Outcomes of Food Laboratory Capacity Building Program in Africa

Good afternoon and thank you for attending my presentation today. My name is Jérémie Théolier. I am a research associate at Laval university.

During this talk, I will present major outcomes of food laboratory Capacity building program in Africa.

In the first part, I will talk about the design of the program and the selection of candidates.

Then I will present the trainees results and the elements that emerge from it.

A little bit of context

At first

- Evaluation of laboratories and staff for a very limited number of countries and trainees
- Online training and training on site (in chosen laboratories)

... but Covid...

- Development of online training and opening to all African countries (up to 8o candidates)
- Dissemination via the African Union, AOAC sub-Saharan section and GFORSS

But before I begin, I need to give you just a little bit of context. Initially the program was designed to reach a limited number of countries. We would have assessed the laboratory capacities of some countries and trained only a few experts in food contaminants, in their laboratory in Africa. This first version of the program was to start in spring 2020, and it has obviously been completely revised following the Covid pandemic.

With our partner organizations, it was decided to change the content of the program by switching it to online mode. In this way, it opened it up to all countries and therefore to many more potential participants. At first, it was decided to limit the number of participants to 80, which was about 10 times more than what was initially planned. The size of the cohort was decided to keep an interaction between the candidates and the teachers (Samuel, Janie and myself). It was estimated that the possibility of being able to answer individual questions would be reduced with more than 80 trainees.

Applications received

Total cohort

- Number of candidates (Total): 322 candidates
- Number of countries (Total): 28 different countries (/54)

- Good participation from the big African countries (Nigeria, Ethiopia, Ghana, Kenya)
- Great participation from EAC countries
- Limited participation from north African, sub-Saharan and central African countries
- Limited participation from small countries (Djibouti, Cape-Verde, Seychelles, Sao-Tome…)

For the recruitment, candidates had to fill out a form and send it back to us for analysis. This form has been disseminated by partner organizations (AOAC sub-saharan section, African Union, USDA and ourselves). Our African colleagues had about a month to submit their applications. The people targeted for this program were people involved in the analysis of food contaminants, from a regulatory point of view, i.e. people in regulatory or inspection agencies. In the end, we received around 300 applications, coming from 28 different countries out of the 54 that are in Africa, including applications from universities and industries.

All the different parts of Africa were represented, but we observed an under-representation of North Africa and Central Africa with fewer candidates than anticipated, indicating that we lack certain communication channels to reach everyone .
Likewise, no candidacy from sub-Saharan countries has been reported.
And on the contrary, we observed a large proportion of certain countries, representing the big African economies (Nigeria, Ghana and Kenya), except for South Africa.
Considering the difficulty of reaching the entire African community, this step was considered a success.

Selection of candidates

Selection criteria:

- Education (5 points), Experience (15 points), Techniques (15 points), Support of Manager ? (5 points-eliminatory); Laboratory can host ? (10 points)

Total: 50 points (cuttoff at 35 points)

- 165 candidates above 40 pts
- 205 candidates above 35 pts

« Too much » good candidates and creation of a second cohort for EAC countries (about 130 applicants).

Selection of candidates and approval from partner organizations (27 countries)

To choose the candidates, we applied the selection criteria which are displayed on screen, including certain eliminatory criteria such as management support.

As the goal was to limit the number of participants to 80, we also setup a threshold at 35 points.

However, it soon became clear that the number of good candidates was very high. More than 160 candidates above 40 and more than 200 above 35 points.

Instead of adding arbitrary criteria, we decided to make two cohorts of 80 candidates each, including one cohort dedicated to the East African community since it presented almost half of the applications on its own.

In the end, after a complete review, the final list of participants was determined and approved by the partner organizations.

