trade of commodities and products with safe levels of aflatoxins

A good understanding of the costs of reducing aflatoxins in foods to safe levels, as compared to the benefits that could accrue from such measures, could catalyze a transformative mindset change—especially if supported by standards based on real risks derived from evidence. In addition, investments in aflatoxin prevention and control could be influenced by clear market signals of demand for aflatoxin-free commodities, especially if technologies and approaches to achieve these safe levels were made accessible and affordable. Moreover, value chain actors who have demonstrated an interest in and ability to address food safety issues provide an opportunity for learning and a basis for scaling. Overall, there is clear opportunity for public-private partnerships (PPPs) that focus on market development (i.e., demand) and support value chain actors to take measures that allow them to benefit from these markets.

Indicative Interventions

- *Undertake an industry-level cost-benefit analysis to catalyze action.* PACA will work with agri-industry representatives, trade bodies and researchers to determine the true cost to industries and countries of aflatoxin contamination (including exclusion from high-value markets and losses due to rejected batches) and the benefits of adopting technologies and approaches that minimize losses due to aflatoxin contamination.
- *Increase understanding and promote wider use of risk-based approaches* to achieve better control of aflatoxins along value chains, including promotion of GAPs, GMPs and Hazard Analysis and Critical Control Point processes.
- *Promote the adoption of appropriate measures to open new markets.* PACA will help to identify otherwise viable markets for which access is currently constrained or prevented due to aflatoxin contamination, and promote the adoption of appropriate measures, including technologies, approaches and certification procedures that would open these markets to African products.

- *Scale promising projects and businesses.* PACA will identify programs, projects and organizations that are already involved in value chain development that could benefit from better aflatoxin control, help them incorporate appropriate interventions and roll these out at scale.
- *Learn from the experiences of the horticulture sector.* There is a real opportunity to benefit from the considerable experience that has been gained from helping small-scale producers meet the quality and safety standards required to supply the EU with horticultural products. Development partners, including the EU, have invested heavily in programs to increase awareness among small-scale producers of the standards they have to meet and to help them work toward meeting those standards. Undoubtedly there are useful lessons, including PPP models, from these and other relevant endeavors.

KRA 3.2: Creating incentives that encourage positive behaviors with respect to aflatoxin management

Objective: *To create incentives to motivate value chain actors to take the necessary actions to minimize aflatoxin contamination*

The logic behind this KRA is the idea that if value chain actors—farmers, traders, transporters, processors, storage providers, wholesalers, retailers and exporters, among others—can see that it is in their own best interest to meet standards, then they will be more likely to do so. At the same time, penalties need to be in place to ensure that those who do *not* take the necessary measures do not benefit from not doing so, nor jeopardize the achievements of those who do. Overall, the aim is to achieve a balanced combination of incentives and penalties that together drive a shift toward desirable behaviors that will reduce aflatoxin levels in value chains and thus reduce consumer exposure to unsafe levels of aflatoxins.

Indicative Interventions

- *Develop and test industry and official standards.* Working with regulatory authorities, local standard-setting agencies, commodity exchanges, those providing warehouse receipt systems, and other private-sector actors, PACA will promote the development and enforcement of appropriate voluntary and official standards and application of practical and fair ways of dealing with commodities and products that fail to meet the standards.
- *Investigate the potential role of aflatoxin-safe certification.* Explore the advantages and disadvantages of aflatoxin-safe certification schemes for foodstuffs for people and feeds for livestock, including third-party certification. Special attention will be paid to the risk of creating a two-tier market, with safe foods available to better-off consumers and potentially contaminated foods channeled to the poor.
- *Increase awareness among buyers*—including businesses who purchase from food processors and feed manufacturers—of commodities that are susceptible to aflatoxin contamination and help them to develop and apply means of verification that enable them to purchase only compliant materials, including exploring differential payment for different levels of aflatoxin contamination.

- *Create awareness among producers and other value chain actors* of the standards being developed, as well as cost-effective technologies and approaches that will enable them to meet the standards, and the benefits of doing so.
- *Develop, promote and facilitate safe and economically viable uses for batches of agricultural commodities that exceed permitted levels of aflatoxins for human consumption.* Possible uses for such materials include: blending with batches that have lower levels of aflatoxins, such that the blended material achieves a safe level; processing the contaminated material so that aflatoxin levels are reduced to safe levels or rendered biologically unavailable; and switching the material from the human food chain to alternative uses (for example, processing the material into biofuel or, if deemed safe to do so, using it for livestock feed). As a last resort, batches of highly contaminated material may need to be destroyed by burying or incineration. In these cases it will be helpful if producers can be compensated, to encourage compliance. If they are not, there is a risk the materials will find their way into informal markets, where they will likely be consumed by the poor.

5.4 Theme 4: Enhancing Capacity for Effective Aflatoxin Prevention and Control

5.4.1 Theme Goal

To enhance the human and institutional capacities of actors along priority value chains, including those involved in trade and policymaking for aflatoxin management

5.4.2 Problem Statement

Even if awareness of the risks associated with aflatoxins is enhanced—e.g., through the interventions outlined in Theme 5—the capacity to take the necessary actions will still be generally lacking. For example:

- There is a lack of reference laboratories on the continent to screen samples—e.g., of staple crops, of animal feeds, and from human and animal subjects—and generate scientific data for aflatoxin management.
- There is a lack of laboratory facilities where researchers can develop novel interventions for aflatoxins and adapt known interventions to the region (e.g., through plant breeding, novel diagnostics, novel decontamination strategies, etc.).
- There is also a lack of human capacity for aflatoxin analysis and management on the continent.
- Even if small-scale farmers knew about aflatoxin and the risks it poses, they do not know how to minimize the risk of contamination occurring in their fields during the growing season, at harvest or during post-harvest.
- Small-scale traders, transporters and processors do not have the knowledge or facilities to handle agricultural commodities in ways that minimize further contamination, nor do they have the capacity to differentiate batches that contain dangerous levels of aflatoxins from batches that are safe.

- Agro-dealers and extension workers are largely unaware that new biological control products are becoming available that can prevent aflatoxin contamination in farmers' fields.
- Health professionals, especially those on the frontline in local clinics and hospitals, are not sufficiently aware of the potential health risks associated with aflatoxins, nor are they equipped to carry out rapid diagnoses so as to be able to differentiate aflatoxin-related diseases from diseases of other etiology.
- Policy makers are not sufficiently aware of the importance of aflatoxins so as to be able to give this problem the attention it warrants. Also, those responsible for enforcing aflatoxin standards (where they exist) are not equipped to do so. And there is a general lack of capacity for applying risk-based approaches to the development of policy and regulations.
- Development partners and other investors tend to be insufficiently aware of the scale and importance of the problem so as to be able to make rational and proportionate investment decisions.

In many cases, a combination of human and institutional capacity development is needed. For example, to ensure that agricultural commodities have safe levels of aflatoxins requires that robust systems be in place to ensure effective sampling and testing; diagnostic tools need to be available to carry out rapid and reliable monitoring; skilled and trained people have to be in place to undertake sampling, on-the-spot testing and laboratory confirmation, all in accordance with standard operating procedures (SOPs); and this all needs to operate within a functioning regulatory framework. PACA will make special efforts to ensure that women can benefit from capacity-building initiatives supported by the Partnership, by designing schedules and locating initiatives in ways that enable women to meet the many competing demands on their time.

