Rapid Loss Appraisal Tool (RLAT)

RLAT in practice: A toolbox for maize

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1. Introduction

GIZ commissioned the design and piloting of the Rapid Loss-Appraisal Tool for agribusiness value chains (RLAT) with the aim of producing a 'lean' and easily manageable methodology that would provide hands-on strategic orientation to those developing realistic and realisable measures for sustainable food loss reduction. The methodology is designed to serve as a pre-screening for further in-depth-studies and to identify leverage points for reducing losses at the various value chain stages — from farming, through handling and processing, to retail trade. RLAT's developers based the tool around a set of tried-and-tested participatory approaches and tools that draw on GIZ's experience of using rapid appraisal methods and on others' experiences of assessing losses (APHLIS, PHFLA, recent studies on food losses implemented by GIZ in Kenya and Nigeria, and GIZ's ValueLinks methodology for VC development and rapid and participatory appraisal methods). The tools and approaches have been simplified for rapid implementation at the local level, enabling users to quickly and systematically collect information, assess stakeholder perceptions of food losses, and triangulate the findings using fast-track multiple evaluation methods that make it possible to confirm the results without undertaking representative sample surveys.

The development and first implementation of RLAT focused on maize. This toolbox builds on the recomendations of the RLAT guide on how to approach food losses using participatory methods and biophysical measurements and provides guidance on specific participatory methods and biophysical measures that were found to be suitable to evaluate food losses of maize in Ghana. This toolbox can be adapted to other crop and livestock value chains (VC) and the local situation.

Points 2 and 3 explain about ready-to-use instruments including well-known participatory methods e.g. transect walk and loss perception rankings. The toolbox provides proposals for workshop programmes, checklists for focus group meetings, guidance for the assessment of aflatoxin prevalence at different VC stages as well as sampling methods and bio-physical measurements to underpin the results of stakeholder workshops and focus group discussions. The toolbox serves as guidance for information gathering, documentation and evaluation.

Furthermore, points 4 and 5 provide hands-on material related to the example of maize for facilitation in the field and for documentation and assessment of findings.

While the process steps are generic and applicable to any VC, the participatory instruments, the toolbox (checklists, data collection and evaluation sheets, etc.) have to be adapted to specific commodities and contexts (e.g. agro-ecological zones or VC framework conditions). The adaptation of the tool requires excellent knowledge of the VC in question and should be performed by proficient VC experts.

2.   Participatory Methods

2.1 Sampling Methods

As a rapid appraisal tool that does not intend to produce statistically reliable results RLAT works with purposive sampling methods. Purposive sampling refers to a method based on some selection criteria that guide the selection process 'on purpose'[1]. Sampling will be done in collaboration with the host project that is planning an RLAT appraisal.

Selecting a 'Survey Zone'

The number and geographical location of sites to be selected depends on the diversity of production regions for which the RLAT appraisal is planned. The more homogeneous potential zones are with regard to e.g. socio-economic patterns, farming systems and husbandry practices, distance to markets, infrastructure conditions and geo-climatic situation as well as prevalence of losses, the less sites may be needed to get sufficiently reliable results.

The following criteria are typical for selecting a zone for an RLAT appraisal (notwithstanding that the criteria have to be adapted to the requirements of a specific case):

- The project planning the RLAT appraisal already works or plans to work in the region. This is necessary to assure that the VC map will be available and stakeholders are known.

- The zone is relevant for the production or distribution of the commodity (e.g. regarding production volumes and/or importance for food security).

- The zone features a relatively homogenous situation (see explanation above); and

- Loss problems have been identified as probable leverage points for VC development.

Selecting participants for the 'Key Expert Roundtable'

Key experts are well informed about the specific VC as such or about particular VC stages as well as about loss-relevant issues regarding the particular product/product range. Care should be taken to include some 'aflatoxin experts' in the Key Expert Roundtable. 15 to 20 key experts should be invited representing governmental organisations, farms and firms or representative bodies of the private sector, research institutions, advisory services and/or non-governmental organisations.

Selecting participants for the 'Stakeholder Workshop'

For the stakeholder workshop, up to 30 participants are drawn from VC stakeholders in the selected survey zone representing VC operators from farm to distribution and project partners.

Selecting participants for the 'Focus Group Meetings and Processor Meetings'

Farmers, traders and processors (probably also transporters) are selected according to the following criteria:

- Existing farmer groups (with a locally specific participation of female farmers) whose farming systems and husbandry practices are largely representative for the survey zone;

- Individuals or groups of traders, processors (possibly transporters) who are involved in aggregating, handling, buying and selling the product in the selected production zone or from the selected production zone.

Depending on the specific VC features, it may be advisable to distinguish different categories of farmers (e.g. using different equipment in production, different harvesting or drying methods), traders (e.g. aggregators, small, medium and large wholesalers, retailers) and/or processors (small, medium and large-scale, street food processors/vendors). Comparing the results of the different Focus Group Meetings could help to uncover differences in loss prevalence and to identify existing local solutions for reducing losses.

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1   For random sampling, in contrast, selection is done 'by chance' without favouring any particular characteristics. Random sampling is required for producing statistically reliable results.

Focus Group Meetings/sample size:

- Farmers:
  - up to 6 different farmer groups with each 12-15 participants

- Traders:
  - 2-3 individual medium to large-scale traders

  - 2-3 groups with 5-10 traders at different aggregation levels (markets)

- Transporters:
  - if relevant and possible, 2-3 transporters

- Processors:
  - 3-4 individual medium and large-scale processors

  - if relevant, 1 group of 4-6 small-scale or street food processors/vendors

Selecting interview partners for the 'Key Informant Meetings'

In case the triangulation of the results of the preceding RLAT process steps (Roundtable, Workshop, Focus Group Meetings) does not lead to convincing findings, key informants with specific practical or scientific expertise can be interviewed. The level of expertise required and the number of key informants to be interviewed depends on the questions, for which clarification or more in-depth information is required.

Key informants may be drawn from the participants in the Roundtable, Workshop or Focus Group Meetings or may be recommended by the participants, the project or partner organisations.

2.2 Loss Hot Spot Analysis

Table 1. Loss Hot Spot Analysis – tool description

Purpose	The Loss Hot Spot Analysis supports the focusing of RLAT on those functions along the VC that are most prone to the risk of losses.
Expected outputs	• Perceptions about the relevance and importance of losses at the various functions along a particular VC are discussed and conclusions are drawn in a participatory way • Loss points at specific functions along a particular VC are identified • Loss points are classified as immediate effects or lost opportunities • Critical loss points (loss hot spots) are ranked according to their relevance and importance • Quantitative losses are estimated for identified loss hot spots • Possible loss points/critical loss points identified during the desktop study are validated
Agenda and Approach	The Loss Hot Spot Analysis is a participatory instrument that provides a structured approach to quickly identify critical loss points (loss hot spots) along a particular VC. Relevance[2] and importance[3] of losses at the various VC functions are weighed. Immediate effects and lost opportunities are distinguished. Eight steps towards the characterisation of Loss Hot Spots (critical loss points) Step 1/ Make a comprehensive VC map available giving the VC functions in detail Step 2/ Prepare pinboards for discussing critical loss points (loss hot spots) Step 3/ Discuss loss perceptions and classify them as immediate effects or lost opportunities Step 4/ Appraise the importance (severity) of losses by VC function Step 5/ Appraise the relevance (probability) of losses by VC function Step 6/ Derive loss hot spots by multiplying 'importance x relevance' Step 7/ Estimate quantitative losses for the loss hot spots identified Step 8/ Identify likely causes for the critical loss points (loss hot spots) identified
Complementing RLAT tools	• VC mapping: identification of functions along selected VCs • Hot spot analysis: appraisal of 'loss relevance x loss importance' by VC function
Use	• Key Expert Roundtable • Stakeholder Workshop
Usability of results	• Results from the Hot Spot Analysis during the Key Expert Roundtable and Stakeholder Workshop are cross-checked with the results of the other process steps (triangulation) • Needs are assessed for further analysis to derive location-specific technical, socio-economic and organisational solutions alongside cost-benefit analysis
Limitations	• Limited consistency of results obtained and risk of taking symptoms for causes of losses • Limited reliability of results taken from perceptions given that 'losses' are usually reused • Insufficient reliability of results for evidence-based policy/business decision making • Restricted suitability of proposed solutions with regard to impact and sustainability
Required inputs	• A comprehensive map of the particular VC providing very detailed information about VC functions from inputs and production up to distribution • Pinboards, kraft paper, moderation cards and markers
References	• RLAT User Guide: Sections 2.1 and 3.3.1

2   'Relevance' refers to the 'probability of losses' answering the question 'How much do people suffer?'

3   'Importance' refers to the 'severity of losses' answering the question 'How many people suffer?'

Procedure:
Step 1/Map the VC and define the VC functions by VC stage

Mapping the VC does not form part of the RLAT methodology. It is a precondition that the project requesting an RLAT appraisal already realised a comprehensive VC mapping. Notwithstanding that the VC map still has to be validated during the Key Expert Roundtable and the Stakeholder Workshop under special consideration of loss issues along the VC. The following figure provides an example of a VC map that provides a detailed view of VC functions that are supposedly relevant for a loss appraisal.

Step 2/Prepare pinboards for discussing critical loss points (loss hot spots)

- one pinboard for each pre-harvest VC stage and for post-harvest VC stages

- list the VC stages and functions in the left column (see figure 2)

- list the points to be discussed in the top row (see figure 2)

Step 3/Discuss loss perceptions and classify them as immediate effects or lost opportunities

- explain participants the interest in assessing loss perceptions of various stakeholders

- explain participants the difference between immediate effects and lost opportunities

- moderate the discussion of participants

Write results of the discussion on moderation cards and affix cards on the pinboard.

Figure 1. Case example: VC map/VC funcions maize Brong Ahafo/Ashanti Regions
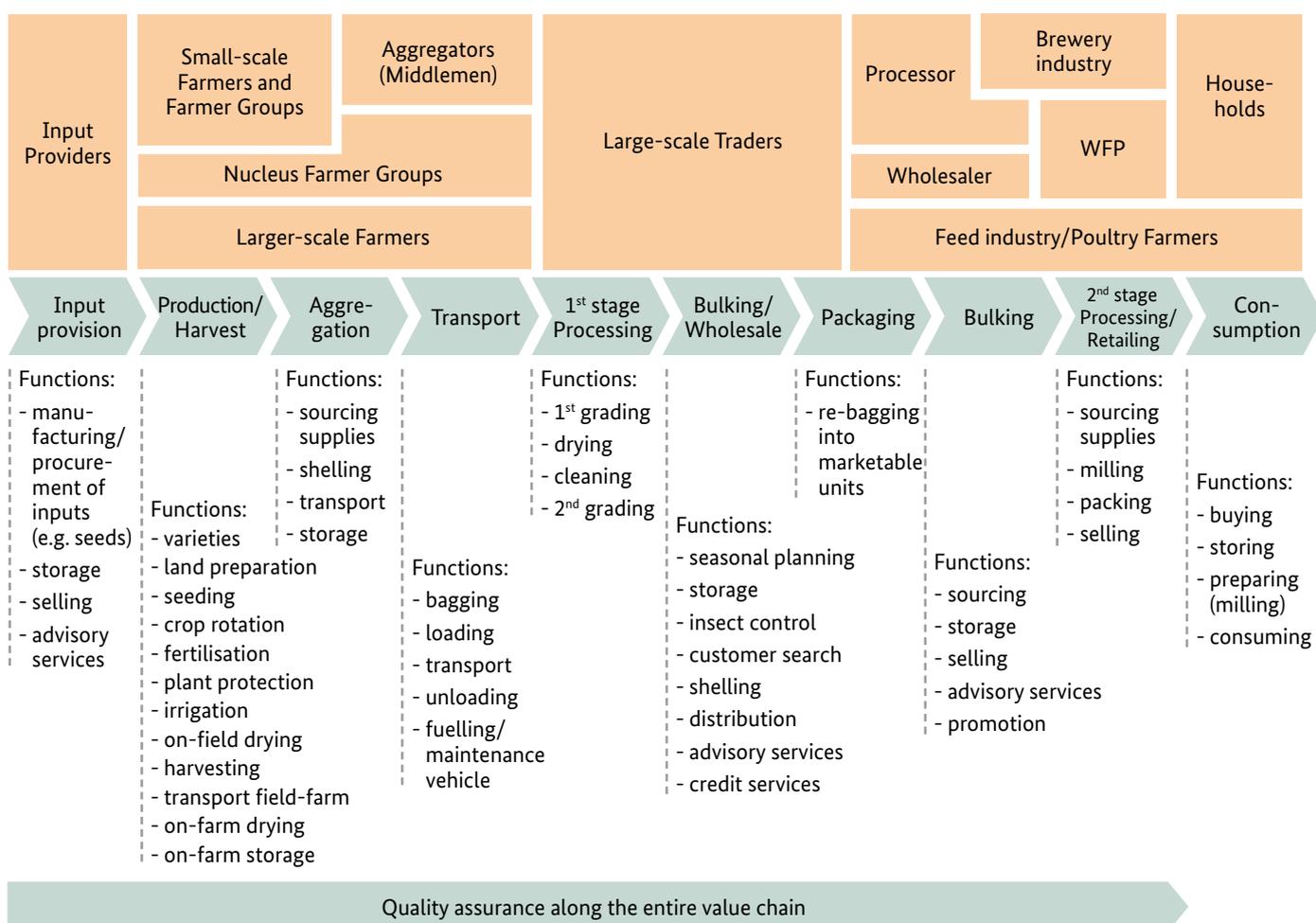
Figure 2. Loss Hot Spot Analysis

VC Function (cf. VC map)	immediate effect	Likely later effect	Relevance (0–3)	Importance (0–3)	Hot spot (6–9)
Input supplies					
• ...					
Harvest					
• ...					
Aggregation					
• ...					
Transport					
• ...					
Same approach for Wholesale Trade, Processing, Retail Trade					

Annotations:
- Loss occurrence & effect at same VC stage
- Missed opportunities
- Prohability of event (0–3) "How many people suffer?"
- Severity of event (0–3) "How many people suffer?"
- Hot spot if "Relevance x importance" = 6 or 9

Step 4/Appraise the importance (severity) of losses by VC function

(Importance/ severity of losses answers the question 'How much do people suffer?')

- explain participants the meaning of importance (= severity) of losses. Explain the difference between importance and relevance (to be discussed in step 5)

- explain participants the meaning of the classification 0-3 (see table 2)

- moderate the discussion of participants

- write results of the discussion on moderation cards and affix cards on the pinboard

Step 5/Appraise the relevance (= probability) of losses by VC function

(Relevance/probability of losses answers the question 'How many people suffer?')

- explain participants the meaning of relevance (= probability) of losses

- explain participants the meaning of the classification 0-3 (see table 3)

- moderate the discussion of participants

- write results of the discussion on moderation cards and affix cards on the pinboard

Table 2. Assessing the importance of losses

Assessing the importance (= severity) of losses answering the question 'How much do people suffer?'		
0	No losses	
1	Losses are negligible	Losses do occur, but the VC operator can accept them in the long run without changing anything.
2	Losses are a concern	Losses do concern the VC operator since they affect his/her business and income and he/she looks for measures to reduce the losses.
3	Losses are intolerable	The VC operator cannot accept the losses since they put his business and income at unacceptable risk.

Table 3. Assessing the relevance of losses

Assessing the relevance (= probability) of losses answering the question 'How many people suffer?'	
0	Number of stakeholders concerned
1	Few stakeholders concerned
2	Lots of stakeholders concerned, but not the majority
3	Majority of stakeholders concerned

Step 6/ Derive loss hot spots by multiplying 'importance x relevance'

- write the results of the multiplication 'importance x relevance' on cards and affix to pinboard

- moderate a discussion aiming at revisiting each case and validating the results of the earlier discussion on importance and relevance since participants often come to the conclusion that the resulting loss hot spots (reaching 6-9 points) or cold spots (reaching 0-5 points) do not always reflect the reality. By facilitating such discussion loops, the Loss Hot Spot Analysis provides a basis for consensus-building about loss perceptions that reflects the reality.