Conception of the training

Nine different modules
Module 1: General background on food contaminants
Modules 2 and 3: Quick methods (ELISA and LFD)
Modules 4, 5 and 6: Theory on LC/GC- MS methods
Module 7: Operation
Modules 8 and 9: AOAC methods and Quality Assurance

25 different lessons, 10 hours of video (English and French)
- 9 self-assessment quiz
- 3 live sessions (+ 1 live introductory session)
- 3 evaluations
- Forum for any questions
- Supplementary documents

Following discussions with partner organizations, we focused on methods to analyze the presence of contaminants in food, for both rapid and confirmatory methods.
The structure of the online program was as follows: a first module to equalize the knowledge of different people on food contaminants, with an introduction on risk analysis. Then modules 2 and 3 put the emphasis on rapid methods (ELISA and LFD). Modules 4 to 6 presented the different concepts used in chromatography and mass spectrometry. Module 7 focused more on the practical part of these methods. Finally, module 8 presented the AOAC methods and explained how these methods were validated. The last module introduced the concepts of quality assurance essential to have robust results. The different modules were offered in English of course, but also in French, as several African countries use it.

In total, the online program contains 10 hours of video, just for the classes. We also had live sessions, mostly to get feedback from the students and to come back on specific points that needed a little more study. During these live sessions, we also went back to the self assessment quizzes so that the students could assess their own progress and if they needed to come back to certain lessons.
Once available, the documents and videos were accessible at all times, and new content was made available according to a predefined schedule which was adapted based on trainees feedback. Trainees also had access to a forum to ask specific questions about the

content or form of the program.

Three evaluations were used to obtain a ranking of the students and also to quantify their knowledge after the end of the program.
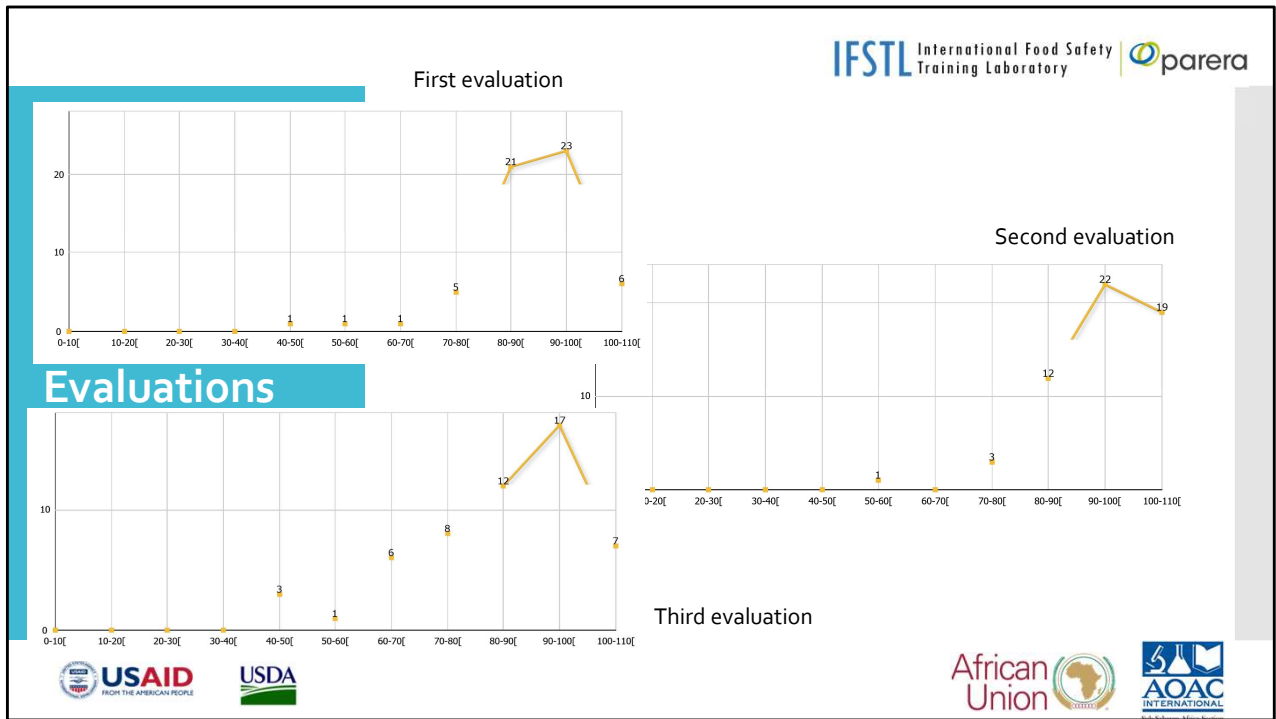
First cohort:

- 75 participants
- 54 graduates (60 completed at least one evaluation)
  - Average: 83%
  - Median: 89%
  - 29 candidates above 90%
  - 2 candidates with perfect grades
- Active participation to live sessions
  - 55 participants to the first live session, 57 to the second and 45 to the third
- Active participation to forum (about 30 questions/subjects)

Major outcomes

For the first cohort, the training started in march and ended in august 2021.
On the 75 students, 54 completed the program, most of them with excellent grades indicating that the participants have well integrated the different concepts discussed in the training.
More than half of the students who finished obtained more than 90%. We also had two students with perfect grades.
The participation during the live sessions was more important than anticipated with more than half of the students for each session, if we mix the French and the English speakers all together.
So basically, everything went smoothly for the first cohort, which confirmed the excellence of the applications that we received.

On the screen you can see the stats for each of the three evaluations and as you can see the scores are good. We can observe a decrease in the grades for the third evaluation but we must not forget that the training lasted 5 months so there was probably a little fatigue at this point.
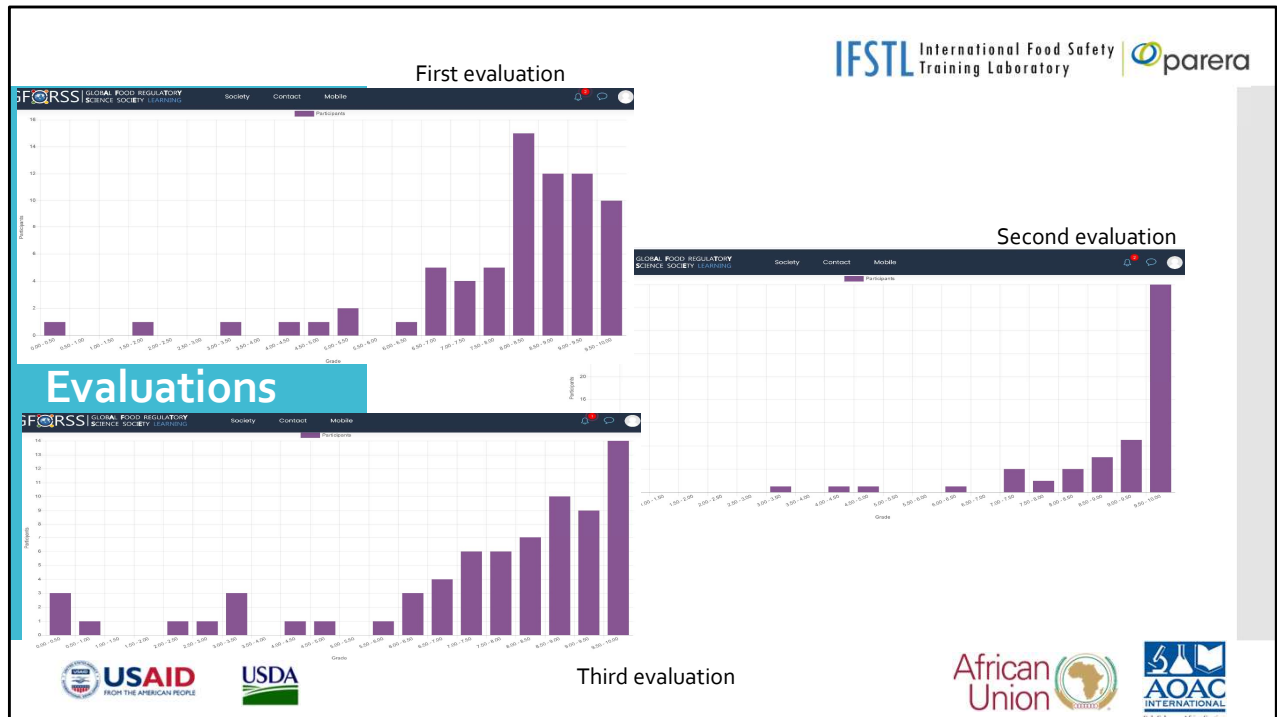
Second cohort:

- 82 participants

- 66 graduates (74 completed at least one evaluation)
  - Average: 82%
  - Median: 85%
  - 22 candidates above 90%

- Active participation to live sessions
  - 42 participants to the first live session, 36 to the second and 33 to the third

- Active participation to forum
  - 32 subjects/question

Major outcomes

For the second cohort, dedicated to the East Africa Community, the training started at the very end of may and ended at the beginning of September 2021.
On the 82 students, 66 graduated from the program. Once again, the scores were quite good.
The quantitative participation during the live sessions was also important but a little less than for the other cohort. As this second cohort was limited to the EAC countries, which is in the east part of Africa, the time difference was important and may explain why there is a small difference with the first cohort. However, the qualitative participation was also good. This time, we had only 22 candidates with grades above 90%. We explained this by the fact that some applicants who could not have been selected for the first cohort may have been selected here.

But in fact it is not that simple.
We had a number of student who tried to complete some evaluations but still manage to complete the program thanks to the other evaluations. This phenomenon was not observed with the first cohort so that could be the explanation why the two cohorts are slightly different in terms of grades.
Anyway, as you can see on screen the grades were excellent overall.

Major outcomes

Main conclusion

- A few dropouts at the beginning of the training
- Good participation from applicants and good success rate
  - 72% success rate for the first cohort
  - 80% for the second cohort
- Great level of knowledge overall
- Great feedback from trainees

For both cohorts, we observed a drop in attendance during the first lessons. There are a whole bunch of reasons that can explain this, for example, the person realized that the training does not suit him or her or that it is too demanding, but anyway it is a phenomenon which was expected. In both case we were below 20% which is good for an online training.

Obviously if the dropout rate is low, the success rate is high. In our case, we are above 70% of success for the two cohorts, which indicates a good general knowledge of the candidates on the topics that were covered.
One can wonder if the training is of interest if the participating candidates are already excellent. But considering the feedback we received from the students themselves, it is.

Major outcomes

Minor difficulties

- Technical issues (French web site, internet connection, schedule of live session)
- Pace a little bit to quick?
- The training was time consuming (about 45 hours) for working people
- The period of the training (interference with field work)

But before highlighting all the positive vibes that emerged from this training, I would like to dwell for a few seconds on the difficulties we encountered. The first being obviously technical difficulties such as bad internet connection which did not allow the videos to be played online but which required the videos to be downloaded. To overcome the issue, we have made the scripts available for the different videos so downloading the videos was not mandatory in the end.

Another problem was the pace of the modules which had to be slowed down to allow some trainees to catch up. The training was designed to last around 45 hours taking into account personal work, which was not necessarily compatible with the schedule of people who have a full time job. We also had the opposite case of a person who requested access to certain modules in anticipation that he could not take care of them later. So we had to adapt.

Finally, the period of August seems particularly busy for analysts and several people asked us for a postponement due to an activity in the field interfering with the completion of the training.

Major outcomes

Positive feedback

- Strong desire to learn
- Questions about the next steps, questions about other trainings, about graduated studies, about AOAC mentoring programs, etc..

- Documentation accessibility (download or streaming)
- Adaptation of the schedule according to trainees feedback
- Direct interactions through forums and live sessions
- Feedback from the partners organizations

However, in the end, the positive outweighs the negative by at least a factor of ten. From our perspective, we saw people who were in demand and wanted to have access to this information. I have personally received a lot of thank you emails, written with kindness. We also received a lot of questions, by email or during the live sessions, which clearly show that there is an interest in this type of training. We also received a similar feedback from partner organizations.

We also received a lot of questions regarding potential next steps, including other trainings in the same area, master or PhD positions, and AOAC subscriptions and mentoring program, which once again show that our African colleagues are eager to progress. A community of food analyst is built and we need to find a way to keep it active.

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That is all for me so I thank you for attending this presentation and I hope you enjoyed it.