5.4.3 Key Results Areas

KRA 4.1: Increasing capacity for risk assessment in African institutions to inform decision making

Objective: To increase the capacity for risk assessment in African institutions

Over the past few decades, interest in risk-based approaches to developing policies and regulations has grown significantly. These approaches focus on identifying and responding to actual risks in the prevailing context, rather than developing prescriptive rules. These approaches enable limited resources to be better targeted to achieve desired policy and regulatory outcomes. Central to these methods is placing the assessment, quantification and monitoring of risk at the core of policy and regulatory design and implementation.

A major constraint to the wider adoption of risk-based approaches is the shortage in Africa of trained and experienced individuals to implement them. Moreover, the impact of climate change and increased climate variability is a game changer with regard to the contamination of food value chains with aflatoxins. The application of risk-based approaches and the modeling of possible future climate scenarios will enable better responses to be developed to cope with future challenges.

This KRA focuses on enhancing national and regional capacity to undertake risk-based approaches, with a particular focus on the adaptation and application of these approaches in the context of aflatoxin risks in Africa, while making the best use of the existing cadre of expertise within the continent.

Indicative Interventions

- *Strengthen risk-based analysis and regulatory science training programs* by including examples relevant to the African context and the aflatoxin challenge. To achieve this, there will be a need to work with regional and national bodies to advocate for a shift toward the use of risk-based approaches to inform decision making.
- *Create and maintain a database of risk assessment experts* from across the continent and facilitate mechanisms for these experts to contribute to the training and mentoring of others, as active and leading members of an emerging community of practice.
- *Use the PACA Partnership Platform to share information, experience and knowledge* about risk-based approaches for the management of aflatoxin risks and about the emergence of a community of practitioners in this area.
- *Gather and analyze data on aflatoxins in order to build predictive models*, define scenarios and highlight potential patterns and risks of future contamination of crops in Africa due to climate change. This will be linked to the work on modeling under Theme 2.

KRA 4.2: Improving institutional competency and infrastructure for aflatoxin diagnosis in crop and livestock commodities and in humans

Objective: *To improve the capacity of African institutions to test for aflatoxin contamination in foods and to detect infection in humans*

The first step to improve the control of aflatoxins is to be able to detect contaminated commodities, foods and feeds, and to be able to diagnose cases of aflatoxin poisoning in people and animals. This requires the development and establishment of robust systems for monitoring at-risk foods—preferably with all countries within regional trade blocks using the same sampling and testing regimes. To ensure that monitoring systems are effectively implemented and give consistently accurate and reliable results, both physical and human capacity will be needed—that is, equipment, facilities and resources, and a skilled workforce. Similarly, effective systems and trained and equipped people are needed to be able to diagnose cases of aflatoxin poisoning in people and animals.

Indicative Interventions

- *Develop guidelines and standard operating procedures for sampling and testing.* PACA will work with regional and national food safety authorities and health agencies, as well as researchers, to develop guidelines and SOPs for sampling and testing agricultural products for aflatoxin contamination and diagnosing aflatoxin poisoning in humans.
- *Develop appropriate infrastructure* (e.g., facilities and equipment) and curricula for regional and national training and facilitate resource mobilization (from donors, governments,

regional organizations and the private sector) to enable effective monitoring of aflatoxins in commodities and diagnosis of aflatoxin poisoning in people and livestock based on SOPs.

- *Create and maintain a database of organizations and individuals who have been trained in SOPs for testing aflatoxins as well as that of screening and reference laboratories for aflatoxin testing on the continent.*

KRA 4.3: Improving the capacity of value chain actors, civil society organizations and health practitioners to implement aflatoxin management best practices

Objective: *To improve the capacity of relevant African institutions to adopt best practices that will contribute to better aflatoxin prevention and control*

If awareness about the risks associated with aflatoxins is increased, more rigorous systems for monitoring contamination are put in place, and (perhaps) incentives are established to meet aflatoxin standards, this will create demand for training programs to enable the implementation of aflatoxin-related best practices. Initially, curricula for extension workers and other intermediaries, such as local civil society staff, will need to be strengthened to include an emphasis on the impacts of aflatoxins and of options for reducing aflatoxin contamination along value chains. Curricula for medical professionals will also need to be designed to better equip doctors and paraprofessionals to diagnose and treat aflatoxin-related diseases—both acute poisoning as well as the effects of longer-term chronic exposure, especially the potential developmental impacts on children.

In addition, training materials will need to be developed, tested, adapted and applied at scale to introduce small-scale farmers, extension personnel, front-line medical staff and even consumers to the most relevant and applicable technologies and approaches.

Developing these curricula and training materials will require collaborative efforts among experts from specialized laboratories, research institutions, universities, national agricultural research systems, the Consultative Group on International Agricultural Research centers, farmer organizations and nongovernmental organizations, among others. Such curricula should take account, as appropriate, of the interconnections among agriculture and food security, health and trade.

Indicative Interventions

- *Develop and test training modules on aflatoxin* that can be incorporated and/or adapted into existing courses for extension workers and front-line medical professionals and paraprofessionals.
- *Make tested and validated training modules easily accessible* for use and adaptation by others, and provide modalities—e.g., through PACA Platforms and other convenings—for the emerging community of practice to share tips, experiences and suggestions for improvements.
- *Develop and test extension materials* and other innovative approaches to promote aflatoxin-related best practices targeted at different audiences. These approaches should utilize

alternative media, formats and language and enable the sharing of results, so that a broad array of actors can benefit from the experience gained.

5.5 Theme 5: Public Awareness, Advocacy and Communication

5.5.1 Theme Goal

To increase awareness of the impacts of aflatoxins and of potential technologies and approaches to address aflatoxins

Note: This Theme is focused on *external* communications. As PACA is a partnership organization, excellent *internal* communications with partners will also be critical; the communication strategy with PACA partners is covered later, in the Making It Happen section.

5.5.2 Problem Statement

As noted previously, awareness about aflatoxins is generally low. This hampers initiatives to decrease contamination along value chains, reduce consumption of contaminated foods, create an enabling policy and institutional environment, and ensure that aflatoxins receive the attention and investment this problem deserves. For example:

- Small-scale farmers and other small-scale value chain actors in Africa are largely unaware of the danger that aflatoxins pose, practices that can lead to the contamination of human food and livestock feeds, and the measures they could take to reduce contamination.
- Consumers are largely unaware that the foods they and their families routinely consume are potentially causing long-term harm due to aflatoxin contamination.
- Health practitioners are unlikely to be equipped to diagnose and treat aflatoxin-related diseases, especially those due to long-term exposure to low to medium levels of aflatoxins.
- Policy makers and development partners tend not to prioritize aflatoxin control and prevention in comparison to other food safety and broader food security issues.

There is therefore a need for scientists and communication specialists to work together to develop clear, evidence-based, actionable messages and information targeted at specific audiences and delivered using the media, formats and language most appropriate and accessible to those groups. In doing so, care needs to be taken to avoid causing alarm and panic among the general public, which might cause markets to collapse. The huge increase in access to modern communication channels, such as mobile phones, television, FM radio stations, and the internet, means that this task can be tackled at a scale and in ways hitherto unimaginable.