- revise the moderation cards if necessary

Step 7/ Estimate quantitative losses for the loss hot spots identified

- moderate the discussion on quantitative losses by only focussing on the loss hot spots identified

- facilitate to come up with an estimate of the percentage of losses

- use a second pinboard, only giving the loss hot spots identified in the left column (see table 4)

- write results of the discussion on moderation cards and affix card on the pinboard

Depending on the composition of participants (key experts, government representatives, VC operators such as farmers, traders, processors) estimation of quantitative losses may be difficult and the resulting figures have to be treated with care.

For VC operators as local infomants it is usually easier to estimate quantitative losses by giving an indication of losses in traditional measures (e.g bags, car loadings, etc.) compared to overall bags harvested/aggregated/bought/sold etc. The relation can be expressed in percent of losses.

Table 4. Estimated loss quantities and causes of Loss Hot Spots

Hot spots along the VC (cf. Steps 4-6)	Estimated quantity losses (%)	Causes of losses
Production		
▪ …		
▪ …		
Total production:		
Aggregation		
▪ …		
Total aggregation:		
Processing		
▪ …		
Total processing:		
Same approach for down-stream VC stages: Trading …		

Step 8/ Identify likely causes for the critical loss points (loss hot spots) identified

- moderate a discussion on likely causes of losses at the loss hot spots identified. Guide the discussion in a way to avoid that symptoms are taken for underlying root causes of losses.

- use the second pinboard only giving the loss hot spots identified in the left column (see table 4)

- write results of the discussion on moderation cards and affix cards on the pinboard

Use of the results of the Loss Hot Spot Analysis

For reporting and final analysis, the results of the Loss Hot Spot Analyses captured during the Key Expert Roundtable and the Stakeholder Workshop are entered into a Cumulative Loss Matrix together with the results of the Focus Group Meetings. The Cumulative Loss Matrix serves to compare the results from the different RLAT process steps (triangulation), identifies which findings are consistent across the different meetings or determines potential differences regarding the establishment of critical loss points, quantitative losses and loss causes. From this information conclusions can be drawn whether more in-depth discussions (e.g. Key Informant Interviews) or more in-depth surveys are required to come up with reliable information that can inform the development of an intervention strategy for reducing losses along the particular VC.

2.3 Key Expert Roundtable

Table 5. Key Expert Roundtable – tool description

Purpose	Loss perceptions of key experts from different disciplines are assessed for the particular VC and existing loss-relevant information regarding quantitative losses, loss causes and possible solutions (results of the Desktop Study) are validated and complemented.
Expected outputs	• Data collected in the desktop study is validated • Critical loss points along the VC are identified through a Hot Spot Analysis • Secondary data on quantitative and qualitative losses along the VC are complemented • Potential loss causes are discussed and – if possible – most probable loss causes identified • Possible solutions for reducing losses at the different VC stages are discussed • Information on traditional weights and measures is collected • Information on formal and informal grading standards is available • Issues related to quality and food safety (especially aflatoxin) are discussed • Information for adapting the RLAT approach to local conditions is gathered
Duration	1 day To ensure that there is enough time for the participatory work (Hot Spot Analysis, discussion of causes and possible solutions) the roundtable has to be well prepared and relevant input from the desktop Study and project results (e.g. VC map) provided for validation. Information will be validated by participants but not newly developed.
Timing	Since the Key Expert Roundtable should be organised not too long before the Stakeholder Workshop, the considerations for the timing of the Stakeholder Workshop and the Focus Group Meetings should be considered .
Participants	• A balanced composition of selected highly qualified/experienced key experts from different disciplines that are relevant to the loss debate in general and to the selected agribusiness VC in particular. • Differing views of participants that may affect data collection, validation and conclusions have to be considered. • Number of participants: 15-20
Staffing	• 2 senior experts as moderators • 1 junior expert for documentation • Support staff for organisational support
Agenda and approach	The agenda should be handled in a flexible way to allow adaptation to specific conditions such as the knowledge of key experts on the particular VC. The roundtable agenda will usually entail the following topics: 1. Opening (30 minutes): • Official welcome and presentation of participants • Objectives of the roundtable 2. Presentations (90 minutes, including questions and answers): • Introduction to RLAT • Introduction to the Loss Hot Spot Analysis along VCs • Introduction to working groups

	3. Working groups (120 minutes):
	
	 • Validation of the results of the desktop Study and assessment of the perceptions on loss hot spots (Loss Hot Spot Analysis), likely causes and possible solutions along the pre-harvest VC functions
	
	 • Validation of the results of the desktop Study and assessment of the perceptions on loss hot spots (Loss Hot Spot Analysis), likely causes and possible solutions along the post-harvest VC functions
	
	 • Collection of information that is essential for the field phase, for:
	    • traditional weights and measures
	    • formal and informal grades/standards
	    • price differentials practiced according to informal/formal grades/standards
	    • issues related to Aflatoxin prevalence and awareness among VC stakeholders
	    • alternative utilisation of unused/inedible/rejected parts/products
	    • loss-relevant framework conditions
	
	 4. Presentation of working group results (90 minutes including questions and answers)
	
	 5. Conclusions and way forward (60 minutes)

Complementing RLAT tools	• Loss Hot Spot Analysis • Ranking of identified loss hot spots (see figure 3)
Usability of results	• Results from the Key Expert Roundtable are cross-checked with the results of the other RLAT process steps (triangulation) • Needs are assessed for further analyses to derive location-specific technical, socio-economic and organisational solutions alongside cost-benefit analysis
Limitations	• Biased results when group expressions interfere with individual perceptions ('groupthinking') • Limited consistency of results obtained and risk of taking symptoms for causes of losses • Limited reliability of results taken from perceptions given that 'losses' are usually reused • Insufficient reliability of results for evidence-based policy/business decision making • Restricted suitability of proposed solutions with regard to practicality and likely adoption
Required inputs	• A comprehensive map of the particular VC providing very detailed information about VC functions, from inputs and production up to distribution • Pinboards, kraft paper, moderation cards and markers • For timing and resource requirements see RLAT User Guide section 3.1
Documentation of results	• Minutes of Meeting (brief report on the process and results of the roundtbale) • Cumulative Loss Matrix
References	• RLAT User Guide: Sections 3.1, 3.3.1

Ranking of Loss Spots[4]

It sometimes proves to be difficult to determine loss hot spots. In this case, the Ranking of Loss Spots may facilitate the differentiation of losses regarding their importance and severity and the identification of loss points to be prioritised (critical loss points/loss hot spots).

Figure 3. Ranking of Loss Spots

		Importance (= severity) of losses			
		No losses (0)	Losses are negligible (1)	Losses are a concern (2)	Losses are intolerable (3)
Relevance (= probability) of losses	Majority of stakeholders concerned (3)			Priority 1	
	Lots of stakeholders concerned (2)				
	Few stakeholders concerned (1)			Priority 2	
	No stakeholders concerned (0)	Priority 3			

Priority 1 = high losses;
Priority 2 = medium losses;
Priority 3 = low losses

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4   Adapted from: Jaffee, St., P. Siegel and C. Andrews
(2010): Rapid Agricultural Supply Chain Risk Assessment: A Concep-
tual Framework. Agriculture and Rural Development Discussion Paper
47. World Bank. p.43.
Available online at: http://www.wds.worldbank.org/external/default/
WDSContentServer/WDSP/IB/2010/09/16/000356161_2010091601
3240/Rendered/
PDF/565900NWP0ARD01pApRisk1combined1web.pdf

2.4 Stakeholder Workshop

Table 6. Stakeholder Workshop – tool description

Purpose	Loss perceptions of a broader group of VC stakeholders are assessed for the particular VC and existing loss-relevant information regarding quantitative losses, loss causes and possible solutions (results of the Desktop Study and the Key Expert Roundtable) is validated and complemented.
Expected outputs	• Loss perceptions of workshop participants are assessed • Loss hot spots (critical loss points) along the VC are discussed and assessed • Results of the Key Expert Roundtable (hot spots) are validated and complemented • Data on quantitative/qualitative losses along the VC are complemented • Potential loss causes are discussed, most probable loss causes are identified, if possible • Possible solutions for reducing losses at the different VC stages are discussed • Loss-relevant local knowledge/location-specific solutions are collected • Information on traditional weights and measures are validated (if necessary) • Information on formal and informal grading standards are validated (if necessary) • Issues related to quality and food safety are discussed (especially Aflatoxin) • Information for adapting the toolbox to local conditions is gathered
Duration	1 day To ensure that there is enough time for the participatory work (Hot Spot Analysis, discussion of causes and possible solutions) the workshop has to be well prepared and relevant input from the Desktop Study, the Key Expert Roundtable and project results (e.g. VC map) provided. Information will be validated by participants but not newly developed.
Timing	When scheduling the workshop, the availability of stakeholders has to be considered. During peak working times of producers, traders and processors, availability of VC operators is limited. Otherwise, RLAT should ideally be implemented when losses present an ubiquitous problem which is usually the case during the major season. Consequently, the workshop is either scheduled for another period than the peak season or the process has to be implemented in a very structured and time-saving way (see RLAT User Guide section 3.1).
Participants	A representative mix of various stakeholders of the VC (producers, middlemen/aggregators, traders, small, medium and large-scale processors). Number of participants: 25-35
Staffing	• 2 senior experts as moderators • 1 junior expert for documentation • Support staff for organisational support

Agenda and approach	The workshop agenda will largely be the same as for the Key Expert Roundtable. However, the moderation method (both plenary and working groups) and the presentations have to be adapted to the practical background of the participants. Practitioners usually have an excellent understanding of the realities on the ground but scientific language and theory-loaden presentations and discussions will not contribute to yielding the desired workshop results.
	
	The agenda should be handled in a flexible way to allow adaptation to specific conditions such as the knowledge of key experts on the particular VC. The workshop agenda will usually entail the following topics :
	
	1. Opening (30 minutes):
	    • Official welcome and presentation of participants
	    • Objectives of the roundtable

Agenda and approach	2. Presentations (90 minutes, including questions and answers): • Introduction to the Rapid Loss Appraisal Tool (RLAT) • Introduction to the Loss Hot Spot Analysis along VCs • Introduction to working groups 3. Working groups (120 minutes; different from the Key Expert Roundtable): • Validation of the results of the former RLAT process steps and assessment of perceptions on loss hot spots (Loss Hot Spot Analysis), likely causes and possible solutions along the production VC stage/ pre-harvest VC functions • Validation of the results of the former RLAT process steps and assessment of perceptions on loss hot spots (Loss Hot Spot Analysis), likely causes and possible solutions along the production VC stage/ post-harvest VC functions • Validation of the results of the former RLAT process steps and assessment of perceptions on loss hot spots (Loss Hot Spot Analysis), likely causes and possible solutions along the trading VC functions • Validation of the results of the former RLAT process steps and assessment of perceptions on loss hot spots (Loss Hot Spot Analysis), likely causes and possible solutions along the processing VC functions 4. Presentation of working group results (90 minutes including questions and answers) 5. Conclusions and way forward (60 minutes)
Complementing RLAT tools	• Loss Hot Spot Analysis • Ranking of loss hot spots identified
Usability of results	• Results from the Stakeholder Workshop are cross-checked with the results of the other RLAT process steps (triangulation; see Cumulative Loss Matrix) • Loss-relevant local/traditional knowledge and location-specific solutions (mainly low cost technologies) are available for further assessment of cost-benefit/feasibility • Needs are assessed for further analysis to derive location-specific technical, socio-economic and organisational solutions alongside cost-benefit analysis
Limitations	• Biased results when group expressions interfere with individual perceptions ('groupthinking') • Limited consistency of results obtained and risk of taking symptoms for causes of losses • Limited reliability of results taken from perceptions given that 'losses' are usually reused • Insufficient reliability of results for evidence-based policy/business decision making • Restricted suitability of proposed solutions with regard to practicality and likely adoption
Required inputs	• A comprehensive map of the particular VC providing very detailed information about VC functions, from inputs and production up to distribution • Pinboards, kraft paper, moderation cards and markers • For timing and resource requirements see RLAT User Guide section 3.1
Documentation of results	• Minutes of Meeting (brief report on the process and results of the workshop) • Cumulative Loss Matrix
References	• RLAT User Guide: Sections 3.1, 3.3.2

2.5   Focus Group Meetings and Processor Meetings

Table 7. Focus Group Meetings and Processor Meetings – tool description

Purpose	Loss perceptions of VC operators (farmers, traders, processors) are assessed for the particular VC, compared with the results of the preceding RLAT process steps (validation) and complemented.
Expected outputs	• Loss perceptions of participants in Focus Group Meetings/Processor Meetings collected • Loss hot spots (critical loss points) along the VC are discussed and assessed • Results of the preceding RLAT process steps (hot spots) are validated and complemented • Potential loss causes are discussed/most probable loss causes are identified, if possible • Possible solutions for reducing losses at the different VC stages are discussed • Information on traditional weights and measures are validated • Information on formal and informal grading standards are validated • Issues related to quality and food safety are discussed to raise awareness (Aflatoxin) • Samples from produce at farmers'/ traders'/ processors' places are collected for Biophysical Measurements (e.g. moisture content, aflatoxin prevalence)
Duration	3-4 hours for the Farmer Focus Group Meeting; about 2 hrs for the Trader/Processor Meetings To ensure that there is enough time for the participatory Farm or Market Transect Walk the meetings have to be well prepared and relevant input from the Desktop Study, the Key Expert Roundtable and the Stakeholder Workshop assessed and kept in mind during the meetings.
Timing	When scheduling the Focus Group and Processor Meetings, the availability of stakeholders has to be considered. During peak working times of producers, traders and processors, availability of VC operators is limited. Otherwise, RLAT should ideally be implemented when losses present an ubiquitous problem, which is usually the case during the major season. Consequently, the meetings are either scheduled for another period than the peak season or the process has to be implemented in a very structured and time-saving way (see RLAT User Guide section 3.1).
Participants	• Random grouping of individual operators at the same VC stage or existing groups of farmers, traders or processors. • Number of participants by meeting: between 4 and 15, typically 8-10; medium or large-scale traders processors will usually be met in one-on-one meetings
Staffing	• 2 senior experts as moderators • 1 junior expert for documentation • Support staff for organisational support
Agenda and approach	Focus Group Meetings are moderated discussions that bring together a small number of people and that aim at exchanging experiences and opinions and in the specific case of RLAT, on loss perceptions. The idea is to facilitate: • self-disclosure among participants on loss perceptions, causes and possible solutions and • consensus-building on loss hot spots. Focus groups are meant to produce qualitative information (here loss perceptions) through dialogue instead of interviewing people using formal questions. In this sense, it is essential to use the Checklists for the Farmer, Trader and Processor Meetings as discussion guides but NOT as questionnaires. It is thus, very important that the meetings are moderated discussions but are not done in the form of interviews (questions and answers).

