Together, beyond animal health

Bangladesh and Ethiopia : Poultry Medicine Training

Ceva Santé Animale, 2016-2021

Increasing the capacity of vets to support small commercial poultry farmers in Bangladesh and Ethiopia.

With support from :

BILL & MELINDA GATES *foundation*

“For millions of people in sub-Saharan Africa and South Asia, poultry represents an irreplaceable source of income and nutrition. It offers promising opportunities for women to own and control assets that can produce steady, reliable income. Unfortunately, poultry diseases still represent a significant impediment for low-income families to invest in small-scale commercial poultry production. Through this partnership, Ceva trained many poultry vets in Bangladesh and Ethiopia and created a sustainable training platform for collaboration between universities in both countries and France. This effort made poultry health care widely available and opened the door for many low-income families to commercialize and grow economically through poultry production.”

Obai Khalifa, Senior Program Officer - Livestock group BMGF

“At Ceva we believe that helping to develop competencies of vets from all around the world is a key part of our vision and purpose. As a leader in animal health, we are committed to working in collaboration with local and international partners to use our veterinary expertise for the good of all animals and our society.”

M Prikazsky - CEO Ceva Santé Animale

“We are proud and happy to have participated for 3 years in this «Post-graduate Veterinary Training on Poultry Diseases» program in Bangladesh in collaboration with Ceva Santé Animale and Sher-e-Bangla University (Dhaka).
We hope that this training has contributed to strengthen the skills of the 92 poultry veterinarians of this country who followed this training, and has consolidated their field expertise by giving them the keys to an efficient and responsible avian health management.”

Prof. Christophe Degueurce, Director ENVA

“The training has been an invaluable opportunity to create links between our academic falculaties, the ENVT and CVMA, and has broadened perspectives for future collaborations in the field of animal health.
This training also developed our understanding of the field realities of poultry production in Ethiopia, which will be very important for the design of relevant projects in education and research in the near future.”

Prof. Pierre Sans - Director ENVT

“Developing poultry production is a key opportunity to enhance global food and nutrition security. To ensure that chicken meat and eggs are produced safely, efficiently, profitably and sustainably requires the development of appropriate and practical skills along a harmonious chain of competencies from vets to farmers.”

Dr Pierre Marie BORNE - Project Director Ceva


EnvA
École nationale vétérinaire d'Alfort


envt
école
nationale
vétérinaire
toulouse


SHER-E-BANGLA AGRICULTURAL UNIVERSITY


Addis Ababa University

Summary

Introduction

In 2015, Ceva Santé Animale received a grant from the Bill & Melinda Gates Foundation to manage a 5-year long project to provide specialist training on poultry health management to a total of 180 vets in Bangladesh and Ethiopia.

The objective was to increase the vets' individual and collective capacity so they could better support emerging commercial poultry farmers.

This report provides background information, describes the training program and how it was planned and implemented, and highlights the key design features and lessons learned.

Poultry sector background

Global demand for animal protein has increased dramatically over recent decades especially for chicken meat and eggs. In response, the global poultry flock has increased six-fold since the early 1960s. Demand is projected to continue to rise in the coming decades, despite the market's disruption due to the Covid19 pandemic.