Clear information that can be understood by non-specialist audiences is needed to support advocacy campaigns—for example, those aiming to develop improved policies or higher resource allocation to support better aflatoxin mitigation and control. An important principle for all PACA communication products and other suitable outputs will be that these are

provided under Creative Commons licenses, which are designed to facilitate, promote and enable their widespread use, adaptation, repurposing and sharing.

5.5.3 Key Results Areas

KRA 5.1: Increasing public awareness, information sharing and knowledge of aflatoxin contamination and health risks

Objective: *To increase awareness of risks associated with aflatoxins to health, agriculture and trade, and about the technologies and approaches available to prevent and mitigate contamination*

Work in this area will provide information to enable informed decision making by actors along relevant value chains, including smallholders, traders, transporters, processors, storage providers, retailers and wholesalers, among others. By analyzing the needs and interests of different actors in the agricultural value chain and policy landscape, and developing and testing communication materials targeted at different audiences, lessons will be generated. These lessons can inform the development of exemplar materials that partners and stakeholders can then use and adapt for local uses, by customizing them to accommodate locally important crops, practices and languages.

Indicative Interventions

- *Develop a strategy for behavioral change.* PACA will develop a communication strategy that aims to bring about positive behavioral change by actors along value chains. This will be informed by baseline perceptions and needs assessment studies.
- *Develop contextualized awareness materials.* Working with local partners—e.g., technical experts and communication specialists, including the media—PACA will develop awareness-raising materials targeted at the needs of specific audiences based on the most appropriate media, format and languages.
- *Learn and adapt materials based on lessons.* PACA will test awareness-raising materials and approaches and generate and share lessons learned—i.e., what worked, what did not and why, and whether materials were equally useful and appropriate for men and women. PACA will also use lessons learned to develop templates containing accurate, simple information on aflatoxin control targeted at different groups that can be translated into local languages for use by stakeholders.

KRA 5.2: Improving policy and political will through targeted communication

Objective: *To provide policy makers with a better understanding of the importance and scale of the aflatoxin problem, the potential benefits associated with better management and the required policy interventions*

Interventions in this area aim to produce and use effective communication and advocacy approaches intended to enable policy makers at all levels—from local through national and regional to continental—to make evidence-based decisions about what should be done, how it

should be done and the appropriate levels of resource allocation needed, and to be able to prioritize aflatoxin issues relative to other pressing issues.

Indicative Interventions

- *Compile authoritative data that demonstrates the cost*, in terms of economic parameters as well as on human health, of the prevailing level of aflatoxin contamination in Africa. This is linked to work in Theme 1.
- *Develop clear, compelling and evidence-based briefs* that explain the problem, the potential solutions and the benefits in terms of improved health outcomes and enhanced trade that could accrue from implementing these solutions. This is linked to Theme 2.
- *Work with parliamentary agriculture committees* to ensure that parliamentarians understand the issues and are able to put in place the necessary legislation as well as secure appropriate budgetary allocations.
- *Work with the AUC and RECs* to ensure that ministers of agriculture and food are adequately briefed on aflatoxin issues.
- *Work with development partners* to ensure they are adequately briefed on aflatoxin issues.

6. Making It Happen

6.1 Governance and Management

6.1.1 PACA Governance

PACA's governance structure will be built upon the platform devised by PACA's Interim Steering Committee and adopted by the full PACA Steering Committee meeting at the African Union Commission in November 2012, during the inaugural events launching PACA. The organizational structure utilizes the following *guiding principles*:

- PACA will be embedded within existing African institutions, especially the African Union Commission and Regional Economic Communities, and aligned with the CAADP process to leverage existing continent-wide harmonization efforts.
- CAADP Pillars II (Improving rural infrastructure and trade-related capacities for improved market access), III (Increasing food supply and reducing hunger) and IV (Agricultural research, technology dissemination and adoption) provide the best conduits for aflatoxin control and abatement activities.
- The CAADP framework supports the mandate of PACA to build upon existing structures while simultaneously offering significant breadth and depth to develop, disseminate and adopt regionally harmonized standards for aflatoxin control in foods and feeds across the continent.

Furthermore, PACA will make every attempt to ensure that its governance structure reflects current *global best practices*, including:

- Clear distinction between the roles of the PACA Secretariat, the hosting entity (the AUC) and the Steering Committee (SC), to ensure that the SC focuses on distinct governance issues, rather than mirroring the Secretariat's functions,
- Clear accountability by the Secretariat, the host organization and the Steering Committee for the work of PACA,
- Commitment to a good working relationship between the Steering Committee, the PACA Secretariat and the AUC as the host organization for the Secretariat,
- Focused and proactive recruitment of Steering Committee members to ensure that diverse, specific skills and experiences are obtained for SC functions,
- A clear conflict management process, including procedures for proactive management of conflicts of interest, and
- Provision of induction training and support for new SC members.

PACA has identified *three main levels of responsibility* that should be reflected in the PACA operational structure: continent-wide, regional and national. The structural elements that operate at the continent-wide level are described in Table 1 later in this section.

The goal of the AUC is to achieve continental integration, working through RECs as the building blocks. With respect to PACA, the continental responsibilities of the AUC include:

- Providing political leadership and strategic guidance on the development of PACA
- Hosting the PACA Secretariat
- Convening Steering Committee meetings
- Promoting inter-REC collaboration and the sharing of experiences
- Policy advocacy
- Reviewing budgets and monitoring and disbursing finances
- Resource mobilization

At the regional level, aflatoxin programs will be coordinated by the RECs in partnership with implementing agencies and the SPS competent authorities within the CAADP framework. The regional entities play the unique role of serving as the coordinator between PACA and country programs. They will take a leadership role in the harmonization of regulations, standards and compliance across all sectors affected by the aflatoxin problem.

RECs, as building blocks of the AUC, develop and implement various programs to advance regional integration. With respect to PACA, they have responsibility for:

- Reviewing project technical proposals with member countries and other stakeholders to ensure PACA activities are synergized with regional SPS programs and national priorities,
- Working with implementing agencies to mobilize actions around CAADP investment plans,
- Continuously monitoring progress at the country and regional levels (through the CAADP and regional SPS Committees), and
- Providing progress updates to the PACA Steering Committee.

National priorities will be developed by countries, through engagement with governments and SPS authorities, the private sector and other stakeholders engaged through the CAADP process, where possible, that will be closely aligned with PACA and regional priorities. Aflatoxin mitigation activities should be linked to CAADP implementation at the country level. PACA activities should strengthen domestic food safety systems and programs and complement existing resources.

A comprehensive aflatoxin program will contain a full range of components, including effective policies, standards and regulations through to full information from economic, food security and health assessments, and returning with improved activities at all levels.

6.1.2 PACA Structure

Below, the elements of an effective PACA structure are outlined, along with the roles and responsibilities, and membership, associated with each element.

The PACA Steering Committee will maintain overall responsibility for the governance of PACA. The SC is the apex organ in the governance structure of PACA, working in coordination with the AUC, RECs and SPS competent authorities. The SC members serve to provide PACA and its membership with guidance, oversight and decision making regarding the operations and activities of PACA.