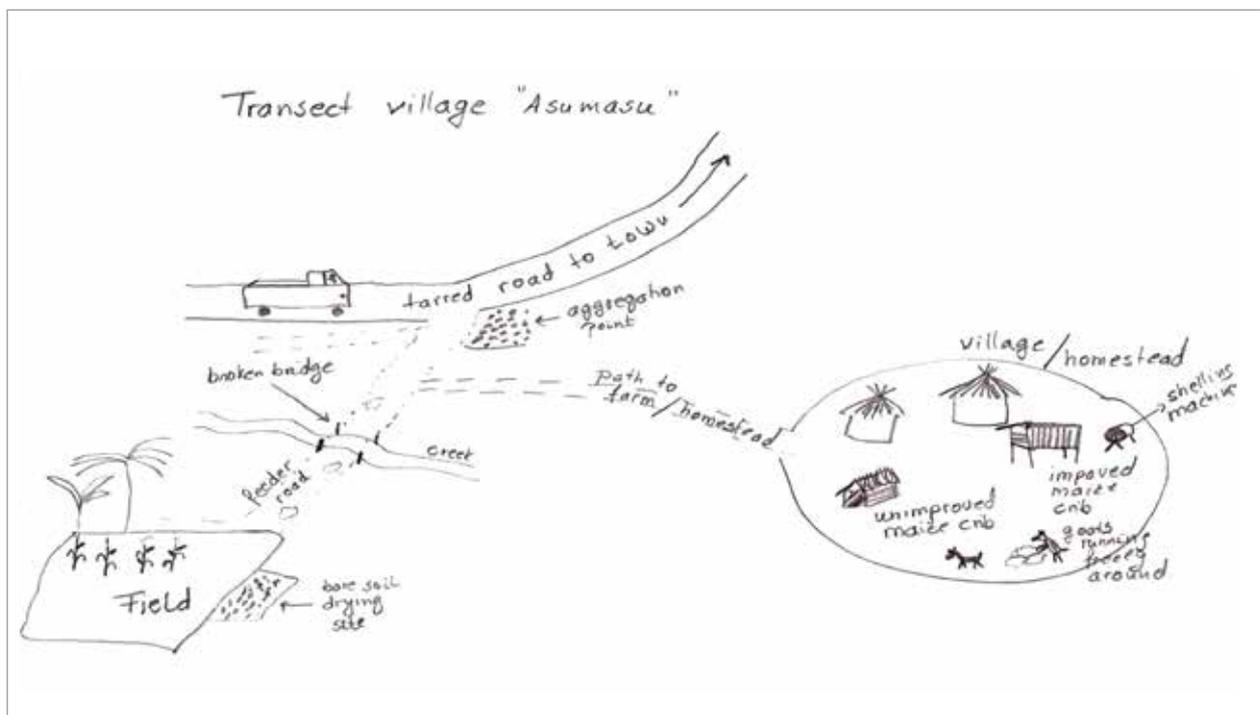| Agenda and approach	While the Checklists for the meetings facilitate the task of the moderator (task of one of the senior experts), the Data Collection sheets for the different VC operator categories are used to fill in the results of the discussions on the different topics (task of the other senior expert, complemented by the documentation done by the junior expert to assure that all information is gathered).
	For the identification of loss hot spots and consensus-building on loss hot spots, RLAT uses the following participatory tools: Farm Transect Walk at farmer level, Market Transect Walk at trader level and Loss Categories and Loss Ranking Matrix. The results of the discussions on perceptions may be substantiated or disapproved by taking samples of produce at different VC functions (e.g. harvest, drying, storage, market) for Biophysical Measurements.
	Results of Focus Group discussions may or may not be representative of common opinions and may or may not be consistent with statistically reliable infomation.
Comple-menting RLAT tools	• Farm Transect Walk • Market Transect Walk • Loss Categories and Loss Ranking Matrix • Biophysical Measurements
Usability of results	• Results from the Focus Group Meetings are cross-checked with the results of the other RLAT process steps (triangulation; see Cumulative Loss Matrix) • Loss-relevant local/traditional knowledge and location-specific solutions (mainly low cost technologies) are available for further assessment of cost-benefit/feasibility • Needs are assessed for further analyses to derive location-specific technical, socio-economic and organisational solutions alongside cost-benefit analysis
Limitations	• Biased results when group expressions interfere with individual perceptions ('groupthinking') • Limited consistency of results obtained and risk of taking symptoms for causes of losses • Limited reliability of results taken from perceptions given that 'losses' are usually reused • Insufficient reliability of results for evidence-based policy/business decision making • Restricted suitability of proposed solutions with regard to practicality and likely adoption
Required inputs	• VC map and results from preceding RLAT process steps • Flipchart paper, markers, moisture meter, weighing scale (max. 5 kg), household sieve of large mesh size so that grains will not fall through, clean plastic bags for collection of samples, UV-light and viewing cabinet (365 μm), cotton bags and clean plastic bags (for 200 gr of grains) for shipping samples for aflatoxin analysis (see also Biophysical Measurements) • For timing and resource requirements see RLAT User Guide section 3.1
Documen-tation of results	• Data collection sheets Farmer, Trader and Processor Meetings • Evaluation sheets Aflatoxin Risk, Farmer, Trader and Processor Meetings • Cumulative Loss Matrix
References	• RLAT User Guide: Sections 3.1, 3.3.3

2.6 Farm Transect Walk

Table 8. Farm Transect Walk – tool description

Purpose	Forming part of the Farmer Focus Group Meeting, the Farm Transect Walk supports the appraisal of on-farm pre- and post-harvest losses, loss causes and possible (location-specific) solutions for loss reduction.
Expected outputs	• Spatial dimensions of the farming system and practices with a special focus on loss points in general and loss hot spots (critical loss points) in particular are visualised • Potential loss points and loss hot spots along the pre- and post-harvest on-farm workflow are identified through direct observation • Causes for losses and possible solutions in specific farming operations are assessed/ identified. Special attention should be paid to local knowledge and location-specific solutions.
Duration	About 60 minutes
Timing	Forms part of the Farmer Focus Group Meetings
Participants	Participants in the Farmer Focus Group Meetings
Staffing	As for Focus Group Meetings
Approach	As a participatory tool, a Transect Walk facilitates systematic discussions between local VC operators and RLAT moderators on loss perceptions, loss causes and possible solutions along a pre-defined path (transect). Activities before starting the Transect Walk: • Explain the purpose of the Transect Walk to participants and guide discussions towards the points of interest of the rapid loss appraisal • Facilitate discussions on the spatial dimension of relevant points and practices in the farm workflow and visualise/map on flipchart paper (see figure 4) • Moderate discussions for determining the sequence of loss-relevant points along the pre- and post-harvest workflow that should be looked at and mark the points in the map Activities during the Transect Walk: • Follow the pre-determined path together with the participants, stop at various locations and discuss loss-relevant issues • Do not only stop at predetermined points to trigger 'out of the box' thinking among farmers. Relevant points may be taken from the results of preceding RLAT process steps. • Observe the surroundings, listen to discussions among participants and modify the transect path if required when observations/discussions bring forth new/divergent views • Ask questions to clarify issues raised/observed that are not clear; but take care not to trigger biased opinions by the ways of asking questions • Facilitate the identification of causes for losses and possible solutions. Special attention should be paid to local knowledge and location-specific solutions. • Filter out concurring and divergent opinions/perceptions and document pertinent information. Fill into the Data Collection sheet Farmer Focus Group Meeting • Use local terms for the documentation to facilitate clarifications (if required) at a later point in time, e.g. with key infomants • Take samples during the walk for Biophysical Measurements If a complete Transect Walk of the farm is not possible (e.g. because of weather conditions or long distances) only look at selected loss points only while the remaining are done as paper exercise. If aggregation, drying and/or storage is done as a collective action of farmers as group or at village level one needs to evaluate whether a Farm Transect Walk or a Transect Walk using the group's or village's facilities as starting point will more likely provide the expected information.

Comple-menting RLAT tools	• Focus Group Meetings • Loss Categories and Loss Ranking Matrix • Biophysical Measurements
Usability of results	• Discussions on loss perceptions, loss hot spots, loss causes and possible solutions are supported during the Farmer Focus Group Meeting • Loss-relevant issues may be uncovered which have not been mentioned during initial discussions of the Farmer Focus Group Meeting or even the preceding RLAT steps (roundtable, workshop) since a Transect Walk supports 'thinking out of the box' • Loss-relevant local/traditional knowledge and location-specific solutions (mainly low cost technologies) are available for further assessment of cost-benefit/feasibility
Limitations	• Biased results when group expressions interfere with individual perceptions ('groupthinking') • Limited consistency of results obtained and risk of taking symptoms for causes of losses • Limited reliability of results taken from perceptions given that 'losses' are usually reused
Required inputs	• VC map and results from preceding RLAT process steps • Flipchart paper, markers, moisture meter, weighing scale (max. 5 kg), household sieve of large mesh size so that grains will not fall through, clean plastic bags for collection of samples, UV-light and viewing cabinet (365 µm), cotton bags and clean plastic bags for 200 gr of grains for shipping samples for aflatoxin analysis (see also Biophysical Measurements)
Documen-tation of results	Data collection sheet Farmer Focus Group Meeting
References	• RLAT User Guide: Section 3.3.3

Figure 4. Case example: Farm Transect Map

2.7 Market Transect Walk/Trader's Place Transect Walk

Table 9. Market Transect Walk/Trader's place Transect Walk – tool description

Purpose	Forming part of the Trader Focus Group Meeting, the Market Transect Walk (or Trader's Place Transect Walk) supports the appraisal of losses on markets/at traders' places and the identification of loss causes and possible (location-specific) solutions for loss reduction.
Expected outputs	• Spatial dimensions of the market/trader's place and handling practices with a special focus on loss points/loss hot spots (critical loss points) are visualised • Potential loss points and loss hot spots along the produce flow on markets/at trader's places are identified through direct observation • Causes for losses and possible solutions in specific trading operations are assessed/identified. Special attention should be paid to local knowledge and location-specific solutions.
Duration	30-60 minutes
Timing	Forms part of the Trader Focus Group Meetings
Participants	Participants in the Trader Focus Group Meetings
Staffing	As for Focus Group Meetings
Approach	As a participatory tool, a Transect Walk facilitates systematic discussions between local VC operators and RLAT moderators on loss perceptions, loss causes and possible solutions along a pre-defined path (transect). Activities before starting the Transect Walk: • Explain the purpose of the Transect Walk to participants and guide discussions towards the points of interest of the rapid loss appraisal • Facilitate discussions on the spatial dimension of relevant points and practices in the produce flow and visualise/map on flipchart paper • Moderate discussions for determining the sequence of loss-relevant points along the produce flow on the market/at the trader's place that should be looked at and mark the points in the map Activities during the Transect Walk: • Follow the pre-determined path together with the participants, stop at various locations and discuss loss-relevant issues • Do not only stop at predetermined points to trigger 'out of the box' thinking among traders. Relevant points may be taken from the results of preceding RLAT process steps. • Observe the surroundings, listen to discussions among participants and modify the Transect path if required when observations/discussions bring forth new/divergent views • Ask questions to clarify issues raised/observed that are not clear; but take care not to trigger biased opinions by the ways of asking questions • Facilitate the identification of causes for losses and possible solutions (special attention should be paid to local knowledge and location-specific solutions) • Filter out concurring and divergent opinions/perceptions and document pertinent information. Fill into the Data Collection sheet Trader Focus Group Meeting • Use local terms for the documentation to facilitate clarifications (if required) at a later point in time, e.g. with key infomants • Take samples during the walk for Biophysical Measurements If a complete Transect Walk of the market/trader's place is not possible (e.g. because of weather conditions or long distances) only selected loss points are looked at while the remaining are done as paper exercise.

Approach	If produce collection, drying and/or storage is done by aggregators who supply individual traders or wholesalers at markets one needs to evaluate whether a Market Transect Walk should be complemented by a Transect Walk at the aggregators' place(s).
Complementing RLAT tools	• Focus Group Meetings • Loss Categories and Loss Ranking Matrix • Biophysical Measurements
Usability of results	• Discussions on loss perceptions, loss hot spots, loss causes and possible solutions are supported during the Trader Focus Group Meeting • Loss-relevant issues may be uncovered which have not been mentioned during initial discussions of the Trader Focus Group Meeting or even during the preceding RLAT steps (roundtable, workshop) since a Transect Walk supports 'thinking out of the box' • Loss-relevant local/traditional knowledge and location-specific solutions (mainly low cost technologies) are available for further assessment of cost-benefit/feasibility
Limitations	• Biased results when group expressions interfere with individual perceptions ('groupthinking') • Limited consistency of results obtained and risk of taking symptoms for causes of losses • Limited reliability of results taken from perceptions given that 'losses' are usually reused
Required inputs	• VC map and results from preceding RLAT process steps • Flipchart paper, markers, moisture meter, weighing scale (max. 5 kg), household sieve of large mesh size so that grains will not fall through, clean plastic bags for collection of samples, UV-light and viewing cabinet (365 μm), cotton bags and clean plastic bags for 200 gr of grains for shipping samples for aflatoxin analysis (see also Biophysical Measurements)
Documentation of results	Data collection sheet Farmer Focus Group Meeting
References	• RLAT User Guide: Section 3.3.3

2.8 Loss Categories and Loss Ranking Matrix

Table 10. Loss Categories and Loss Ranking Matrix – tool description

Purpose	The Loss Categories and Loss Ranking Matrix form part of the Focus Group meetings and support the appraisal of losses and loss hot spots on farms and at markets/traders' places.
Expected outputs	• Losses at different loss points are put into relation • Losses are ranked according to their importance • Losses are quantified
Timing	Forms part of the Trader Focus Group Meetings
Participants	Participants in the Trader Focus Group Meetings
Staffing	As for Focus Group Meetings
Comple-menting RLAT tools	• Focus Group Meetings • Farm and Market Transect Walks
Documen-tation of results	• Data Collection sheets Farmer and Trader Focus Group Meetings • Cumulative Loss Matrix
References	• RLAT User Guide: Section 3.3.3

Table 11. Loss Categories and Percentages of Losses – approach and categories

Approach	• Discuss the definition of the three loss categories given in the table below (negligible losses, losses are a concern, losses are intolerable) • Ask participants to estimate the percentage of losses by category in produce traded in the last season • Use traditional measures (bags etc.) to estimate the losses and translate these into percentages (example: number of bags lost out of 100 bags) • Use the size of average storage facilities or the amount of harvested bags to be as concrete as possible in defining loss categories and loss percentages Note: The results should be validated in Key Informant Interviews with individual farmers.

Loss categories		Estimated losses in the last season	
		(in traditional weights/ measures)	(in %)
1	**Losses are negligible:** Losses do occur but the VC operator can accept them in the long run without changing anything.		
2	**Losses are a concern:** Losses do concern the VC operator since they affect his/her business and income and he/she looks for measures to reduce the losses.		
3	**Losses are intolerable:** The VC operator cannot accept the losses since they put his business and income at risk.		

Table 12. Loss Ranking Matrix – approach and categories

Approach	Draw a Loss Ranking Matrix (see Table below) on the ground or on a flipchart paper indicating the three loss categories, the most important loss points (loss hot spots) in farming, trading and processing (use results of the Transect Walks).
	Approach when doing the loss ranking with farmers:
	• Distribute seed kernels (e.g. beans) or any other material to every participant (1 kernel per loss point listed; different colours for men and women)
	• Ask the participants to 'vote' by putting one kernel into the field that corresponds best to his/her loss perception at a given loss point along the VC. Every participant only puts 1 kernel per loss point, i.e. 1 kernel per row.
	• Count the kernels per field at the intersection of a certain loss point with a given loss category
	Approach when doing the loss ranking with traders:
	• Ask traders to use markers for drawing a stroke into the field that corresponds best to his/her loss perception at a given loss point along the VC. Only one stroke per participant and row
	• Count the strokes per field at the intersection of a certain loss point with a given loss category
	Discuss results with participants:
	• According to the number of kernels/strokes per field, loss points can be ranked and loss hot spots identified (see also Loss Hot Spot Analysis)
	• Ask participants whether they all agree with the combined 'vote' for ranking loss points and discuss different loss perceptions at given VC functions
	• If there is a difference between the loss perceptions of men and women ask for the possible underlying reasons
	• Cross-check results of the loss ranking with the percentage values identified in the loss category exercise (see above) together with the participants and discuss whether participants still approve the loss percentages
	• Take a photo of the loss ranking for photo documentation (see figure 5)
	Calculate the percentage of kernels/strokes per field (intersection loss point/loss category) and transfer the results into the Cumulative Loss Matrix.