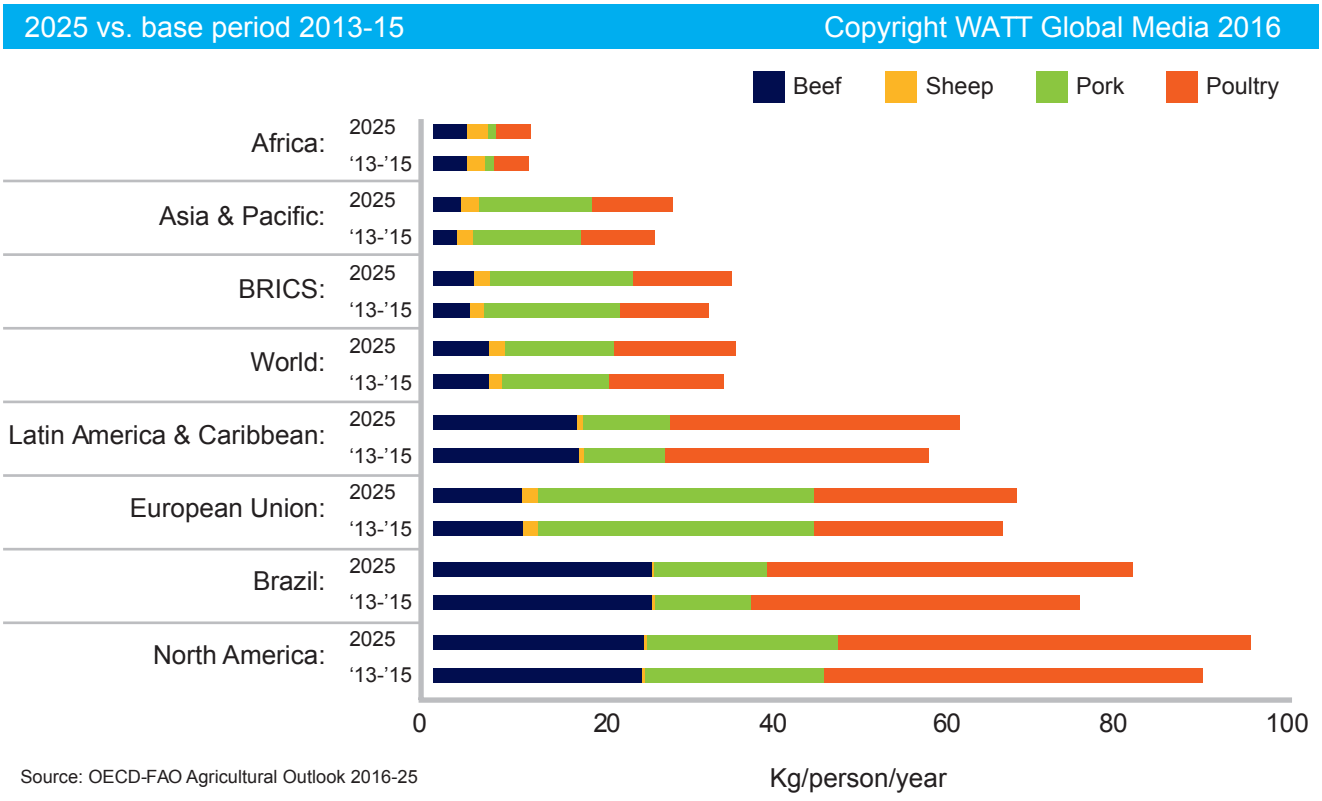


Figure 1: Per capita meat consumption worldwide by type (WATT Global Media, 2016)

Although developing countries are mostly characterized by low consumption of meat per capita, population growth, a rapidly growing middle-class and rising incomes are increasing demand and promoting a switch to more modern farming methods. In this context, the poultry industry particularly stands out, attracting many local and regional investors. Some of the reasons for this include:

• It provides a regular source of income with a rapid return on investment as the production cycle is short and does not depend on the season.

• There are fewer religious or other cultural constraints associated with consuming poultry than other meats.

• The cost of starting commercial production is lower than for most other types of livestock and can be affordable even for smallholders.

• It can be adapted to a wide diversity of farming systems and is resilient to different climates.

• The production model does not vary much between farming systems (same process, same inputs, etc.).

• It provides relatively cheap, healthy and easy-to-cook food (eggs and meat) with high quality protein and other essential micronutrients.

• It has the smallest carbon footprint per kilogram of meat consumed, compared to other livestock.

Did you know?

Source : LDAD, 2018

The amount of greenhouse gases generated per kilogram of protein produced (protein emission intensity) varies widely between livestock species and commodities; on average, it is globally highest for beef and lowest for eggs. In addition, there is wide variation within a species/commodity by region, which is largely driven by differences in efficiency of production.

There is considerable scope to reduce emissions, especially in developing regions, by increasing the efficiency of production, thereby closing the gap between less developed and more developed regions. Developing skills within the poultry sector and helping emerging commercial poultry farmers to adopt better management practices has the potential to make poultry production in developing regions more efficient as well as more environmentally friendly.