The PACA SC shall be comprised of representatives of the following organizations, with designated representatives to rotate as terms expire (the number of seats are in parentheses, with 14 total):

- African Union Commission (1) (Chair)
- Regional Economic Communities (2)
- Farmer organizations (1)
- Civil society organizations (1)
- Private sector (1)
- African health institutions (1)
- African research or academic institutions (1)
- Development partners (1)
- Technical agencies (2)
- Additional institutions, as needed (2)
- PACA Secretariat (1, the Program Manager or Designee)

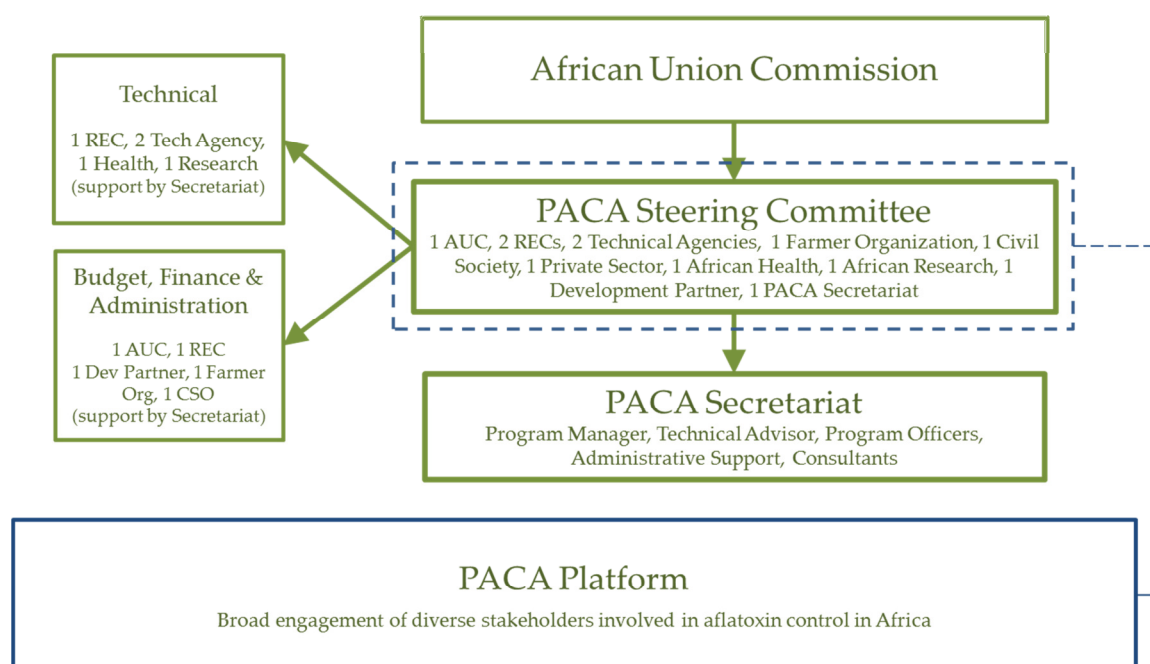
As of September 2013, the following institutions are members of the SC: AUC Department of Rural Economy and Agriculture; Economic Community of West African States (ECOWAS) and Common Market for Eastern and Southern Africa (COMESA); Pan African Farmers Organization (PAFO); Consumers International; Pan African Agribusiness and Agro Industry Consortium (PanAAC); African Medical and Research Foundation (AMREF); Forum for Agricultural Research in Africa (FARA); U.S. Agency for International Development (USAID); African Agricultural Technology Foundation (AATF); and International Institute of Tropical Agriculture (IITA).

SC members are appointed to serve on behalf of their institutions, not as individuals, and agree to represent the general interests of their constituency. SC members will be nominated to and selected by the Steering Committee with input from all stakeholders. Members of the SC will hold office for three years (beginning 1 November 2012) and are eligible for reappointment once. The SC will generally meet twice per year, and more often as necessary. Continuity of representation will be ensured by having no more than one half of the members up for rotation at any given time.

The SC will constitute and convene subcommittees as needed to effectively carry out its responsibilities, to be drawn from the SC membership and key stakeholder groups.

Every effort will be made to ensure a balance of expertise on the SC relevant to the business of PACA. Specifically, efforts will be made to ensure that the SC includes a balance of expertise and representation from agriculture, health and trade; both the biophysical and social sciences; both practical experience and local knowledge; and both men and women.

Partnership for Aflatoxin Control in Africa Organogram



These elements are described in more detail in Table 1, on the following page.

All governance bodies will operate under agreed-upon Terms of Reference, which will be made publicly available on the PACA website.³

³http://www.aflatoxinpartnership.org/en/About_PACA.aspx

Table 1. Roles and Responsibilities of Structural Elements of the Partnership for Aflatoxin Control in Africa

Organizational Element	Roles and Responsibilities	Membership
PACA Partnership Platform	<ul style="list-style-type: none"> - Exchange information about aflatoxin control activities and policies - Provide input on the strategic direction and activities of PACA 	Broad range of diverse stakeholders involved in aflatoxin control in Africa
Steering Committee	<ul style="list-style-type: none"> - Approval of overall structure, functions and positions of the PACA Secretariat - Provide policy direction and strategic guidance on the development of PACA - Promote dialogue among all partners and stakeholders to ensure synergy - Address overlapping roles and gaps of RECs - Raise awareness of and advocate for aflatoxin control at the international and Africa-wide levels, and support awareness-raising, communications and advocacy activities at the regional and country levels as appropriate - Mobilize resources and conduct fundraising - Make decisions on Africa-wide initiatives and projects - Report to the PACA Partnership Platform - Provide implementation oversight, including approval of revised strategic and implementation plans, annual work plans and budgets, and annual financial and audit statements 	Members as defined in the SC Terms of Reference
Budget, Finance and Administration Subcommittee	<ul style="list-style-type: none"> - Review and monitor PACA finances and budget and provide general recommendations on the annual budget for discretionary funds, reporting to the SC - Advise the SC on establishing a financial mechanism to manage funds from multiple sources that are supporting aflatoxin control actions 	Currently has five members representing the following categories of members: AUC, REC, Famers' Organization, Civil Society and Development Partner

Other Subcommittees	<ul style="list-style-type: none"> - The PACA SC may appoint standing subcommittees to address specific PACA objectives. These subcommittees will be primarily comprised of SC members. - For instance, PACA might create technical subcommittees to: <ul style="list-style-type: none"> o Provide technical guidance at the continental level, and technical advice on Africa-wide proposals and projects, to inform Steering Committee decisions o Provide input to the PACA Steering Committee on priority-setting and strategy development o As needed, provide oversight of a proposal review process to be carried out by independent proposal review team(s) o Upon request, review and provide an assessment of technical documents for the SC o Review the progress of PACA projects and provide an assessment of progress to the SC o Provide advice on the engagement of the private sector and others who can inform long-term sustainable approaches for aflatoxin control in Africa 	A diverse and balanced group of SC members and external technical experts
Secretariat	<ul style="list-style-type: none"> - Support the Steering Committee, Subcommittees, membership and independent proposal review teams - Promote communication linkages between PACA members - Develop an Africa-wide website - Support PACA communications - Provide day-to-day oversight of PACA activities and projects 	About five staff members with formal linkages to SPS Programs at RECs and in countries

6.1.3 PACA Management Approach

PACA will operate with a relatively small Secretariat staff, reflecting its primary roles as catalyst, facilitator, project developer, knowledge broker, resource mobilizer and advocate. The core team will consist of several positions, including: Program Manager (who will also be responsible for day-to-day management of the Secretariat), a Technical Advisor (who will also serve as the Deputy Manager) and Program Officer(s), supported by an administrative assistant. The following positions may be added to the Secretariat, depending on need and available budget: Communications and Partnership Officer and Monitoring and Evaluation (M&E) Officer.