Loss points along the VC	Loss categories						
	Negligible (1)		Concern (2)		Intolerable (3)		
	Number of counts (C)	% of answers [C*100/T]	Number of counts (C)	% of answers [C*100/T]	Number of counts (C)	% of answers [G*100/T]	Total answers (T)
Loss point 1							
Loss point 2							
Loss point 3							
Loss point 4							
Further…							

Figure 5. Case example: Loss ranking matrix

3. Biophysical Measurements and Methods for Aflatoxin Assessment

3.1 Bio-physical Measurements

(Farmer, Trader, Processor Focus Group Meetings, Farm/Market Transect Walks)

Commodity:_____

List of material needed:

- moisture meter

- weighing scale (max. 5 kg)

- household sieve of large mesh size (grains shall not fall through)

- clean plastic bags

- UV-light and viewing cabinet (365 μm)

- cotton bags, clean plastic bags (200 gr of grains) for shipping samples for aflatoxin analysis

General background information

- **Stored product characteristics:**
  Maize can be stored as:

  - grains

  - cobs without husk

  - cobs with husk

- **Storage structure:**
  Samples can come from:

  - maize stored in bags (usually as grains)

  - maize stored in storage bins/cribs etc. (usually on cobs/or in north as grains)

- Quantity stored on a farm, at a trader place or in a storage shed:

  - either number of bags (usually 100 kg or more; rarely 50 kg bags)

  - or quantity in kg or tons

Table 13. Steps to follow for biophysical measurements

Steps	Activity	Information/ Measurements
1	Select a farmer/trader/processor for sampling. Any farmer/trader who stores maize can be selected for sampling.	Collect information on: • Storage method & structure • Age of storage structure • Maize variety • Insecticide treatment • Storage period (e.g. time since harvest)
2	Select a commodity: • If cobs, continue with Step 3 • If grains continue with Step 5	Samples are selected randomly and are representative (no bias) for the lot. Typically many small incremental samples are selected from the lot and combined to form an aggregate sample.
3	Collect 30 cobs randomly from different layers (see information on representative sampling below)	No. of damaged cobs with husk
3	Take off husk	No. of discoloured cobs without husk
3		No. of potentially thrown away cobs without husk
4	Remove all grains from cobs and put them on a plastic sheet	
5	Sample grains (1 kg) are divided into 3 parts, take one lot and count out 500 grains (see information on representative sampling below)	Sieve through a household sieve and count No. of insects per 500 grains
5		Sieve through a household sieve and weigh the frass/ debris per 500 grains
5		Count No. of grains that show insect damage (basis of 500 grains)
5		Count No. of grains that are discolored (basis of 500 grains)
5		Count No. of grains that are undersized or shriveled (basis of 500 grains); determine the number of grains that would be thrown away
6	Measure moisture of grains with a rapid grain moisture tester	Grain moisture (mean of 3 measurements)

3.2 Sampling Methods & Evaluation

Refering to 2.1/ Step 3: Collect 30 cobs randomly from different layers

Drawing a Sample & Evaluation Maize cobs

- take 30 cobs from several positions in the store: from the top, 1-3 from middle layers and from the bottom, from four directions (e.g. north, south, east, west)

- look at each cob to sort for obvious external insect, disease, rat, bird, mechanical or other damage and count No. of cobs damaged

  Calculate **Ratio A:**
  No. of damaged cobs divided by total number of cobs.

- dehusk all cobs (take off the outer leaves) Look at each cob to sort for cobs with external discolored parts or grains (green, white, pink, black, gray) and count No. of cobs with discolored grains or parts

  Calculate **Ratio B:**
  No. of cobs with discoloured areas divided by total No. of cobs

- discuss with participants in Focus Group Meetings to identify cobs which would be thrown away and count No. of cobs that would be thrown away

  Calculate **Ratio C:**
  No. of cobs potentially thrown away divided by total No. of cobs

Table 14. Biophysical Measurements for Maize cobs

Biophysical Measurements for Maize cobs (on the basis of 30 cobs)			Weigthing[5]
Count No. of cobs with damage/ total No. of cobs	**Ratio A**	Damaged cobs/ 30 cobs	0-0 cobs 1-1-2 2-3-5 cobs 3->5 cobs 4->10 cobs
Count No. of cobs with discolored grains or parts (green, white, pink, black, grey)/ total No. of cobs (see below)	**Ratio B**	Cobs with discolored grains or parts/ 30 cobs	0-0 cobs 1-1-2 2-3-5 cobs 3->5 cobs 4->10 cobs
Count No. of cobs that would be thrown away/ total No. of cobs	**Ratio C**	Cobs thrown away/ 30 cobs	0-0 cobs 1-1 cob 2-2 cobs 3-3 cobs 4->3 cobs

---

5   0 = none; 1 = negligible; 2 = concern; 3 = intolerable; 4 = total loss

Refering to 2.1/ Step 4:
Remove all grains from cobs and put on a plastic sheet

Remove all the grains from each cob and place them all together on a clean plastic sheet (continue below FOR GRAINS)

Refering to 2.1/ Step 5:
Sampling shelled grains in bags

- if farmers have 10 bags of maize or less sample all the bags. Otherwise, sample 10 bags randomly from all the bags.

- from each selected maize bag, draw 5 handfuls of maize per bag at different levels and different positions.

- put the sample of 5 handfuls into a clean, new plastic bag for transport. Keep it open to avoid accumulation of condensation.

- assemble all drawn samples from all bags on a clean plastic sheet and follow the protocol below.

QUANTIFY DAMAGE DUE TO INSECTS AND FUNGI

Maize grains

- take a sub-sample of the grains sampled (see description above) by dividing the whole lot into 4 parts and take handfuls from each quarter into a plastic bag up to about 1 kg

- divide the obtained sample into 3 parts by taking one lot out of each of the 3 parts and count 500 grains

- if possible, sieve the 500 grains and collect the insects AND frass using a simple household sieve of larger

mesh size and determine the No. of **INSECTS**, alive and dead in the grains and weigh the **FRASS** in grams

- evaluation of grains on the basis of 500 grains –

  i. Determine the number of grains that show insect damage (**Count A**)

  ii. Determine the number of grains that are discolored (**Count B**)

  iii. Determine the number of grains that are undersized or shrivelled (**Count C**)

Refering to 2.1/ Step 6:
Determine Grain Moisture

There are two methods to determine grain moisture content:

- the oven method, which is more accurate but is lab-based since a drying oven running at 105°C is required; and

- the rapid grain moisture tester, which can easily have a problem of calibration

For this rapid assessment we recommend to use a calibrated grain moisture tester[6].

GRAIN MOISTURE measurement should be done in triplicates and a mean calculated.

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6 HGCA (2008): Grain moisture – guidelines for measurement. Online at: http://www.hgca.com/media/185767/g37-grain-moisture-guidelines-for-measurement.pdf

Table 15. Biophysical Measurements for Maize grains

Biophysical Measurements for Maize GRAINS (on the basis 500 grains)			Weighting[7]
Count No. of insects per 500 grains after sieving through a household sieve	**INSECTS**	No./ 500 grains	0-0 1-1-3 insect 2-3-5 insects 3-5-10 insects 4->10 insects
Weight the frass/ debris per 500 grains after sieving through a household sieve	**FRASS**	Weight in grams	0-0 1-1 gr. 2-2-3 gr. 3-3-5 gr. 4->5 gr.
Count the No. of grains that show insect damage	**Count A**	No. of grains with insect damage/ 500 grains	0-0 1-1-15 grains 2-15-50 grains 3-50-74 grains 4->75 grains
Count the No. of grains that are discolored	**Count B**	No. of grains that are discolored/ 500 grains	0-0 1-1-15 grains 2-15-50 grains 3-50-74 grains 4->75 grains
Count the No. of grains that are undersized or shriveled	**Count C**	No. of grains undersized or shriveled/ 500 grains	0-0 1-1-15 grains 2-15-50 grains 3-50-74 grains 4->75 grains

Table 16. Biophysical Measurements for Maize grains – grain moisture

Grain moisture measured with rapid grain moisture tester (3 replications)	**GRAIN MOISTURE**	Mean of 3 measurements	value

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7   0 = none; 1 = negligible; 2 = concern; 3 = intolerable; 4 = total loss

3.3 Methods for Aflatoxin Assessment in Corn

The tool Aflatoxin Risk Assessment works with proxies. For maize e.g. the measurement of grain moisture content with a grain moisture meter can give an indication (proxy) of the risk for aflatoxin. Moisture content levels below 12.5 percent for maize are usually considered as being safe from aflatoxin development.

Table 18 gives an overview on commercially available test methods and shows the respective costs, the ease of use and the accuracy level of the methods. However, a systematic sample analysis cannot be realised within the frame of a rapid appraisal like RLAT. Punctual analysis for calibrating the risk assessment will nevertheless improve the accuracy of the tool.

Table 17. Methods for Aflatoxin Assessment in corn

Pre-test	The test serves to identify corn lots that may contain the toxin and to determine whether a corn lot should be analysed for aflatoxin or not. Since most samples do not contain a detectable amount of aflatoxin, it is useful to identify those samples with minimum cost (human and material) using a visual method.
	The presumptive test for aflatoxin is based on the 'bright greenish-yellow fluorescence' (BGYF) or the 'black light' test. The commodity is inspected under an ultra-violet (UV) lamp (365 µm) for a characteristic bright greenish yellow fluorescence that is observed on broken and damaged kernels. This is related to the presence of kojic acid produced by the aflatoxin causing fungi *Aspergillus flavus* or *A. parasiticus* or possibly the mycotoxin itself. The test takes 5 minutes or less. Quantification is not possible.
Rapid screening methods	The method serves to establish the presence or absence of the toxin and to know the aflatoxin level (such as the Dipstick, E-Nose and ELISA method).
Quantitative methods	The method serves to determine types and contents of aflatoxin.Key is a sound sampling protocol for obtaining a representative sample. There is need for expensive instrumentation (HPLC; LC-MS; TLC[8]), sophisticated infrastructure and human capacity. This method needs multiple steps for quantification involving extraction, cleaning-up, derivatization and detection.

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8   HPLC– High Performance Liquid Chromatography; LC-MS– Liquid Chromatography-Mass Spectrometry; TLC – Thin Layer Chromatography

Table 18. Diagnostic technologies commercially available for flatoxin testing (Source: IFPRI[9])

Diagnostic technologies	Technology cost	Sample cost ($)	Portable	Potential use for milled sample/ whole grains	Ease of use (prep. time)	Accuracy level (Mycotoxin detected)	Need for standard
LC/MS-MS	$$$	$$	no	yes/no	++	Accurate (multiple)	yes
HPLC/UPLC	$$$	$$	no	yes/no	++	Accurate (individual)	yes
VICAM (immuno affinity fluorometry)	$	$$	yes	yes/no	++	Accurate (Total)	no
ELISA	$	$$	some	yes/no	+++	Less accurate (individual)	yes
TLC	$	$$	no	yes/no	+++	Accurate (individual)	yes
NIR (proof of concept underway)	$$	$	no	yes/yes	+	Less acurate (individual)	no
E-nose (proof of concept underway)	$	$	yes	yes/no	+	Less accurate (individual)	no
Agristrips* and other dipsticks	$	$$	yes	yes/no	+	Less accurate (individual)	no
BGYF	$	$	yes	Yes/yes	+	Not accurate/ screening	no

$ = low/ $$$ = High cost (relative within column); + = low effort/+++ = high effort * the limit of detection of most dipsticks is above the acceptable limit i.e. 4 µg/kg

LC-MS/MS – Liquid Chromatography Tandem Mass Spectrometry; HPLC/UPLC - High Performance Liquid-chromatography/Ultra Performance Liquidchromatography; ELISA - Enzyme Linked Immunosorbent Assay; TLC - Thin Layer Chromatography; NIR - Near Infrared; BGYF – Bright Greenish Yellow Fluorescence

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4. Checklists, Data Collection Sheets and Evaluation Sheets

4.1 Checklist General Data

Note: The 'Checklists' provide a structured guideline for the collection of data for the desktop study and the Focus Group Meetings with farmers and traders and the Processor Meetings.

Sources of information: Internet, Key Expert Roundtable, Stakeholder Workshop, Focus Groups Meetings

Commodity: _____

Table 19. Checklist general data

A. Survey zone
☐ Administrative name and size of survey zone
☐ Population density, distribution of urban and rural population
☐ Agro-ecological/climate zone
☐ Temperature (min./max.) and precipitation over the year
☐ Seasons, in which the product is grown

B. Relevant institutions
☐ Ministry of Agriculture (agricultural sector and investment plans)
☐ National/international research institutes, universities (loss-relevant studies)
☐ National and international projects (loss-relevant documents)
☐ Non-governmental organisations (loss-relevant documents)
☐ Farmer, business and value chain organisations (loss-relevant documents)

C. Standards and regulations
☐ Existence of informal/formal quality/food safety standards and their enforcement
☐ Existence of maximum permissible values for Aflatoxin

D. Rural infrastructure
☐ Road infrastructure (incl. feeder roads)
☐ Market infrastructure at different aggregation levels

E. Rural services
☐ Financial services
☐ Rural advisory services

F. Farm-level socio-economics and agronomics
☐ Production area of the particular crop in the survey zone (ha) and average field sizes
☐ Typical farming systems and cropping patterns
☐ Predominant utilisation of harvests (subsistence/commercialisation)

G. Trading and processing
☐ Main target markets for the survey zone and distance to markets/places of main buyers
☐ Market prices of crops in the survey zone over the year
☐ Price differentials for informal/formal quality grades
☐ Types and scale of processing operations

4.2 Checklist Farmer Focus Group Meeting

Commodity: _____

Location of meeting:	Name of group, if applicable:
No. of men attending:	No. of women attending:

1. Introduction to the meeting

- thank the farmers for the opportunity to meet them

- explain the objectives of the meeting

- propose a sequence of activities for the meeting

  - discussion of general information and quality awareness

  - Transect walk or visit of 1-2 potential loss points

  - Loss ranking matrix

Note:
Do not use the topics in the checklist as interview guides/questionnaire but invite the local informants to speak freely about the mentioned head line topics (A-H) while trying to capture as much information as possible from their explanations. Only ask questions if more detailed explanations are required. Ticking the sub-topics which have been sufficiently answered helps you to keep track of the information needed.

Notes should be taken by a second consultant, not by the facilitator.

2. General information, quality requirements and process steps

Invite the farmers to give some background information on their farming practices in general as well as on their quality awareness in regard to the crop which is subject of this meeting.

Refer to topics (below) in regard to:

- A. General information

- B. Quality awareness

Table 20. Checklist farmer focus group meeting

A. General information
☐ Seasons when product is grown and their importance in regard to losses
☐ Average field size of product
☐ Average yield
☐ Relevance of maize in household economy (Relevance: not important, one activity amongst others, most important activity)
☐ Home consumption/commercialization (%)
☐ Where/to whom do the farmers sell to?
☐ Lowest and highest prices achievable on local market/with trader, Do farmers achieve it?
☐ Organizational structures on farmer´s level, their role in transport/storage/processing/marketing?
☐ Women in agriculture, if applicable specific roles in VC steps

B. Quality Awareness
☐ Farmer´s definition of good and bad quality
☐ Causes for bad quality
☐ Price differentials at farmer´s level for different product qualities
☐ Usage of bad quality product
☐ Measures applied to improve quality and their efficiency (A)[10]
☐ Measures known but not applied, reason for not applying

(As a reminder for later more in-depth discussions, the interviewer ticks the likely loss category.)

Are quality issues an important loss factor?

☐ No ; ☐ Negligible ; ☐ Concern ; ☐ Intolerable ; ☐ Total loss

3. Transect

(See Farm Transect Walk in Toolbox 2.6 for further details.)

The topics C-H can be answered by walking a transect with the farmers to visit the most important potential loss hot spots. If a complete transect walk is not feasible due to local conditions (too long distances between transect points, weather conditions, no plants on the field) draw the transect on a flipchart and start a comprehensive discussion around the below listed key loss topics.

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10 (A) means, that at this step there could be a potential aflatoxin risk, and that you have to apply the aflatoxin Risk checklist later on.

Table 21. Transect walk

C. Pre-harvest
☐ Visual appreciation of location/field (hygienic conditions)
☐ Crop residues staying on the field (A)
☐ Kind of soil preparation and tools used
☐ Varieties used and source of seed (A)
☐ Plant spacing (high or low density) (A)
☐ Mono cropping/mixed cropping (A)
☐ Crop rotation over the years (A)
☐ Use of agricultural inputs (fertilizer, pesticides), dose of inputs (too high, too low, optimal) (A)
☐ Periodic drought or flooding (A)
☐ Losses occurring before harvest
☐ Measures applied to reduce losses and their efficiency (A)
☐ Measures known but not applied, reason for not applying
(As a reminder for later more in-depth discussions, the interviewer ticks the likely loss category.)   **Are pre-harvest issues an important loss factor?**   ☐ No ; ☐ Negligible ; ☐ Concern ; ☐ Intolerable ; ☐ Total loss

D. Harvest
☐ Harvest time (month, early or late harvest) (A)
☐ Harvested product (green or dry maize)
☐ Labour availability (A)
☐ Harvesting techniques
☐ Immediate removal of harvested good from field or drying on stalk? (A)
☐ Losses occurring during harvest
☐ Measures applied to reduce losses and their efficiency (A)
☐ Measures known but not applied, reason for not applying
(As a reminder for later more in-depth discussions, the interviewer ticks the likely loss category.)   **Are harvest issues an important loss factor?**   ☐ No ; ☐ Negligible ; ☐ Concern ; ☐ Intolerable ; ☐ Total loss

E. Transport

- ☐ Mode of transport to farm
- ☐ Own mode of transport or rented?
- ☐ Average distance from field to farm (A)
- ☐ Packaging used, if any (A)
- ☐ Losses occurring during transport
- ☐ Measures applied to reduce losses and their efficiency
- ☐ Measures known but not applied, reason for not applying

(As a reminder for later more in-depth discussions, the interviewer ticks the likely loss category.)

Are transport issues an important loss factor?

☐ No ; ☐ Negligible ; ☐ Concern ; ☐ Intolerable ; ☐ Total loss

F. Drying

- ☐ Location of drying (on-field, off-field) (A)
- ☐ Method of drying (bare soil, on tarpaulin, dryer crib) (A)
- ☐ Length of drying (A)
- ☐ Moisture of product after drying, if known (A)
- ☐ Losses occurring during drying
- ☐ Measures applied to reduce losses and their efficiency
- ☐ Measures known but not applied, reason for not applying

(As a reminder for later more in-depth discussions, the interviewer ticks the likely loss category.)

Are drying issues an important loss factor?

☐ No ; ☐ Negligible ; ☐ Concern ; ☐ Intolerable ; ☐ Total loss

G.	Storage

- ☐ Stored produce: grain or cobs
- ☐ Location of storage (on field, outside field, bag, local crib, improved crib, covered by tarpaulin etc.) (A)
- ☐ Storage conditions (ventilation? waterproof? mixed with old stocks?, construction material) (A)
- ☐ How much of harvested product is sold immediately after harvest (no storage)
- ☐ Length of storage period (A)
- ☐ After which time (weeks) is 50% of harvested product sold or consumed?
- ☐ Relocation of harvested good during storage period? (A)
- ☐ Regular inspection of storage? (A)
- ☐ Use of insecticide, kind of insecticide (A)
- ☐ Use of other pesticide, kind of pesticide (A)
- ☐ Losses occurring during storage and reasons
- ☐ Measures applied to reduce losses and their efficiency (A)
- ☐ Measures known but not applied, reason for not applying

(As a reminder for later more in-depth discussions, the interviewer ticks the likely loss category.)

Are storage issues an important loss factor?

☐ No ; ☐ Negligible ; ☐ Concern ; ☐ Intolerable ; ☐ Total loss

H.	First- Stage Processing

- ☐ Kind of processing (threshing, shelling, winnowing)
- ☐ Damage of grain during processing (A)
- ☐ Sorting of damaged grain? Sorting criteria (A)
- ☐ Use of minor quality product/Use of residues?
- ☐ Location of processing? (on-field, outside field) (A)
- ☐ Losses occurring during storage and reasons
- ☐ Measures applied to reduce losses and their efficiency
- ☐ Measures known but not applied, reason for not applying

(As a reminder for later more in-depth discussions, the interviewer ticks the likely loss category.)

Are first-stage-processing issues an important loss factor?

☐ No ; ☐ Negligible ; ☐ Concern ; ☐ Intolerable ; ☐ Total loss

4. Loss Categories and Loss Ranking Matrix

(See Loss Categories and Loss Ranking Matrix in toolbox 2.8 for further details.)

Loss Categories	Estimated losses in the last season	
	(in traditional weights/ measures)	(in %)
1 **Losses are negligible:** Losses do occur, but the farmer can accept them in the long run without changing anything.		
2 **Losses are a concern:** Losses do concern the farmer since they affect his/her business and income and he/she looks for measures to reduce the losses.		
3 **Losses are intolerable:** The farmer cannot accept the losses since they put his business and income at risk.		

Loss Ranking Matrix

Loss points along the VC	Loss categories						Total answers (T)
	Negligible (1)		Concern (2)		Intolerable (3)		
	Number of counts (C)	% of answers [C*100/T]	Number of counts (C)	% of answers [C*100/T]	Number of counts (C)	% of answers [G*100/T]	
Loss point 1							
Loss point 2							
Loss point 3							
Loss point 4							
Further...							

After completion of the matrix, mark the three most critical loss points .

4.3 Data Collection Sheet Farmer Focus Group Meeting

The 'Data Collection Sheets' features the very same contents as the Checklists but provide space for filling in information/data collected.

Commodity: _____

Location of meeting:	Name of group, if applicable:
No. of men attending:	No. of women attending:

A. General information
☐ Knowledge of Good agricultural practices
☐ Access to Extension services
☐ Number of seasons when product is grown and their importance in regard to losses
☐ Average field size of product
☐ Average yield
☐ Relevance of maize in household economy (Relevance: not important, one activity amongst others, most important activity)
☐ Home consumption/commercialization (%)
☐ Where/to whom do the farmers sell to?
☐ Lowest and highest prices achievable on local market/with trader, Do farmers achieve it?
☐ Organizational structures on farmer´s level, their role in transport/storage/processing/marketing?
☐ Women in agriculture, if applicable specific roles in VC steps

B.	**Quality Awareness**

☐ Farmer´s definition of good and bad quality

☐ Causes for bad quality

☐ Price differentials at farmer´s level for different product qualities

☐ Usage of bad quality product

☐ Measures applied to improve quality and their efficiency (A)[11]

☐ Measures known but not applied, reasons for not applying

(As a reminder for later more in-depth discussions, the interviewer ticks the likely loss category.)

Are quality issues an important loss factor?

☐ No ; ☐ Negligible ; ☐ Concern ; ☐ Intolerable ; ☐ Total loss

---

11 (A) means, that at this step there could be a potential aflatoxin risk, and that you have to apply the aflatoxin Risk checklist later on.

Transect Walk

Attach the transect map to the Data Collection sheet.

C. Pre-harvest
☐ Visual appreciation of location (hygienic conditions)
☐ Crop residues staying on the field (A)[12]
☐ Kind of soil preparation and tools used
☐ Varieties used and source of seed (A)
☐ Plant spacing (high or low density) (A)
☐ Mono cropping/mixed cropping (A)
☐ Crop rotation over the years (A)
☐ Use of agricultural inputs (fertilizer, pesticides), dose of inputs (too high, too low, optimal) (A)
☐ Periodic drought or flooding (A)
☐ Losses occurring before harvest
☐ Measures applied to reduce losses and their efficiency (A)
☐ Measures known but not applied, reason for not applying
(As a reminder for later more in-depth discussions, the interviewer ticks the likely loss category.) **Are pre-harvest issues an important loss factor?** ☐ No ; ☐ Negligible ; ☐ Concern ; ☐ Intolerable ; ☐ Total loss

12 (A) means, that at this step there could be a potential Aflatoxin risk and that you have to apply the Aflatoxin Risk checklist later on.

D.	Harvest

☐ Harvest time (month, early or late harvest) (A)

☐ Harvested product (green or dry maize)

☐ Labour availability (A)

☐ Harvesting techniques

☐ Immediate removal of harvested good from field or drying on stalk? (A)

☐ Losses occurring during harvest

☐ Measures applied to reduce losses and their efficiency (A)

☐ Measures known but not applied, reason for not applying

(As a reminder for later more in-depth discussions, the interviewer ticks the likely loss category.)

Are harvest issues an important loss factor?

☐ No ; ☐ Negligible ; ☐ Concern ; ☐ Intolerable ; ☐ Total loss

E.	Transport

☐ Mode of transport to farm

☐ Own mode of transport or rented?

☐ Average distance from field to farm (A)

☐ Packaging used, if any (A)

☐ Losses occurring during transport

☐ Measures applied to reduce losses and their efficiency

☐ Measures known but not applied, reasons for not applying

(As a reminder for later more in-depth discussions, the interviewer ticks the likely loss category.)

Are transport issues an important loss factor?

☐ No ; ☐ Negligible ; ☐ Concern ; ☐ Intolerable ; ☐ Total loss

F.	Drying

☐ Location of drying (on-field, off-field) (A)

☐ Method of drying (bare soil, on tarpaulin, dryer crib) (A)

☐ Length of drying (A)

☐ Moisture of product after drying, if known (A)

☐ Losses occurring during drying

☐ Measures applied to reduce losses and their efficiency

☐ Measures known but not applied, reason for not applying

(As a reminder for later more in-depth discussions, the interviewer ticks the likely loss category.)

Are drying issues an important loss factor?

☐ No ; ☐ Negligible ; ☐ Concern ; ☐ Intolerable ; ☐ Total loss

G.	Storage

☐ Stored produce: grain or cobs

☐ Location of storage (on field, outside field, bag, local crib, improved crib, covered by tarpaulin etc.) (A)

☐ Storage conditions (ventilation? waterproof? mixed with old stocks?, construction material) (A)

☐ How much of harvested product is sold immediately after harvest (no storage)?

☐ Length of storage period (A)

☐ After which time (weeks) is 50% of harvested product sold or consumed?

☐ Relocation of harvested good during storage period? (A)

☐ Regular inspection of storage? (A)

☐ Use of insecticide, kind of insecticide (A)

☐ Use of other pesticide, kind of pesticide (A)

☐ Losses occurring during storage and reasons

☐ Measures applied to reduce losses and their efficiency (A)

☐ Measures known but not applied, reason for not applying

(As a reminder for later more in-depth discussions, the interviewer ticks the likely loss category.)

Are storage issues an important loss factor?

☐ No ; ☐ Negligible ; ☐ Concern ; ☐ Intolerable ; ☐ Total loss

H.	First-Stage Processing

☐ Kind of processing (threshing, shelling, winnowing)

☐ Damage of grain during processing (A)

☐ Sorting of damaged grain? Sorting criteria (A)

☐ Use of minor quality product/Use of residues?

☐ Location of processing? (on-field, outside field) (A)

☐ Losses occurring during storage and reasons

☐ Measures applied to reduce losses and their efficiency

☐ Measures known but not applied, reasons for not applying

(As a reminder for later more in-depth discussions, the interviewer ticks the likely loss category.)

Are first-stage-processing issues an important loss factor?

☐ No ; ☐ Negligible ; ☐ Concern ; ☐ Intolerable ; ☐ Total loss

Loss Categories and Loss Ranking Matrix

(See Loss Categories and Loss Ranking Matrix in toolbox 2.8 for further details.)

Loss Categories	Estimated losses in the last season	
	(in traditional weights/ measures)	(in %)
1 **Losses are negligible:** Losses do occur, but the farmer can accept them in the long run without changing anything.		
2 **Losses are a concern:** Losses do concern the farmer since they affect his/ her business and income and he/she looks for measures to reduce the losses.		
3 **Losses are intolerable:** The farmer cannot accept the losses since they put his business and income at risk.		

Loss Ranking Matrix

Loss points along the VC	Loss categories						
	Negligible (1)		Concern (2)		Intolerable (3)		
	Number of counts (C)	% of answers [C*100/T]	Number of counts (C)	% of answers [C*100/T]	Number of counts (C)	% of answers [G*100/T]	Total answers (T)
Loss point 1							
Loss point 2							
Loss point 3							
Loss point 4							
Further...							

After completion of the matrix, mark the three most critical loss points .

4.4 Evaluation Sheet Aflatoxin Risk Farmer Focus Group Meeting

Note: The 'Evaluation Sheets Aflatoxin Risk' provide guidance for using proxies for assessing Aflatoxin risks at the various VC stages.

Commodity:_____

This Evaluation sheet has to be filled in after the Data Collection sheet Farmer Focus Group Meeting has been completed. The points below refer to those lines in the aforementioned sheet which are marked by '(A)'

Table 22. Evaluation sheet Aflatoxin Risk

	High Aflatoxin Risk	**Low Aflatoxin Risk**
Quality Awareness (Data Collection sheet point B.)		
1. Measures applied to improve quality and their efficiency	No knowledge on technologies for maintaining and improving quality	Farmers have knowledge on quality and how to improve it
Pre-Harvest (Data Collection sheet point C.)		
2. Crop residues stay on the field	Crop residues left in the field and incorporated in soil	Residues are taken out
3. Varieties under cultivation	Non resistant varieties	Local varieties and Bt varieties
4. Own seed or seed with quality control	Own source	Quality controlled source
5. Color and size of grain	Large, white maize	Small, yellow maize
6. Plant spacing/seed density	High seed density with close plant spacing	Low seed density with correct spacing
7. Mono/mixed cropping (name the crops)	Close plant density, association with mycotoxin supporting crops (groundnut)	
8. Crop rotation (name the crops)	No rotation, growing the same crop on the field every year	Rotation (soybean, cassava, sweet potato, potato)
9. Use of fertilizer	Too low or too high application of fertilizer	Optimal application
10. Use of fungicide	No fungicide use	Use of fungicide, especially to control seed-borne fungi or ear molds
11. Use of insecticide	No insecticide/high insect infestation	Low insect infestation
12. Control of weeds	No weed control	Mechanical or chemical weed control

13. Periodic drought or flooding on field during cropping period	Water stress	No water stress
14. Measures applied to reduce pre-harvest losses	Poor crop management	Good management practices
Harvest **(Data Collection sheet point D.)**		
15. Harvest time (month)	Delay of harvest long after physiological maturity	In-time-harvest
16. Labor availability	Delayed harvest	Rapid harvest
17. Immediate removal of harvested good from field or drying on stalk?	Drying on stalk	Immediate removal
18. Measures applied to reduce losses and their efficiency	Harvest of crop in bits and under the rain & with delays	Rapid harvest of crop at maturity
Transport field to farm **(Data Collection sheet point E.)**		
19. Distance from field to farm	Crops transported over long distances and in adverse conditions (rain, heat)	Short distance
20. Packaging used during transport	Use of material that prevents aeration, tight packaging	Well aerated
Drying **(Data Collection sheet point F.)**		
21. Drying location	Field drying in piles or on stalk	Immediate evacuation and drying outside the field
22. Method of drying	Drying on bare soil	Drying on tarpaulin or in dryer crib
23. Length of drying	Drying for more than 3 days without reaching safe levels	Drying within 3 days after harvest
24. Drying place	Unclean drying places, on ground, moisture	Use of storage cribs
25. Moisture of final product (safe level)	>12.5% grain moisture	<12.5% grain moisture
Storage **(Data Collection sheet point G.)**		
26. Location of storage	Storage on the field	Storage outside field, outside the house or over kitchen fire, hermetic storage
27. Storage ventilation	No ventilation	Good ventilation
28. Mix of old and new stocks	Mix of old and new stocks	No old residues; cleaning prior to new loading
29. Type of storage structure	Clay store; polypropylene bags	Well aerated store (crib, traditional stores), clean jute bags

30. Are grains in contact with the wall?	Grains in contact with store wall	Grains not in contact with store wall
31. Length of storage (days/weeks/months)	Storage for more than 6 months in unsanitary conditions	Sold off between 3-6 months of storage
32. Relocation of harvested product during storage period	No change of store/no control	Change of store/no control
33. Regular inspection for damage during storage	No inspection	Crops are regularly inspected
34. Do you use storage insecticides?	No insect control	Use of storage insecticide or hermetic storage
35. Damage due to weevils, rodents, moisture, fungal	Yes insects, rodents, fungi are a problem	No biotic damage
36. Measures applied to reduce losses and their efficiency	No management of storage	Good storage management
First-Stage Processing (Data Collection sheet point H.)		
37. Type of processing; damage of grain	Damaged grain due to inappropriate machinery	No damaged grain, hand shelling
38. Sorting of damaged, discolored, shriveled, undersized grain	No sorting	Yes, sorting of grains
39. Location of processing	On-field	Off-field
Number of answers out of 39 question points (Ratio of Aflatoxin risk)	…………/39	…………/39

4.5 Checklist Trader Focus Group Meeting

Commodity: _____

Location of meeting:
Function of traders: ☐ Middlemen/aggregators ☐ Wholesalers at rural aggregation market ☐ Wholesalers at regional market hub ☐ Middlemen between wholesalers and processors/retailers
Number of persons attending the meeting (men/women):

1. Introduction to the meeting

- thank the traders for the opportunity to meet them

- explain the objectives of the meeting

- propose a sequence of activities for the meeting

  – discussion of general information of trading and quality issues

  – visit of the trading place/market

  – final discussion and loss ranking

Note:
Do not use the topics in the checklist as interview guides/questionnaires, but invite the local informants to speak freely about the mentioned head line topics (A-H) while trying to capture as much information as possible from their explanations. Only ask questions if more detailed explanations are required. Ticking the sub-topics which have been sufficiently answered helps you to keep track of the information needed.