The PACA Secretariat team should collectively have strong expertise pertinent to aflatoxin control and a diversity of sector experiences, such as in agriculture and food security, health and trade. PACA will make every effort to ensure that women are adequately represented in the management and staffing structure at the Secretariat. As the PACA strategy is operationalized, program officers will oversee project implementation. An appropriate staff member will oversee the development and implementation of a gender strategy to ensure that the interests and special needs of women and youth are comprehensively mainstreamed into all PACA strategies, programs, projects and activities and that the progress tracking indicators of the M&E plans reflect this.

All support functions—such as travel, interpretation and translation services, and other services not part of PACA’s core business—will be outsourced, preferably within the continent. In addition, short-term consultants will be engaged for specific, short-term tasks when either the necessary skills are not available in-house, or the Secretariat needs additional human resources for a particular period and activity.

Secretariat Transition to the AUC

In 2012, working closely with the African Union Commission and the Steering Committee, Meridian Institute acted as an interim PACA Secretariat. Also in 2012, PACA began the process of transitioning from these interim arrangements to a sustainable, Africa-based organization, with a full Steering Committee and a Secretariat hosted and led by the AUC’s Department of Rural Economy and Agriculture in Addis Ababa. The process of transitioning the Secretariat to the AUC is well underway. In 2013, three Secretariat staff members were hired at the AUC to provide programmatic development and management for PACA. PACA’s AUC-based Secretariat is developing budgets and reporting vehicles for 2013 and beyond, as well as an interim financing arrangement for receiving funds for Secretariat activities and a medium-term strategic plan for 2014–2017. In addition, many other programmatic activities are being undertaken, as guided by this document, PACA Strategy 2013–2022, and the PACA Steering Committee.

6.2 Partnerships

The Partnership for Aflatoxin Control in Africa is truly a *partnership* initiative, defined by the functional engagement of stakeholders to facilitate ongoing, joint problem identification and solution creation. PACA will remain open to all stakeholders with an interest and activities in aflatoxin and related issues. The success of the Partnership will be defined by core partners who are not only users of solutions or products of the Partnership, but are passionate and proactive creators of the required solutions. Thus, in addition to having “open arms” for interested *stakeholders*, PACA also will carefully select *strategic partners* to leverage expertise and resources, while keeping these relationships meaningful for the broader PACA stakeholder community. The identification of strategic partners will be driven by the need to meet PACA’s objectives under each strategic theme. PACA’s partners will be the champions of the initiative and will support delivery of the PACA agenda. The PACA SC and the Secretariat will identify partners and manage relationships with a clear focus on: “engagement for what purpose,” “at what point in time,” and “how.” The development of strategic partners will, therefore, be an ongoing process undertaken between and during platform convenings.

6.2.1 The Partnership Platform

Innovation is about using existing technologies, institutions and approaches in new ways that increase efficiency, effectiveness or sustainability. Thus, innovations are not just about new technologies or technical solutions, but also include bringing to bear social and institutional change as part of the transformation process (Smits 2002; Hall and Clark 2010). An “innovation platform” approach to problem solving is one *through which actors with a stake in a common set of issues get together regularly to address their common challenges*. Innovation platforms can be effective because they bundle members’ complementary skills and competencies—which are linked to their core business, expertise and experiences as individuals, teams or organizations—thereby allowing for work to take place on institutional change at different levels in the system. In the context of the aflatoxin challenge, the issues in common involve ensuring that foods being consumed at home or put on the market are safe for human consumption. Many of these issues require the engagement of multiple actors and need attention on a continuing basis. The aflatoxin challenge thus lends itself to an innovation platform approach to problem solving.

An innovation platform approach is envisaged as an important means through which PACA will engage the many organizations working to control aflatoxin in Africa and other global partners in an ongoing basis. PACA’s innovation platform will be referred to as the *PACA Partnership Platform*. A functioning PACA Partnership Platform will provide a forum for information sharing, the identification of systemic challenges to aflatoxin prevention and control and the co-creation of solutions. The platform will also form the basis for coordination among stakeholders and co-ownership of PACA, helping to identify synergies, avoiding duplication and leveraging resources. Thus, the PACA Partnership Platform will seek to:

- facilitate information exchange and coordinate between stakeholders at various levels,

- broker partnerships within and outside of Africa to leverage resources for and collaboration on aflatoxin prevention and control and to effectively exploit synergies and avoid duplication,
- convene ongoing, virtual and face-to-face forums of stakeholders for identifying challenges and co-creating solutions, and
- undertake proactive, coordinated advocacy aimed at putting aflatoxin on national, regional and continental agendas.

The engagement of the private-sector donor community (inside and outside of Africa) is crucial to the success of PACA. African governments, RECs as well as the AUC are critical to ensure African ownership of the initiative. PACA was established through the strong leadership of the AUC, and with participation from individual African and other governments, RECs, the private sector, farmers' organizations and civil society leaders from across Africa. Thus, the required engagement is already well underway and must continue to be a feature of the PACA Partnership Platform.

6.3 Communications (External and Internal)

As a partnership organization with partners spread throughout Africa and beyond, PACA must communicate effectively with its partners and also facilitate effective communication among and between partners.

A communication strategy will therefore be developed that will aim to facilitate two-way communication and keep partners fully aware of what is happening, what is planned, lessons emerging, implications for programs and partnerships, and opportunities and other matters. This will be achieved through a combination of virtual and face-to-face approaches.

In designing and implementing the communication strategy, due attention will be paid to ensure that, at a minimum, both Anglophone and Francophone speakers' needs are accommodated. As appropriate and necessary, the needs of other AUC language speakers will be considered, subject to resource availability.

It should be noted that these internal (within the PACA family) communication activities are about information flow within the system, and are different from strategic Theme 5 (public awareness, advocacy and communication), which aims to disseminate information and awareness about aflatoxins to a wider external audience.

A key tool to achieve effective communication will be the PACA website. This site should include regular news stories about PACA's plans, progress and achievements; a blog by the PACA Program Manager that highlights key issues and links these to the broader landscape in which PACA operates; and a regularly updated calendar of events that flags forthcoming events and archives past ones, among other content. If necessary, password-protected areas can be created to enable collaborative work among partners and the sharing of works in progress.

In addition to the website, a quarterly newsletter will be produced and distributed, mostly via e-mail but also in hard copy where there is demand for this. The newsletter will mirror news stories and other information that has appeared on the website. Such a publication is important for providing information to those who are without access to, or are not inclined to use, the internet.

Partnership Platform meetings will be held to facilitate planning and prioritization, problem solving, celebration of achievements and sharing of other information. Some of these meetings will be themed, focused on pressing issues, opportunities or challenges. The biannual meetings could also be linked to optional capacity-building events focusing on specific priority topics. In addition, opportunities will be sought to piggyback on events organized by others, and special meetings will be organized to meet specific demands and needs.

For Steering Committee meetings, whenever possible, full advantage will be taken of information and communication tools to reduce costs, save traveling time and reduce the Partnership's carbon footprint.