Notes should be taken by a second consultant, not by the facilitator.

2. General information, quality requirements and flow of produce

Invite the traders to give some background information on their activities in general as well as on the buying and selling strategies with regard to the product for which the rapid loss appraisal is realised.

Refer to topics in regard to

- A. General Information

- B. Quality

Table 23. Checklist trader focus group meeting

A. General Information
☐ Products bought (green, cobs, grain, other), Please specify the form bought.
☐ Products sold (e.g. graded, dried)
☐ Main buying regions; according to seasons (A)
☐ Main buying and selling season
☐ Buying place (farm gate, collection point, market place, rural or regional market)
☐ Quantities traded per year
☐ Main customers
☐ Services used and costs involved (e.g. shelling, transport, drying, storage) (A)
☐ Other marketing costs (e.g. renting sheds, levies related to buying, levies related to selling)
☐ Membership in trader organizations

B. Quality
☐ Description of grades applied when buying (A)
☐ Quality of purchased grain (A) (percentage of discolored grains, cracked grains, grains with insect damage, filthy not winnowed grains)
☐ Grain moisture measured at purchase (A)
☐ Price differential for qualities of products bought
☐ Average percentage of rejected produce when buying (A)
☐ Reasons for rejected qualities
☐ Use of rejected produce
☐ Description of grades applied by customers when selling
☐ Price differential for qualities of products sold
☐ Average percentage of produce rejected by customers
☐ Reasons for rejected produce
☐ Use of rejected produce (A)
☐ Ways of measuring moisture content and average moisture content according to season (A)
☐ Customers for good quality products
☐ Official quality standards known, Are these applied?
☐ Quality inspection by official institutions, Which one and what are the results?
☐ Official inspection on the market (Which institutions?, frequency) (A)
☐ Measures applied to improve quality and their efficiency (A)
☐ Measures known but not applied to improve quality, reasons for not applying

(As a reminder for later more in-depth discussions, the interviewer ticks the likely loss category.)
Are quality issues an important loss factor?
☐ No ; ☐ Negligible ; ☐ Concern ; ☐ Intolerable ; ☐ Total loss

3. Market Transect Walk

Follow the instructions of the participatory method Market Transect Walk. Discuss topics C-G with participants.

Table 24. Market transect walk

C. Shelling, transport and loading
If the aggregator, middleperson or trader is responsible for the activities:
☐ Means of shelling (own, hired)
☐ Shelling method (A)
☐ Staff for loading
☐ Means of transport (own, rented)
☐ Quality of transport covering, cleanliness (A)
☐ Distance of transport from farm to market or rural market to wholesale market, etc. (A)
☐ Losses during shelling and loading/reasons
☐ Losses during transport/reasons
☐ Losses upon arrival at the trading/market place (access to the place, unloading, etc.)
☐ Use of the losses
☐ Measures applied to reduce losses and their efficiency
☐ Measures known but not applied, reason for not applying
(As a reminder for later more in-depth discussions, the interviewer ticks the likely loss category.)   **Are shelling, transport, loading issues an important loss factor?**   ☐ No ; ☐ Negligible ; ☐ Concern ; ☐ Intolerable ; ☐ Total loss
D. Grading and cleaning
(Refer to "B. Quality" if there is need for further clarifications)
☐ Ways of grading (A)
☐ Ways of cleaning (A)
☐ Reasons for losses during grading and cleaning
☐ Ways of measuring moisture content (A)
(As a reminder for later more in-depth discussions, the interviewer ticks the likely loss category.)   **Are grading and cleaning issues an important loss factor?**   ☐ No ; ☐ Negligible ; ☐ Concern ; ☐ Intolerable ; ☐ Total loss

E. Packaging/ Re-bagging

☐ Provision of packaging material to farmers? Which?

☐ Who does packing/filling? (Farmer? Trader?)

☐ Losses during packing and reasons

(As a reminder for later more in-depth discussions, the interviewer ticks the likely loss category.)

Are packaging/Re-bagging issues an important loss factor?

☐ No ; ☐ Negligible ; ☐ Concern ; ☐ Intolerable ; ☐ Total loss

F. Storage

☐ Description of storage facilities (A) (incl. storage structure)

☐ Basic hygiene prior to loading store (A)

☐ Are grains in contact with the wall (A)

☐ Length of storage (days/weeks/months) (A)

☐ Quality control during storage (A)

☐ Repacking during storage (A)

☐ Moisture content during storage/use of moisture meter? (A)

☐ Official inspection (A)

☐ Losses during storage and their reason (A)

☐ Measures applied to reduce losses and their efficiency (A)

☐ Measures known but not applied, reason for not applying

(As a reminder for later more in-depth discussions, the interviewer ticks the likely loss category.)

Are storage issues an important loss factor?

☐ No ; ☐ Negligible ; ☐ Concern ; ☐ Intolerable ; ☐ Total loss

G. Outreach of measures to reduce losses to other VC actors

☐ Measures recommended to farmers/suppliers to reduce losses

☐ Measures recommended to aggregators/transporters to reduce losses

☐ Are you in direct contact with a group of farmers/suppliers that you purchase from?

☐ Do you train the group/suppliers in good management practices? (A)

4.6 Data Collection Sheet – Biophysical Measurements

Table 25. Data collection sheet: Biophysical measurements

Label	Measurement	Weight/ value
Ratio A	Damaged cobs/ 30 cobs	0-0 cobs 1-1-2 2-3-5 cobs 3->5 cobs 4->10 cobs
Ratio B	Cobs with discolored grains or parts/ 30 cobs	0-0 cobs 1-1-2 2-3-5 cobs 3->5 cobs 4->10 cobs
Ratio C	Cobs thrown away/ 30 cobs	0-0 cobs 1-1 cob 2-2 cobs 3-3 cobs 4->3 cobs
INSECTS	No/ 500 grains	0-0 1-1-3 insect 2-3-5 insects 3-5-10 insects 4->10 insects
FRASS	Weight in gr.	0-0 1-1 gr. 2-2-3 gr. 3-3-5 gr. 4->5 gr.
Count A	No. of grains with insect damage/ 500 grains	0-0 1-1-15 grains 2-15-50 grains 3-50-74 grains 4->75 grains
Count B	No. of grains that are discolored/ 500 grains	0-0 1-1-15 grains 2-15-50 grains 3-50-74 grains 4->75 grains
Count C	No. of grains undersized or shriveled/ 500 grains	0-0 1-1-15 grains 2-15-50 grains 3-50-74 grains 4->75 grains
Grain moisture	Mean of 3 measurements	value

4.7 Data Collection Sheet Trader Focus Group Meeting

Commodity:_____

Location of meeting:
Function of traders: ☐ Middlemen/aggregators ☐ Wholesalers at rural centers ☐ Wholesalers at regional market hub ☐ Middlemen between wholesalers and processors/retailers
Number of persons attending the meeting (men/women):

A. General information
☐ Products bought, Please specify the form bought. ☐ Products sold (e.g. graded, dried) ☐ Main buying regions; according to seasons (A) ☐ Main buying and selling season ☐ Buying place (farm gate, collection point, market place rural or regional market) ☐ Quantities traded per year ☐ Main customers ☐ Services used and costs involved (e.g. shelling, transport, drying, storage) (A) ☐ Other marketing costs (e.g. renting sheds, levies related to buying, levies related to selling) ☐ Membership in trader organization

B. Quality

☐ Description of grades applied when buying (A)

☐ Quality of purchased grain (A) (percentage of discolored grains, cracked grains, grains with insect damage, filthy, not winnowed grains)

☐ Grain moisture measured at purchase (A)

☐ Price differential for qualities of products bought

☐ Average percentage of rejected produce when buying (A)

☐ Reasons for rejected qualities

☐ Use of rejected produce

☐ Description of grades applied by customers when selling to them

☐ Price differential for qualities of products sold

☐ Average percentage of produce rejected by customers

☐ Reasons for rejected produce

☐ Use of rejected produce (A)

☐ Ways of measuring moisture content and average moisture content according to season (A)

☐ Customers for good quality products

☐ Official quality standards known? Are these applied?

☐ Quality inspection by official institutions? Which one and with which result?

☐ Official inspection on the market (Which institutions?, frequency) (A)

☐ Measures applied to improve quality and their efficiency (A)

☐ Measures known but not applied to improve quality, reasons for not applying

Are quality issues an important loss factor?

☐ No ; ☐ Negligible ; ☐ Concern ; ☐ Intolerable ; ☐ Total loss

Market Transect Walk

Attach the transect map to the Data Collection sheet.

C. Shelling, transport and loading
If the aggregator, middleperson or trader is responsible for the activities: ☐ Means of shelling (own, hired)   ☐ Shelling method (A)   ☐ Staff for loading   ☐ Means of transport (own, rented)   ☐ Quality of transport covering, cleanliness (A)   ☐ Distance of transport from farm to market or rural market to wholesale market, etc. (A)   ☐ Losses during shelling and loading/reasons   ☐ Losses during transport/reasons   ☐ Losses upon arrival at the trading/market place (access to the place, unloading, etc.)   ☐ Use of the losses   ☐ Measures applied to reduce losses and their efficiency   ☐ Measures known but not applied, reasons for not applying
Are shelling, transport, loading issues an important loss factor?   ☐ No ; ☐ Negligible ; ☐ Concern ; ☐ Intolerable ; ☐ Total loss

D. Grading and cleaning

(Refer to "B. Quality" if there is need for further clarifications)

☐ Ways of grading (A)

☐ Ways of cleaning (A)

☐ Reasons of losses during grading and cleaning

☐ Ways of measuring moisture content (A)

Are grading and cleaning issues an important loss factor?

☐ No ; ☐ Negligible ; ☐ Concern ; ☐ Intolerable ; ☐ Total loss

E. Packaging/ Re-bagging

☐ Provision of packaging material to farmers? Which?

☐ Who does packing/filling? (Farmer? Trader?)

☐ Losses during packing and reasons

packaging/re-bagging issues an important loss factor?

☐ No ; ☐ Negligible ; ☐ Concern ; ☐ Intolerable ; ☐ Total loss

F.	Storage

- ☐ Description of storage facilities (A) (incl. storage structure)
- ☐ Basic hygiene prior to loading store (A)
- ☐ Are grains in contact with the wall? (A)
- ☐ Length of storage (days/weeks/months) (A)
- ☐ Quality control during storage (A)
- ☐ Repacking during storage (A)
- ☐ Moisture content during storage/use of moisture meter? (A)
- ☐ Official inspection (A)
- ☐ Losses during storage and their reason (A)
- ☐ Measures applied to reduce losses and their efficiency (A)
- ☐ Measures known but not applied, reasons for not applyingg

Are storage issues an important loss factor?
☐ No ; ☐ Negligible ; ☐ Concern ; ☐ Intolerable ; ☐ Total loss

G.	Outreach of measures to reduce losses to other VC actors

☐   Measures recommended to farmers/suppliers to reduce losses

☐ Measures recommended to aggregators/transporters to reduce losses

☐ Are you in direct contact with a group of farmers/suppliers that you purchase from?

☐ Do you train the group/suppliers in good management practices? (A)

Loss Categories and Loss Ranking Matrix

(See Loss Categories and Loss Ranking Matrix in Toolbox 2.8 for further details.)

Loss Categories	Estimated losses in the last season	
	(in traditional weights/ measures)	(in %)
1 Losses are negligible: Losses do occur, but the trader can accept them in the long run without changing anything.		
2 Losses are a concern: Losses do concern the trader since they affect his/ her business and income and he/she looks for measures to reduce the losses.		
3 Losses are intolerable: The trader cannot accept the losses since they put his business and income at risk.		

Loss Ranking Matrix

Loss points along the VC	Loss categories						
	Negligible (1)		Concern (2)		Intolerable (3)		
	Number of counts (C)	% of answers [C*100/T]	Number of counts (C)	% of answers [C*100/T]	Number of counts (C)	% of answers [G*100/T]	Total answers (T)
Loss point 1							
Loss point 2							
Loss point 3							
Loss point 4							
Further…							

After completion of the table and the voting, count the strokes per field and mark the three most critical loss points.

4.8 Evaluation Sheet Aflatoxin Risk Trader Focus Group Meeting

Commodity:_____

This Checklist has to be filled after the "Checklist Trader" has been completed. The below points refer to those lines in the before mentioned Checklists, which are marked by "(A)"

	High Aflatoxin Risk	**Low Aflatoxin Risk**
General Information (Data Collection sheet point A.)		
1. Main buying region, season	Source from high humidity regions, coastal regions; source during the rainy season	Source from dry season and dryer regions
2. Services used and costs involved (e.g. shelling, transport, drying, storage)	Using cheap services, no cleaning, sheller damages grains	Using high quality services to maintain grain quality
Quality (Data Collection sheet point B.)		
3. Description of grades applied when buying	Purchase low cost commodities without regard to grades	Purchase according to grades, use of some quality control measurement
4. Percentage of discolored grains	High percentage of discolored grains >5%	Little discolored grains
5. Grain moisture measured at purchase	>12.5% grain moisture	<12.5% grain moisture
6. Do grains have cracks?	Grains with cracks	No cracked grains
7. Is insect damage above 5%?	Grains with insect damage > 5 %	No insect damage
8. Are grains filthy, not winnowed	Grains with a lot of debris, not winnowed, filthy	No filth
9. Grains are sorted when buying and quality control is applied?	No sorting and quality control	Grains are sorted out
10. Use of rejected produce	Rejected produce are blended with higher quality grains and sold	Rejected produce are sold to animal feed market
11. Ways of measuring moisture content and average moisture content according to season	No moisture meter used to control grain moisture at purchase and during storage	Moisture meter used to control grain moisture at purchase
12. Official inspection on the market (Which institutions?, frequency)	No inspection and regulation (grain standards)	There is inspection and purchasing with standards/grades
13. Measures applied to improve quality and their efficiency	No measures to improve grain quality	Good management practices to improve grain quality (sorting, winnowing, cleanliness)
Shelling, transport and loading (Data Collection sheet point C.)		
14. Shelling method	Use of high speed mechanical shellers that damage grains	Shelling grains with method that does not damage grains
15. Distance of transport from farm to market or rural market to wholesale market, etc.	Long distance	Short distance

16. Quality of transport	Loading in mixed loads; risk of wetting; risk of heat build-up	Clean trucks, covered by tarpaulin well aerated
Grading and cleaning (Data Collection sheet point D.)		
17. Ways of grading	No grading; blending of products to obtain certain grades	Grading; no blending of products
18. Ways of cleaning	No cleaning and sorting	Grains are winnowed, cleaned and sorted
19. Ways of measuring moisture content	>12.5% grain moisture	<12.5% grain moisture
Storage (Data Collection sheet point F.)		
20. Description of storage facilities	No ventilation; tight packing	Good ventilation; well packed, spaces, palettes
21. Basic hygiene prior to loading store	Mix of old and new stocks	No old residues, cleanliness
22. Type of storage structure	Clay store; polypropylene bags	Well aerated store (crib, traditional stores), Clean jute bags
23. Are grains in contact with the wall?	Grain in contact with store wall	Grains not in contact with store wall
24. Duration of storage (days/ weeks/ months)	Storage for more than 9 months in unsanitary conditions	Sold between 3-6 months of storage
25. Quality control during storage	Once stored no more inspection	Grains are regularly inspected and samples taken
26. Repacking during storage	Once stored no more repackaging	Grains are sieved, sorted and repackaged
27. Moisture content during storage/use of moisture meter	>12.5% grain moisture	<12.5% grain moisture
28. Official inspection	No official inspection	Official inspection
29. Losses during storage and their reason	High amount of insect infestation; mold growth	Generally free of insects, rats and mould
30. Measures applied to reduce losses and their efficiency	Storage in unclean & unsanitary conditions	Good storage management, if needed insecticide treatment
Outreach of measures to reduce losses to other VC actors (Data Collection sheet point G.)		
31. Do you train the group/suppliers in good management practices?	No training to farmers or suppliers	Train farmer groups/suppliers in good management practices
Number of answers out of 31 question points (Ratio of aflatoxin risk)	…………/31	…………/31

4.9 Checklist Processor Meeting

Commodity: _____

Location of meeting:
Name of processing company:

Product ranges offered by the company:
    – Semi-finished products, namely:
 	
....
    – Final products, namely:
 	
....

1. Introduction to the meeting

- thank the processor for the opportunity to meet him/her

- explain the objectives of the meeting

- propose a sequence of activities for the meeting

  - discussion of general information

  - if feasible, visit of the processing unit

  - final discussion and loss ranking

Note:
Do not use the topics in the checklist to formulate questions but invite the local informants to speak freely about the mentioned head line topics (A-K) while trying to capture as much information as possible from their explanations. Only ask questions if more detailed explanations are required. During the interview tick the sub topics which have been sufficiently answered. This helps you to keep track of the information needed and the remaining issues to be handled.

Notes should be taken by a second consultant, not by the facilitator. It is recomendable to record the interview .

2. General information and quality requirements

Invite the processor to give some background information on the company in general as well as on the procurement and sales strategies, but only with regard to the product for which the rapid loss appraisal is realised.

Refer to topics in regard to

- A. General information

- B. Quality of procured raw material/semi-finished products

Table 26. Checklist processor meeting

A. General information
☐ Sources, from which the raw materials/ semi-finished products are procured (farmers, traders, other processors, other)
☐ Supply calendar (seasonal or continuous throughout the year; main buying period) (A)
☐ Total volumes procured per year (specify unit)
☐ Business relations with suppliers (occasional, contract, other)
☐ Specification of processed products and volumes produced
☐ Selling periods (continuous/seasonal)
☐ Main customers

B. Quality of raw material/procured semi-finished products
☐ Raw material/semi processed products procured from suppliers
☐ Region and season when products are purchased
☐ Moisture at safe levels for product (A)
☐ Description of grades accepted (A)
☐ Percentage of discolored grains (A)
☐ Which variety is purchased?
☐ Rewards for good quality (premium prices, bonus systems) (A)
☐ Price differential between different grades accepted
☐ Average percentage of rejection; periods of the year
☐ Main reasons for rejection (insect damage, discolored grains, debris) (A)
☐ Further use of rejects (A)
☐ Influence of quality of raw material/semi-finished products on quality of final product
☐ Measures applied to improve quality and their efficiency (A)
☐ Measures known but not applied to improve quality, reason for not applying

(As a reminder for later more in-depth discussions, the interviewer ticks the likely loss category.)

Are quality issues of raw material/semi-finished products an important loss factor?

☐ No ; ☐ Negligible ; ☐ Concern ; ☐ Intolerable ; ☐ Total loss

3. Flow Chart of Processing Steps/visit of the processing unit

Note:
*The **Flow Chart of Processing Steps** serves to identify the process steps from procurement, through processing to selling'. The description of process steps helps to identify critical loss points (hot spots). Process steps will only be specified for those activities the processor is responsible for . Possible process steps are e.g. purchase, transport of raw materials/semi-processed products, reception of goods, grading & sorting, rejection, intermediate storage of raw material/semi-processed products, several process steps during processing, packaging, intermediate storage of semi-finished or finished products, sales, transport. The flow chart will help to follow the explanations during the visit of the processing unit.*

- Fill in the following Processing Flow Chart. Ask the processor to give a short overview of the process flow. Further explanations should be given during the visit of the processing unit.

- Ask the processor, if a visit of the most important potential loss points in the unit is possible. During the walk, discuss topics C-K and capture the information.

- If a visit of the company is not feasible use the flow chart only as guidance for discussing loss-related issues along the process steps. Undertake a comprehensive discussion around the key topics listed below. During the visit of the processing unit or in the discussion about the content of the flow chart, focus the discussions on loss-relevant topics.

- Start the flow chart by defining the process steps in the middle row and check at every level if losses or by-products occur.

If losses occur, note the loss categories[13]	Process steps	If intended by-products occur, note them
	← ↓ →	
	← ↓ →	
	← ↓ →	
	← ↓ →	
	← ↓ →	
	← →	

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13 1 = negligible loss; 2 = loss is a concern; 3 = loss is intolerable

C. Transport/procurement of raw material/semi-finished products to factory

(Only relevant, if transport is organized by the company)

☐ Main loss points during transport (delays, wetting, heat, no tarpaulin to cover load) (A)

☐ Own transport or rented vehicle

☐ Means of transport

☐ Way of transported (mixed load), quality of transport (A)

☐ Distances of transport (A)

☐ Packaging method (A)

☐ If possible: use of losses

☐ Measures applied to reduce losses during transport and their efficiency

☐ Measures known but not applied, reasons for not applying

(As a reminder for later more in-depth discussions, the interviewer ticks the likely loss category.)

Are transport/ procurement of raw material/ semi-finished products an important loss factor?

☐ No ; ☐ Negligible ; ☐ Concern ; ☐ Intolerable ; ☐ Total loss

D. Pre-processing/Intermediate storage of raw material/semi-finished products

☐ Product stored (A)

☐ Drying method & location of drying prior to storage (A)

☐ Storage room (A)

☐ Cleanliness in room, ventilation in room (A)

☐ Average duration of storage, Which months? (A)

☐ Sorting or cleaning/winnowing before storage (A)

☐ Inspection during storage (A)

☐ Use of moisture meter (A)

☐ Main loss points during storage of raw materials/semi-finished products

☐ Main reasons for losses (moisture, insects, pests, rodents, other) (A)

☐ Relocation/re-bagging during storage period (A)

☐ Use of sorted out/rejected products when changing storage

☐ Measures applied to reduce losses and their efficiency (A)

☐ Measures known but not applied, reason for not applying

(As a reminder for later more in-depth discussions, the interviewer ticks the likely loss category.)

Are pre-processing/intermediate storage of raw material/semi-finished product issues an important loss factor?

☐ No ; ☐ Negligible ; ☐ Concern ; ☐ Intolerable ; ☐ Total loss

E.	Processing

☐ Technology used (traditional, modern, age of technology)

☐ Further cleaning, drying, sorting during processing (A)

☐ Conversion rate (raw material/final product)

☐ Processing by-products and their use

☐ Main loss points during processing

☐ Kind of losses

☐ Reasons for losses

☐ Use of losses

☐ Measures applied to reduce losses and their efficiency

☐ Measures known but not applied, reasons for not applying

(As a reminder for later more in-depth discussions, the interviewer ticks the likely loss category.)

Are issues during processing important loss factors?

☐ No ; ☐ Negligible ; ☐ Concern ; ☐ Intolerable ; ☐ Total loss

F.	Quality of final product

☐ Description of quality standards for own processed products

☐ Quality standards produced by the company, Any type of certification?

☐ Customer reward systems for good quality of final product (premium prices, bonus systems)

☐ Price differential, different quality standards of final product

☐ Customers interested in quality products

☐ Customers interested in lower-quality final products

☐ Measures applied to improve quality and their efficiency (A)

☐ Measures known but not applied to improve quality, reason for not applying

(As a reminder for later more in-depth discussions, the interviewer ticks the likely loss category.)

Are quality issues of final products an important loss factor?

☐ No ; ☐ Negligible ; ☐ Concern ; ☐ Intolerable ; ☐ Total loss

G. Storage and packaging of final product

- ☐ Description of storage method (A)
- ☐ Duration of storage, Which months/seasons? (A)
- ☐ Inspection during storage (A)
- ☐ Humidity and temperature at safe levels for product? (A)
- ☐ Packaging of final product (A)
- ☐ Main loss points during storage of final product
- ☐ Reasons for losses (moisture, insects, pests, rodents, other) (A)
- ☐ Use of rejected products when changing storage
- ☐ Measures applied to reduce losses and their efficiency (A)
- ☐ Measures known but not applied, reasons for not applying

(As a reminder for later more in-depth discussions, the interviewer ticks the likely loss category.)

Are issues during storage and packaging important loss factors?

☐ No ; ☐ Negligible ; ☐ Concern ; ☐ Intolerable ; ☐ Total loss

H. Transport of final product to customer

- ☐ Own transport or rented
- ☐ Means of transport
- ☐ Distance of transport
- ☐ Protection of goods during transport (A)
- ☐ Main loss points during transport of final product
- ☐ Reasons for losses
- ☐ Use of losses
- ☐ Measures applied to reduce losses during transport and their efficiency (A)
- ☐ Measures known but not applied, reasons for not applying

(As a reminder for later more in-depth discussions, the interviewer ticks the likely loss category.)

Is transport of final product an important loss factor?

☐ No ; ☐ Negligible ; ☐ Concern ; ☐ Intolerable ; ☐ Total loss

I. Outreach of measures to reduce losses to other VC actors

- ☐ Measures recommended to farmers/suppliers to reduce losses
- ☐ Measures recommended to aggregators/transporters to reduce losses
- ☐ Direct contact with group of farmers?

4. Loss Categories and Loss Ranking Matrix

(See Loss Categories and Loss Ranking Matrix in Toolbox 2.8 for further details.)

Discuss with participants the loss categories 1, 2 and 3 in order to get a quantitative approximation in percentages for each category using the below matrix.

Loss Categories		Estimated losses in the last season	
		(in traditional weights/ measures)	(in %)
1	**Losses are negligible:** Losses do occur, but the processor can accept them in the long run without changing anything.		
2	**Losses are a concern:** Losses do concern the processor since they affect his/ her business and income and he/she looks for measures to reduce the losses.		
3	**Losses are intolerable:** The processor cannot accept the losses since they put his business and income at risk.		

Loss Ranking Matrix

Loss points along the VC	Loss categories						
	Negligible (1)		Concern (2)		Intolerable (3)		
Loss point 1							
Loss point 2							
Loss point 3							
Loss point 4							
Further…							

After completion of the table, mark the three most critical loss points.

4.10 Data Collection Sheet Processor Meeting

Commodity: _____

Location of meeting:
Name of processing company:

Product ranges offered by the company:
    – Semi-finished products, namely:
 	
....
    – Final products, namely:
 	
....

A. General information
☐ Sources, from which the raw materials/semi-finished products are procured (farmers, traders, other processors, other)
☐ Supply calendar (seasonal or continuous throughout the year; main buying period) (A)
☐ Total volumes procured per year (specify unit)
☐ Business relations with suppliers (occasional, contract, other)
☐ Specification of processed products and volumes produced
☐ Selling periods (continuous/seasonal)
☐ Main customers

B.	**Quality of raw material/ semi-finished products**

☐ Raw material/semi processed products procured from suppliers

☐ Region and season when products are purchased

☐ Moisture levels at safe levels for product (A)

☐ Description of grades accepted (A)

☐ Percentage of discolored grains (A)

☐ Rewards for good quality (premium prices, bonus systems) (A)

☐ Price differential between different grades accepted

☐ Average percentage of rejection, periods of the year

☐ Main reasons for rejection (insect damage, discolored grain, debris) (A)

☐ Further use of rejects (A)

☐ Influence of quality of raw material/semi-finished products on quality of final product

☐ Measures applied to improve quality and their efficiency (A)

☐ Measures known but not applied to improve quality, reason for not applying

(As a reminder for later more in-depth discussions, the interviewer ticks the likely loss category.)

Are quality issues of raw material/semi-finished products an important loss factor?

☐ No ; ☐ Negligible ; ☐ Concern ; ☐ Intolerable ; ☐ Total loss

Flow Chart of Processing Steps/visit of the processing unit

If losses occur, note the loss categories[14]	Process steps	If intended by-products occur, note them
	←	→	
	←	→	
	←	→	
	←	→	
	←	→	
	←	→	
	←	→	
	←	→	
	←	→	

Transfer the loss categories from the left column of the flow chart into the loss ranking matrix at the end of the document.

14 1 = negligible loss; 2 = loss is a concern; 3 = loss is intolerable

C.	Transport/ procurement of raw material/semi-finished products to factory

(Only relevant, if transport is organized by the company)

☐ Main loss points during transport (delays, wetting, heat, no tarpaulin cover) (A)

☐ Own transport or rented

☐ Means of transport

☐ Way of transport (mixed load), quality of transport (A)

☐ Distances of transport(A)

☐ Packaging method (A)

☐ If possible: use of losses

☐ Measures applied to reduce losses during transport and their efficiency

☐ Measures known but not applied, reasons for not applying

(As a reminder for later more in-depth discussions, the interviewer ticks the likely loss category.)

Are pre-harvest issues an important loss factor?

☐ No ; ☐ Negligible ; ☐ Concern ; ☐ Intolerable ; ☐ Total loss

D.	Pre-processing/Intermediate storage of raw material/semi-finished products

☐ Product stored (A)

☐ Drying method and location of drying prior to storage (A)

☐ Storage room (A)

☐ Cleanliness in room, ventilation in room, grains in contact with wall (A)

☐ Sorting or cleaning/winnowing before storage (A)

☐ Average duration of storage, Which months? (A)

☐ Inspection during storage (A)

☐ Use of moisture meter (A)

☐ Main loss points during storage of raw materials/semi-finished products

☐ Main reasons for losses (moisture, insects, pests, rodents, other) (A)

☐ Relocation/re-bagging during storage period (A)

☐ Use of rejected products when relocating storage

☐ Measures applied to reduce losses and their efficiency

☐ Measures known but not applied, reason for not applying

(As a reminder for later more in-depth discussions the interviewer ticks the likely loss category.)

Are intermediate storage issues an important loss factor?

☐ No ; ☐ Negligible ; ☐ Concern ; ☐ Intolerable ; ☐ Total loss

E.	Processing

☐ Technology used (traditional, modern, age of technology)

☐ Further cleaning, drying, sorting during processing (A)

☐ Conversion rate (raw material/final product)

☐ Processing by-products and their use

☐ Main loss points during processing

☐ Kind of losses

☐ Reasons for losses

☐ Use of losses

☐ Measures applied to reduce losses and their efficiency

☐ Measures known but not applied, reasons for not applying

(As a reminder for later more in-depth discussions the interviewer ticks the likely loss category.)

Are processing issues an important loss factor?

☐ No ; ☐ Negligible ; ☐ Concern ; ☐ Intolerable ; ☐ Total loss

F. Quality of final product
☐ Description of quality standards for own processed products
☐ Quality standards produced by the company, certification
☐ Customer reward systems for good quality of final product (premium prices, bonus systems)
☐ Price differential, different quality standards of final product
☐ Customers interested in quality products
☐ Customers interested in lower-quality final products
☐ Measures applied to improve quality and their efficiency (A)
☐ Measures known but not applied to improve quality, reasons for not applying

(As a reminder for later more in-depth discussions the interviewer ticks the likely loss category.)

Are quality issues of final products an important loss factor?

☐ No ; ☐ Negligible ; ☐ Concern ; ☐ Intolerable ; ☐ Total loss

G.	Storage and packaging of final product

☐ Description of storage method (A)

☐ Duration of storage, Which months? (A)

☐ Inspection during storage (A)

☐ Humidity and temperature at safe levels for product (A)

☐ Packaging of final product (A)

☐ Main loss points during storage of final product

☐ Reasons for losses (moisture, insects, pests, rodents, other)(A)

☐ Use of rejected products when changing storage

☐ Measures applied to reduce losses and their efficiency (A)

☐ Measures known but not applied, reason for not applying

(As a reminder for later more in-depth discussions the interviewer ticks the likely loss category.)

Are storage and packaging issues an important loss factor?