6.4 Financial Planning

PACA's leadership is fully aware of the global trend toward funding specific projects that meet specific donor interests, and yet the Partnership needs flexibility in its formative stages to be able to tackle priority issues. It will take time for PACA to match specific donors to PACA priorities. In the short term, PACA's priorities will be on high and immediate areas of impact, as well as on the development of long-term mechanisms for increased investment in aflatoxin control activities across Africa.

In the initial stages, PACA requires funding to support operations and startup activities. PACA will engage traditional as well as nontraditional international development partners to help secure the required resources to enable the implementation of its agenda. As part of the launch of this first Strategy, PACA will embark on donor and investor engagement to ensure that early progress can be made in securing the essential resources.

As part of its resource mobilization strategy, PACA will seek to continue the engagement of its founding donors, diversifying its funding sources by approaching new, nontraditional investors. For all donor categories, PACA will put emphasis on proactive investor relations, keeping donors informed of changing priorities, challenges and opportunities as they arise—and not just through reporting. Donors will be treated as strategic partners in the PACA Partnership Platform, with PACA creating space for resource discussions at platform meetings and facilitating specific donor convenings.

Early in the operationalization of the PACA strategic plan, PACA will undertake a comprehensive donor analysis to identify resource opportunities for the activities of the various

thematic areas and program support. This will feed into a resource mobilization strategy that will be developed soon after finalizing the PACA Strategy 2013–2022.

6.4.1 Key Elements of the Resource Mobilization Strategy

To better develop and mobilize financial resources, PACA will:

- Pursue a broader international donor base (to attract donors),
- Develop cooperation with non-traditional development partners (e.g., foundations and other philanthropies),
- Develop an AUC-based donor mechanism for PACA programmatic implementation,
- Engage countries and RECs to commit counterpart funding, specifically for interventions that speak to their interests—for example, within-country and -region activities targeting specific “localized” challenges, the learnings from which can be replicated,
- Encourage partnerships with research and/or academic institutions in agriculture and health to attract funds from non-traditional development sources for knowledge generation and capacity development activities, and
- Target partnerships with the private sector, focusing on interventions critical for their business interests.

Table 2, below, presents a typology of potential PACA resourcing possibilities.

Table 2. Potential Resourcing Possibilities for PACA

Donor Category (not all are mutually exclusive)	Resource Mobilization Focus
African Union Commission	In-kind contributions as convener of advocacy processes and continental and international champion of the PACA agenda; in-kind office space and administrative support for the PACA Secretariat
Regional Economic Communities	In-kind and cash contributions to trade-related R&D and convening processes that directly converge with REC agendas; advocacy and convening role
National governments	In-kind and cash contributions to agriculture- and health-related R&D, and to support the development of policies, regulations and standards
Private-sector institutions involved in agriculture	R&D support of specific agricultural value chains of interest; alternative uses of contaminated commodities; trade-related R&D; policy, regulation and standards advocacy
Public agricultural R&D institutions (national and international)	Cash and in-kind (staff, facilities) contributions through R&D partnerships for developing agricultural technologies and approaches relevant for agriculture—e.g., testing technologies for contamination; alternative uses of contaminated commodities; trade-related R&D; generation of regulatory/policy evidence through provision of crucial data and technological options
Health R&D institutions (public and private, national and	Cash and in-kind (staff, facilities) contributions through R&D partnerships for developing technologies and approaches

international)	relevant for health—e.g., diagnostics—and influencing the regulatory landscape through the provision of crucial data and technological options
Development partners (traditional multilateral and bilateral donors, foundations and other philanthropic organizations)	Operations and project-related funding that is fungible and provides flexibility, for investment across the PACA portfolio; other targeted funding obtained by matching PACA priorities to donor interests

6.4.2 Budget Development and Donor Partners

PACA has developed an ambitious agenda requiring significant resources well above the financing it has had in its formative period (2011–2013). PACA’s current resource portfolio comes primarily from several key donors—the Bill and Melinda Gates Foundation, the U.K. Department for International Development (DfID) and USAID—that have provided startup funding to support PACA operations and initial projects. This initial commitment ends by December 2016. In developing new activities in the thematic areas, PACA will be aiming to secure funding to support all of the activities outlined in this ten-year Strategy. To achieve this, PACA’s leadership will seek to match high-priority areas with investors.

6.5 PACA Project Development

While PACA’s strategic focus will be on partnership brokerage and facilitation, catalytic projects will be a critical means by which PACA will get the aflatoxin agenda moving. PACA’s project funding will be guided by the following principles:

- Maintaining a clear focus on strategic priorities
- Managing risks while maintaining flexibility, keeping transaction costs low and reducing bureaucracy in project oversight and management
- Strategic targeting of grants with a focus on investments in interventions with a high likelihood of success and advancing innovation
- As much as possible, focusing on interventions that build on what is already known (i.e., the “low-hanging fruit”)
- Leveraging existing resources—physical, human and financial
- Increasing human capacity building
- Utilizing clear and transparent assessment criteria for calls for proposals
- Holding project managers accountable
- Conducting simple, practical reporting
- Adhering to the overarching principles of PACA for delivery of its mandate, as outlined in section 4 of this Strategy

A detailed approach to project development will be developed in the near term.

7. Conclusion, and PACA Mid-Term Strategic Plan, 2014–2017

The Partnership for Aflatoxin Control in Africa seeks to *support agricultural development, safeguard consumer health and facilitate trade by catalyzing, coordinating and increasing effective aflatoxin control along agricultural value chains in Africa*. Based on the input of more than 100 stakeholders, and through countless individual consultations, the content of the PACA Strategy, 2013–2022, has been drafted, reviewed and enriched. The Strategy will now be circulated to the broader PACA community.

This year, using the content of this ten-year Strategy, the PACA Steering Committee will develop a medium-term strategic plan focused on the most needed, immediate action areas for PACA from 2014 to 2017. This medium-term strategic plan will prioritize specific actions of the Key Results Areas, with justification and implementation activities, under each of the five major thematic areas. The initial draft medium-term plan is being developed by the PACA Secretariat, will be reviewed and approved by the Steering Committee, and then will be sent to the PACA Community for comment.

We all look forward to implementing the PACA vision: Africa free from the harmful effects of aflatoxins.