☐ No ; ☐ Negligible ; ☐ Concern ; ☐ Intolerable ; ☐ Total loss

H.	Transport of final product to customer

☐ Own transport or rented vehicle

☐ Means of transport

☐ Distances of transport

☐ Protection of goods during transport (A)

☐ Main loss points during transport of final product

☐ Reasons for losses

☐ Use of losses

☐ Measures applied to reduce losses during transport and their efficiency (A)

☐ Measures known but not applied, reasons for not applying

(As a reminder for later more in-depth discussions the interviewer ticks the likely loss category.)

Are transport of final product issues an important loss factor?

☐ No ; ☐ Negligible ; ☐ Concern ; ☐ Intolerable ; ☐ Total loss

I.	Outreach of measures to reduce losses to other VC actors

☐ Measures recommended to farmers/suppliers to reduce losses (A)

☐ Measures recommended to aggregators/transporters to reduce losses

☐ Direct contact with group of farmers?

Loss Ranking Matrix

Discuss with participants the loss categories 1 to 3[15] in order to get a quantitative approximation in percentages using the matrix below.

Loss Categories	Estimated losses in the last season	
	(in traditional weights/ measures)	(in %)
1 **Losses are negligible:** Losses do occur, but the processor can accept them in the long run without changing anything.		
2 **Losses are a concern:** Losses do concern the processor since they affect his/her business and income and he/she looks for measures to reduce the losses.		
3 **Losses are intolerable:** The processor cannot accept the losses since they put his business and income at risk.		

Loss Ranking Matrix

- Transfer the loss categories from the flow chart (see point 3) into this loss ranking matrix
- Complete the loss categories with the processor if any are still missing
- After completion of the table, mark the three most critical loss points

Loss points along the VC	Loss categories						
	Negligible (1)		Concern (2)		Intolerable (3)		
Loss point 1							
Loss point 2							
Loss point 3							
Loss point 4							
Further…							

---

15   1 = negligible loss; 2 = loss is a concern; 3 = loss is intolerable

4.11   Evaluation Sheet Aflatoxin Risk Processor Meeting

Commodity:_____

This Checklist has to be filled after the "Checklist Processor" has been completed. The below points refer to those lines in the before mentioned Checklists which are marked by "(A)".

	High Aflatoxin Risk	**Low Aflatoxin Risk**
General information (Data Collection sheet point A.)		
1. Supply calendar (seasonal or continuous throughout the year; main buying period)	Source from high humidity regions, coastal regions; source during the rainy season	Source from dry season and dryer regions
Quality of raw material/ procured semi-finished products (Data Collection sheet point B.)		
2. Moisture levels at safe levels for product	>12.5% grain moisture	<12.5% grain moisture
3. Description of grades accepted	Purchase low cost commodities without regard to grades	Purchase according to grades, use some quality control measurement
4. Percentage of discolored grains	High percentage of discolored grains >5%	Little discolored grains
5. Rewards for good quality (premium prices, bonus systems)	No regard for quality	One purchase highest grade, incentivize supplier to produce high quality
6. Main reasons for rejection (insect damage, discolored grains, debris)	No rejection	Reject grains with >5% insect grains; >5% discolored grains
7. Further use of rejects	Rejected produce are blended with higher quality grains and sold	Rejected produce are sold to animal feed market
8. Measures applied to improve quality and their efficiency	No measures to improve grain quality	Good management practices to improve grain quality (sorting, winnowing, cleanliness)
Transport/procurement of raw material/semi-finished products to factory (Data Collection sheet point C.)		
9. Main loss points during transport (delays, wetting, heat, no tarpaulin to cover load)	Delays, heat build-up and wetting during transport, no tarpaulin to cover load	No delays, temperature control and aeration
10. Way of transport (mixed load); quality of transport	Loading in mixed loads; risk of wetting; risk of heat build-up	Clean trucks, covered by tarpaulin well aerated
11. Distance of transport from farm to market or rural market to wholesale market, etc.	Long distance	Short distance
12. What packaging method	Heat build-up, airtight packaging	Well aerated, no heat build-up

Pre-processing/Intermediate storage of raw material/ semi-finished products
(Data Collection sheet point D.)

13. Product stored (e.g. grains, cobs without husks, cobs with husk)	Stored as cobs with husk for a long time	Stored as grains with moisture content <12.5%
14. Drying method & location of drying prior to storage	Grains are dried on the ground without tarpaulin for more than 3 days	Dried on tarpaulin, within 3 days safe moisture level
15. Storage room	Clay store; polypropylene bags	Well aerated store (crib, traditional stores), Clean jute bags
16. No aeration; palettes	No ventilation; tight packing	Good ventilation; well packed, spaces, palettes
17. Cleanliness in room	Mix old and new stocks	No old residues, cleanliness
18. Are bags/grains in contact with the wall?	Grain in contact with store wall	Grains not in contact with store wall
19. Purchased inputs are cleaned, winnowed or sorted prior to use	No further quality control	Cleaning, winnowing or sorting prior to use
20. Average duration of storage, Which months?	Storage for more than 6 months in unsanitary conditions; mostly during humid season	Sold off between 3-6 months of storage
21. Inspection during storage	Once stored no more inspection	Grains are regularly inspected and samples taken
22. Use of moisture meter	>12.5% grain moisture	<12.5% grain moisture
23. Main reasons for losses (moisture, insects, pests, rodents, other)	High amount of insect infestation; mold growth	Generally free of insects, rats and mould
24. Relocation/re-bagging during storage period	No change of storage	Changing storage method or storage form (cobs to grains)
25. Measures applied to reduce losses and their efficiency	Storage in unclean & unsanitary conditions	Good storage management, if needed insecticide treatment

Processing (Data Collection sheet point E.)

26. Further cleaning, drying, sorting during processing	No cleaning, drying, sorting during processing	Cleaning, drying, sorting during processing

Quality of final product (Data Collection sheet point F.)

27. Measures applied to improve quality and their efficiency	No quality standards or good manufacturing practices or HACCP	Processing according to quality standards, apply good manufacturing practices or HACCP

Storage and packaging of final product (Data Collection sheet point G.)

28. Description of storage method	No ventilation; tight packing	Good ventilation; well packed, spaces, palettes

29. Duration of storage, Which months/ seasons?	Storage for more than 9 months in unsanitary conditions, mostly wet season	Sold off between 3-6 months of storage
30. Inspection during storage	Once stored, no more inspection	Goods are regularly inspected and samples taken
31. Humidity and temperature at safe levels for product	>12.5% grain moisture	<12.5% grain moisture
32. Packaging of final product	Poor packing with moisture seepage	Airtight packaging
33. Reasons for losses (moisture, insects, pests, rodents, other)	High amount of insect infestation; mold growth	Generally free of insects, rats and mould
34. Measures applied to reduce losses and their efficiency	Storage in unclean & unsanitary conditions	Good storage management, if needed insecticide treatment
Transport of final product to customer (Data Collection sheet Point H.)		
35. Are goods well protected from temperature and sun during transport?	Loading in mixed loads; risk of wetting; risk of heat build-up	Clean trucks, covered by tarpaulin well aerated
36. Measures applied to reduce losses during transport and their efficiency	Long transport route, no regard to temperature and relative humidity	Transport at right temperature and relative humidity for commodity
Outreach of measures to reduce losses to other VC actors (Data Collection sheet Point I.)		
37. Do you train the group/suppliers in good management practices?	No training to farmers group or suppliers	Train farmer groups/suppliers in good management practices
Number of answers out of 37 question points (Ratio of Aflatoxin risk)	…………/37	…………/37

5.   Forms for documenting results

5.1   Cumulative Loss Matrix

5.2   Summary Aflatoxin Risk Assessment

5.3   Reporting structure and contents

5.1 Cumulative Loss Matrix

Table 27. Cumulative Loss Matrix

Purpose	By providing a complete overview of stakeholders' loss perceptions collected through the different process steps in a single table, the Cumulative Loss Matrix facilitates the triangulation of information gathered along the RLAT process.
Expected outputs	• Stakeholders' loss perceptions collected through the different RLAT process steps are documented in a single table providing a complete overview of pertinent results • Consistencies and inconsistencies of results gathered through the different RLAT process steps are clearly displayed to facilitate triangulation • Results of the triangulation are fed into the conclusions and recommendations of the RLAT appraisal
Approach	The perception of loss hot spots obtained in the roundtable, workshop and meetings may differ significantly: • Participants in the Stakeholder Workshop may be more detailed in defining VC functions and may identify more hot spots than participants in the Key Expert Roundtable • Participants in Focus Group Meetings may identify other critical loss points than have been discussed in the roundtable and workshop It is obvious that loss perceptions are a relative and not an absolute means to appraise losses. Cross-checking the information obtained through triangulation, however, will usually lead to approximate values that reflect value chain reality in a way that provides sufficiently reliable results to support decisions on the way forward in addressing losses. If no conclusions can be drawn since results differ too much, further Key Informant Meetings or more in-depth studies may have to be realised to unveil the differences and to come up with realistic dimensions of the perceived loss hot spots.
Complementing RLAT tools	• Results of the Hot Spot Analysis of the Key Expert Roundtable and Stakeholder Workshop • Data Collection sheets Farmer, Trader and Processor Meetings • Key Informant Meetings
Use	• Conclusions and Recommendations • Reporting
Usability of results	If no conclusions can be drawn since results differ too much, further Key Informant Meetings or more in-depth studies may have to be realised to unveil the differences and to come up with realistic dimensions of loss hot spots (critical loss points).
References	• RLAT User Guide: Section 3.4.1

Fill the results of the Hot Spot Analyses of the different RLAT process steps into the following Cumulative Loss Matrix.

Cumulative Loss Matrix

VC function	Who is affected?	Effects		Hot spots			Losses		
		Immediate effects	Likely later effects	Key expert roundtable	Stake-holder workshop	Focus group/ processor meetings	Key expert roundtable	Stake-holder workshop	Focus group/ processor meetings
	Indicate VC operator[16]	Tick relevant boxes		Indicate results of loss hot spot analysis or loss ranking respectively			Indicate quantified losses or loss categories respectively (in %)		
Production									
Input supply									
Pre-harvest									
Harvest									
Aggregation									
Transport									
....									
....									
Trading									
....									
....									
....									
....									
Processing									
....									
....									
....									
....									
Distribution									
....									

16 A = Aggregators; F = Farmers; P = Processors; S = Service providers; T = Traders; WS = Workshop

5.2 Summary Aflatoxin Risk Assessment

Table 28. Summary Aflatoxin Risk Assessment

Purpose	Providing a proxy based assessment of the aflatoxin risk in the targeted value chain.
Expected outputs	• General information on aflatoxin is assessed during the key expert workshop und stakeholder workshop • Stakeholders' risk assessment collected at farmers, processors and traders level through the different risk assessment sheets and a score for aflatoxin risk is calculated for each chain actor • Specific high and low risk practices are identified for each value chain actor and for different chain steps, this risk is evaluated by the interviewers after the site visit and done without participation of the interviewees
Approach	The general perception on aflatoxin and related food losses is collected at the key expert workshop and in the regional stakeholder workshop for subsequent triangulation The evaluation of aflatoxin risk is evaluated by an aflatoxin or postharvest expert after the field visits without the participation of interviewees. All of this is supported by biophysical measurements, that determine certain proxies for aflatoxin such as: • Grain moisture level; • Number of damaged cobs; grains (on basis of 500 gr.); • Number of discoloured cobs; grains; • No. of grains that are undersized or shriveled; • Determine the number of grains that would be thrown away • Use of black-light cabinet to determine the intensity of the fluorescent which is an indication of aflatoxin The collected information should provide sufficiently reliable results to support decisions on the way forward in addressing aflatoxin and identifying high risk and low risk practices. If no conclusions can be drawn since results differ too much, further Key Informant Meetings or more in-depth studies requiring determination of aflatoxin may have to be realised to unveil the differences and to come up with realistic dimensions of the perceived loss hot spots.
Complementing RLAT tools	• Results of the key expert workshop • Results of the regional stakeholder workshop • Results of the biophysical measurement
Use	• Identification of high and low risk practices • Utilising proxy methods for determining aflatoxin in-situ without resolving to expensive aflatoxin analysis with resource intensive apparatus & personnel
Usability of results	The quality of the collected data depends highly on the experience and the knowledge of the person that is undertaking aflatoxin risk assessment. He/She will need to have a good knowledge of the prevailing farming practices in the regions since not all the VC steps can be observed during the site visit since many of the production practices are not permanent during the year but are rather punctual and often only done during specific seasons.
References	• RLAT User guide: Section 2.2, 3.4.1

5.3 Reporting Structure and Contents

Table 29. Reporting structure and contents

Purpose	Findings of the RLAT exercise, conclusions and recommendations are available for potential users including recommendations for substantiating the results (if required).
Expected outputs	• Findings of the RLAT exercise are consolidated in a concise report • Executive summary is included to facilitate a fast overview of the main results • If required, a presentation is developed to inform potential users/create awareness in public
Target audience	A concise report is essential for making RLAT results available to: • VC operators who have to change technologies • VC service providers who have to adapt service products and • Policy makers and administrations that are responsible for creating an enabling environment for investments into loss reduction
Sample report outline	The following sample report outline has to be adapted to every RLAT appraisal to reflect the specific approach adopted, the particular needs of the users and the intended target audience (for ideas on the substance of the report see 'Considerations on contents' below): 1. Executive summary 2. Introduction and context 3. Methodology and course of action 3.1 Objectives and implementing organisation 3.2 RLAT process steps and schedule 4. RLAT findings 4.1 General information 4.2 Brief outline of results of the field phase 6. Conclusions and recommendations 7. Way forward

Considerations on contents	While trying to capture the wealth of information gathered in the field, the report has to be strictly limited to really relevant information regarding the objective of the RLAT exercise and the needs of potential users of the results.
	The report provides the following information in a concise way:
	• Brief insights into the process of the particular RLAT appraisal
	• Documentation of the results of the different process steps in the Cumulative Loss Table and the Summary Aflatoxin Risk Assessment
	• Conclusions and recommendations
	Loss-relevant results of the Key Expert Roundtable, the Stakeholder Workshop, the Focus Group and the Key Informant Meetings should as far as possible be presented in diagrams accompanied by concise explanations. To illustrate specific issues that have come up during the field phase or possible solutions recommended by interview partners, boxes explaining the case may be included.
	The conclusions and recommendations consider questions such as[17]:
	• What is the dominant pattern of losses and what are notable variations (triangulation)?
	• When and where do losses occur (e.g. seasonal, geographical)?
	• What is/are the cause(s) for the losses (relationship between prevailing practices and losses)?
	• Which VC stages, VC functions and VC operators are involved and how?
	• Which other factors affect the losses (e.g. knowledge gaps on technologies or infrastructure issues)?
	• What are the effects on up- and down-stream VC operators?
	• Which solutions are possible?
	• How much of a loss reduction can realistically be achieved?
	• At which costs can losses be reduced?
	• Which investments are involved? Are they feasible?
	• Which cost-benefit (incentive for investors) can be expected from investments?
	• What are the constraints that inhibit adoption of improved technologies?
	When documenting the conclusions and recommendations, it must be clearly distinguished and the reasons explained for:
	• Recommendations that are based on sufficiently reliable and verified findings to support decision making on loss-reduction measures, and
	• Findings that require further substantiation (e.g. evaluation of the feasibility of proposed measures) to inform the planning of self-standing loss-reduction interventions or the integration of loss relevant actions into VC upgrading strategies.
Complementing RLAT tools	• Cumulative Loss Matrix
	• Summary Aflatoxin Risk Assessment
	• Key Expert Roundtable and Stakeholder Workshop
	• Data Collection sheets Farmer, Trader, Processor Meetings
References	• RLAT User Guide: Conclusions and Recommendations section 3.4.2

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17 Adapted from: Schoonmaker Freudenberger, K., n.d. Rapid Rural Appraisal (RRA) and Participatory Rural Appraisal (PRA):
    A manual for CRS Field Workers and Partners. p.17ff. Available online at: http://www.crs.org/our-work-overseas/research-publications/
    rapid-rural-appraisal-and-participatory-rural-appraisal