Appendix 1: Reference List

- Bankole, S.A., and Mabekoje, O.O. (2004). Occurrence of aflatoxins and fumonisins in preharvest maize from south-western Nigeria. *Food Additives and Contaminants*, 21(3), 251–255.
- Cleveland, T.E., Dowd, P.F., Desjardins, A.E., Bhatnagar, D., and Cotty, P.J.(2003).United States Department of Agriculture Agricultural Research Service research on pre-harvest prevention of mycotoxins and mycotoxigenic fungi in U.S. crops. *Pest Management Science*, 59,629–642.
- Cotty, P.J., and Jaime-Garcia, R. (2007).Influences of climate on aflatoxin producing fungi and aflatoxin contamination. *International Journal of Food Microbiology*, 119, 109–115.
- FAO.(2004). *Worldwide Regulations for Mycotoxins in Food and Feed in 2003*. FAO Food and Nutrition Paper No. 81. Rome: FAO.(Available at<http://www.fao.org/docrep/007/y5499e/y5499e00.htm>.)
- FAO, World Food Programme and International Fund for Agricultural Development.(2012). *The State of Food Insecurity in the World 2012: Economic Growth Is Necessary but Not Sufficient to Accelerate Reduction of Hunger and Malnutrition*. Rome: FAO.
- Gong, Y.Y., Cardwell, K., Hounsa, A., Egal, S., Turner, P.C., Hall, A.J., andWild, C.P. (2002). Dietary aflatoxin exposure and impaired growth in young children from Benin and Togo: Cross sectional study. *BMJ*, 325(7354), 20–21. doi: 10.1136/bmj.325.7354.20.
- Gong, Y.Y., Egal, S., Hounsa, A., Turner, P.C., Hall, A.J., Cardwell, K., and Wild, C.P. (2003). Determinants of aflatoxin exposure in young children from Benin and Togo, West Africa: The critical role of weaning. *International Journal of Epidemiology*, 32, 556–562.
- Gong, Y.Y., Hounsa, A., Egal, S., Turner, P.C., Sutcliffe, A.E., Hall, A.J., Cardwell, K., and Wild, C.P. (2004).Post weaning exposure to aflatoxin results in impaired child growth: A longitudinal study in Benin, West Africa. *Environmental Health Perspectives*, 112, 1334–1338.
- Hall, A.,and Clark, N. (2010).What do complex adaptive systems look like and what are the implications for innovation policy? *Journal of International Development*, 22(3), 308–324.
- IARC. (2002). Aflatoins. International Agency for Research on Cancer (IARC) Monograph. Available at: <http://monographs.iarc.fr/ENG/Monographs/vol82/volume82.pdf>
- Jiang, Y., Jolly, P.E., Preko P., Wang, J.S., Ellis, W.O., Phillips, T.D., and Williams, J.H. (2008). Aflatoxin-related immune dysfunction in health and in human immunodeficiency virus disease. *Clinical and Developmental Immunology*.doi:10.11552008/790309.

Keenan, J., Jolly, P., Preko, P., Baidoo, J., Wang, J., Phillips, T.D., Williams, J.H., and McGwin, G. (2011). Association between aflatoxin B1 albumin adduct levels and tuberculosis infection among HIV+ Ghanaians. *iMedPub Journals*, 2(3), 3. doi: 10.3823/230.

Leslie, J.F., Bandyopadhyay, R., and Visconti, A., eds. (2008). *Mycotoxins: Detection Methods, Management, Public Health and Agricultural Trade*. Oxfordshire, U.K.: C.A.B. International.

Liu, Y., and Wu, F. (2010). Global burden of aflatoxin-induced hepatocellular carcinoma: A risk assessment. *Environmental Health Perspectives*, 118(6), 818–824.

Shephard, G.S. (2008). Risk assessment of aflatoxins in food in Africa. *Food Additives and Contaminants: Part A: Chemistry, Analysis, Control, Exposure and Risk Assessment*, 25(10), 1246–1256.

Smits, R. (2002). Innovation studies in the 21st century: Questions from a user's perspective. *Technological Forecasting and Social Change*, 69, 861–883.

Turner P.C., Collinson, A.C., Cheung, Y.B., Gong, Y.Y., Hall, A.J., Prentice, A.M., and Wild, C.P. (2007). Aflatoxin exposure *in utero* causes growth faltering in Gambian infants. *International Journal of Epidemiology*, 36, 1119–1125.

Turner, P.C., Moore, S.E., Hall, A.J., Prentice, A.M., and Wild, C.P. (2003). Modification of immune function through exposure to dietary aflatoxin in Gambian children. *Environmental Health Perspectives*, 111, 217–220.

UN. (2012). *World Urbanization Prospects: The 2011 Revision*. New York: United Nations. (Available at: <http://esa.un.org/unup/Documentation/highlights.htm>.)

USAID and Danya International, Inc. (2012). *Aflatoxin: A Synthesis of the Research on Health, Agriculture and Trade*. Nairobi, Kenya: USAID. (Available at: <http://agarchive.kdid.org/library/aflatoxin-synthesis-research-health-agriculture-and-trade>.)

Waliyar, F., Siambi, M., Jones, R., Reddy, S.V., Chibonga, D., Kumar, P. L., and Denloye, S. (2008). Institutionalizing Mycotoxin testing in Africa. In Leslie, J.F., Bandyopadhyay, R., and Visconti, A., eds. *Mycotoxins: Detection Methods, Management, Public Health and Agricultural Trade* (pp. 359–368). Oxfordshire, U.K.: C.A.B. International.

Williams, J., Phillips, T., Jolly, P., Stiles J., Jolly, C., and Aggarwal, D. (2004). Human aflatoxicosis in developing countries: A review of toxicology, exposure, potential health consequences, and interventions. *American Journal of Clinical Nutrition*, 80, 1106–22.

Wild, C.P., and Gong, Y.Y. (2010). Mycotoxins and human disease: A largely ignored global health issue. *Carcinogenesis*, 31, 71–82.

Appendix 2: Stakeholder Consultation Workshop Participant List

Name	Organization	Country
Abdu Hayghaimo (Dr.)	Ministry of Livestock and Fisheries Development	Tanzania
Abigael Obura(Ms.)	Centre for Disease Control Kenya	Kenya
Aichi Kitalyi (Ms.)	PICOTEAM (Institute for People, Innovation and Change in Organisations)	Kenya
Alex Ariho (Mr.)	Excel Hort	Uganda
Amadou Senghor (Mr.)	Crop Protection Directorate Plant Pathology Laboratory	Senegal
Amare Ayalew (Dr.)	Haramaya University	Ethiopia
Anicet Muriro (Mr.)	Rwanda Bureau of Standards	Rwanda
Anthony Negedu (Dr.)	Ministry of Science and Technology	Nigeria
Archileo Kaaya (Prof.)	Makerere University	Uganda
Aubrey Chinseu (Mr.)	National Smallholder Farmers' Association of Malawi	Malawi
Babalola Semiu Abdul (Mr.)	Panapress	Nigeria
Babatunde Iyanda (Mr.)	African Union	Ethiopia
Barbara Stinson (Ms.)	PACA Secretariat	USA
Benoit Gnonlonfin (Dr.)	BecA Capacity and Action for Aflatoxin Reduction in Eastern Africa	Kenya
Boitshepo Bibi Giyose (Ms.)	New Partnership for Africa's Development	South Africa
Brian Katongo Nsofu (Mr.)	Common Market for Eastern and Southern Africa (COMESA)	Zambia
Bukola Masha (Mr.)	Doreo Partners	Nigeria
Candida Shirima (Ms.)	Tanzania Food and Drugs Authority	Tanzania
Cees Waalwijk (Dr.)	Wageningen University	Netherlands
Cesarie Kantarama (Ms.)	Eastern Africa Farmers Federation	Rwanda
Charity Mutegi (Dr.)	International Institute of Tropical Agriculture	Kenya
Charys Ugullum (Ms.)	Tanzania Food and Drugs Authority	Tanzania
Christine Chemutai Bii (Dr.)	Kenya Medical Research Institute	Kenya
Connie Bacon (Dr.)	U.S. Agency for International Development	Senegal
Delia Grace (Dr.)	International Livestock Research Institute	Kenya
Diana Oyena Akullo (Ms.)	African Union	Ethiopia
Dorothy Namuchimba (Ms.)	East, Central and Southern African Health Community	Tanzania
Edward Rege (Dr.)	PICOTEAM (Institute for People, Innovation and Change in Organisations)	Kenya
Emmanuel Monyo (Dr.)	Bunda College, Chitedze Research Station,	Malawi

	International Crops Research Institute for the Semi-Arid Tropics	
Erastus Kang'ethe (Prof.)	University of Nairobi	Kenya
Fhumulani Mashau (Ms.)	Southern African Confederation of Agricultural Unions	South Africa
Flaubert Nana Sani (Dr.)	AU Inter-African Phytosanitary Council	Cameroon
Florence Temu (Dr.)	African Medical and Research Foundation	Ethiopia
Foluke Areola (Ms.)	Federal Ministry of Agriculture and Rural Development	Nigeria
Francesca Nelson (Ms.)	U.S. Agency for International Development	Kenya
Francis Nang'ayo (Dr.)	African Agricultural Technology Foundation	Kenya
Frank Madinda (Dr.)	Arusha Lutheran Medical Centre	Tanzania
Geoff Smith (Mr.)	Essential Micronutrients Foundation	Singapore
Grace Musimami (Ms.)	Farmers Media Uganda	Uganda
Henry Richard Kimera (Mr.)	Consumer Education Trust	Uganda
Hiiti Sillo (Mr.)	Tanzania Food and Drugs Authority	Tanzania
Hussaini Makun (Dr.)	Department of Biochemistry, Federal University of Technology	Nigeria
Jagger Harvey (Dr.)	BecA-ILRI-HUB-CSIRO-AusAID Capacity and Action for Aflatoxin Reduction in Eastern Africa	Kenya
Janet Ngombalu (Ms.)	Eastern Africa Grain Council	Kenya
Jean Kamanzi (Dr.)	Food and Agriculture Organization of the United Nations	Zimbabwe
Jeff Hill (Mr.)	U.S. Agency for International Development	USA
Jennifer Maurer (Ms.)	U.S. Agency for International Development	USA
Jennifer Pratt Miles (Ms.)	PACA Secretariat	USA
John Lamb (Mr.)	Abt Associates	USA
Jonathan "Tim" Williams (Dr.)	Peanut Collaborative Research Support Program	United States
Jonsyn-Ellis Felixtina (Prof.)	Njala University	Sierra Leone
Jovin Mugula (Prof.)	Sokoine University of Agriculture	Tanzania
Joyceline Kaganda (Dr.)	Tanzania Food and Nutrition Centre	Tanzania
Judith Akolo (Ms.)	Kenya Broadcasting Corporation	Kenya
Jumanne Mrisho (Mr.)	Said Salim Bakhresa Co. & Ltd	Tanzania
Kebba Sarr (Mr.)	Ministry of Agriculture	Gambia
Keith Sones (Dr.)	PICOTEAM (Institute for People, Innovation and Change in Organisations)	Kenya
Kenton Eugene Dashiell (Dr.)	International Institute of Tropical Agriculture	Nigeria
Kepha Ombacho (Dr.)	Ministry of Public Health and Sanitation	Kenya
Kerstin Hell (Dr.)	International Institute of Tropical Agriculture	Benin
Komla Bissi (Mr.)	African Union	Ethiopia
Lightness Muro (Ms.)	Ministry of Agriculture, Food Security and Cooperatives	Tanzania

Lourena Arone (Ms.)	Ministry of Agriculture	Mozambique
Lucy Muchoki (Ms.)	Pan African Agribusiness and Agro Industry Consortium	Kenya
Lutana Lasu (Dr.)	University of Juba	South Sudan
Maria Bisamaza (Ms.)	Makerere University	Uganda
Maria Pia Rizzo (Ms.)	Food and Agriculture Organization of the United Nations	Ethiopia
Martha Byanyima (Ms.)	Common Market for Eastern and Southern Africa	Zambia
Martin Kimanya (Dr.)	Nelson Mandela African Institution of Science and Technology	Tanzania
Michel Koffi Nguessan (Mr.)	Ministry of Agriculture	Côte d'Ivoire
Molalet Tsedeke (Mr.)	African Union Commission	Ethiopia
Monique Nijs (Dr.)	Wageningen University	Netherlands
Mweshi Mukanga (Dr.)	Zambia Ministry of Agriculture, Zambia Agriculture Research Institute	Zambia
Olusegun Atanda (Dr.)	Mycotoxology Society of Nigeria	Nigeria
Oluwabamiwo Bosede Folasade (Ms.)	National Agency for Food and Drug Administration and Control, Central Laboratory	Nigeria
Omar Maulidi Badi(Mr.)	GrainPro, Inc.	Kenya
Omari Kalanje Mponda (Dr.)	Naliendele Research Centre	Tanzania
Onica Makwakwa (Ms.)	Consumer International	South Africa
Onyema Damian Ihedioha (Mr.)	Africa Development Bank	Tunisia
Orin Hasson (Mr.)	Bill and Melinda Gates Foundation	USA
Patrick Ndakidemi(Prof.)	Nelson Mandela African Institution of Science and Technology	Tanzania
Peter Cotty (Dr.)	U.S. Department of Agriculture	USA
Peter Kimotho (Mr.)	World Food Programme of the United Nations	Kenya
Ranjit Bandyopadhyay (Dr.)	International Institute of Tropical Agriculture	Nigeria
Rex Raimond (Mr.)	PACA Secretariat	USA
Rose Omari (Ms.)	EatSafe Ghana	Ghana
Samweli Mdachi (Mr.)	Prime Minister's Office, Regional Administration and Local Government	Tanzania
Shamsideen Aroyeun (Dr.)	Cocoa Research Institute of Nigeria	Nigeria
Sheila Okoth (Prof.)	University of Nairobi	Kenya
Shiferaw Bekele (Dr.)	International Maize and Wheat Improvement Center (CIMMYT)	Kenya
Stephen Fapohunda (Dr.)	Nigeria Mycotoxin Awareness and Study Network	Nigeria
Stephen Muchiri (Mr.)	Pan African Farmers Organization	Kenya
Steve Collins (Mr.)	ACDI/VOCA	Kenya
Steve Wiersma (Dr.)	Centre for Disease Control Tanzania	Tanzania
Sylla Thiam (Dr.)	African Medical and Research Foundation (Headquarters)	Kenya
Tayo Imafidon (Ms.)	Mycotoxology Society/ National Agency for Food and Drug Administration and Control	Nigeria

Theresia Hubert (Ms.)	Tanzania Bureau of Standards	Tanzania
Usha Kulkarni (Dr.)	Mekelle University	Ethiopia
Victor Manyong (Dr.)	International Institute of Tropical Agriculture	Tanzania
Wezi Chunga (Ms.)	PACA Secretariat	Ethiopia
Winta Sintayehu (Ms.)	PACA Secretariat	Ethiopia
Yemi Akinbami (Dr.)	African Union Commission	Ethiopia
YunYun Gong (Dr.)	University of Leeds	United Kingdom
Zacarias Almeida (Mr.)	U.S. Department of Agriculture, Foreign Agricultural Service	Mozambique



Partnership for Aflatoxin Control in Africa

PACA Secretariat
PO Box 3243
Department of Rural Economy and Agriculture
African Union Commission
Addis Ababa W21K19
Ethiopia

www.aflatoxinpartnership.org