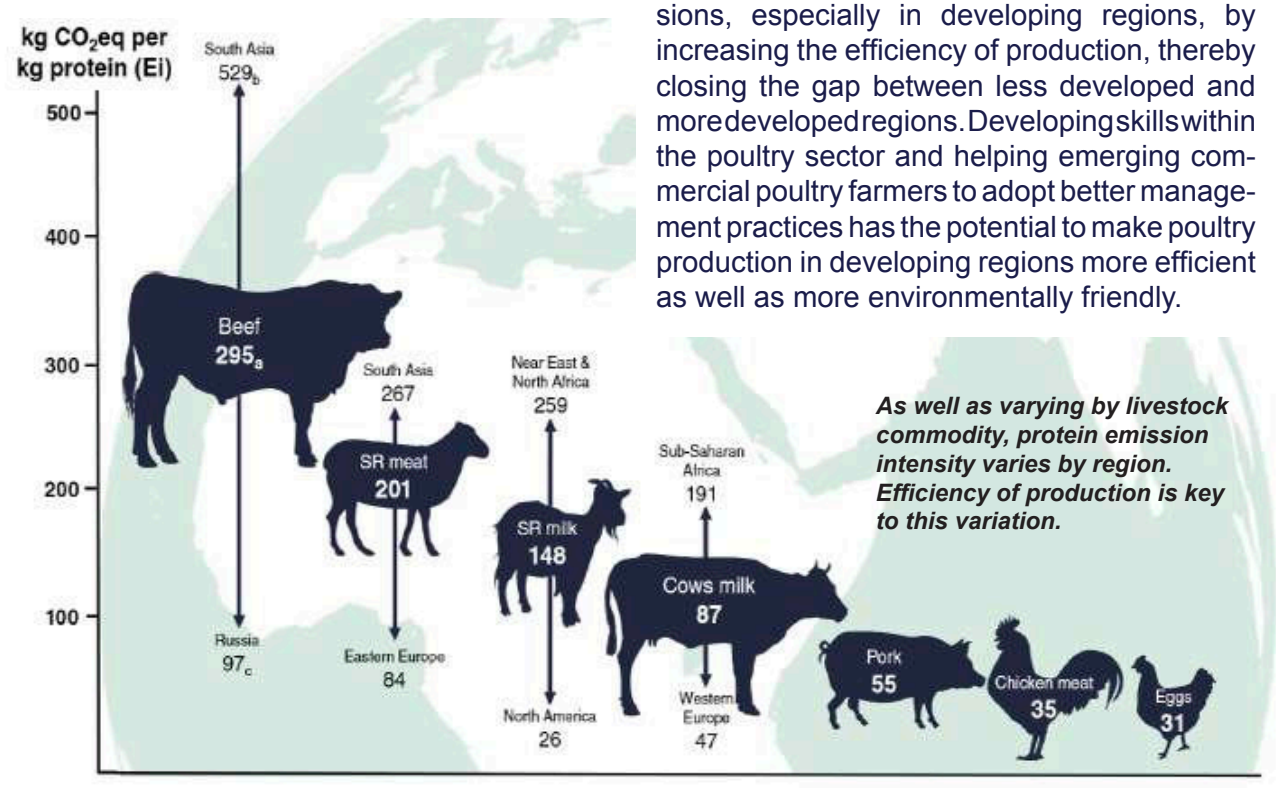


Figure 2 : Global average emissions intensities (EI) for different livestock products (a), and regional variation (b & c). SR = small ruminants. CO_2eq stands for carbon dioxide equivalents; a measure of total GHGs using the fonctionally equivalent alount of carbon dioxide Data from FAO modelling using GLEAM[15].

Based on the FAO's classification system (FAO, 2008), the poultry production sector is divided in two major farming systems and four sectors which follow completely different paradigms in terms of flock and sanitary management, as detailed in Figure 3.

In developed regions, very large-scale commercial poultry systems (sectors 1 and 2), often involving fully integrated operations that include all aspects of breeding, rearing, and even extending to processing and marketing, dominate production of eggs and meat. In contrast, in developing regions more than 80% of poultry are still kept in low input-low output poultry systems (sectors 3 and 4).

The sector 1 and 2 players in developing countries are mostly concentrated on the upstream breeding part and egg production respectively. As a consequence, **the bulk of the commercial production in quantity of eggs and meat comes from a huge number of sectors 3 and 4 farmers having limited access to quality services.**

To improve the productivity of the poultry industry and keep up with the growing demand, it is therefore critical to support those farmers, and especially emerging commercial farmers whose management practices allow better efficiency of the production.

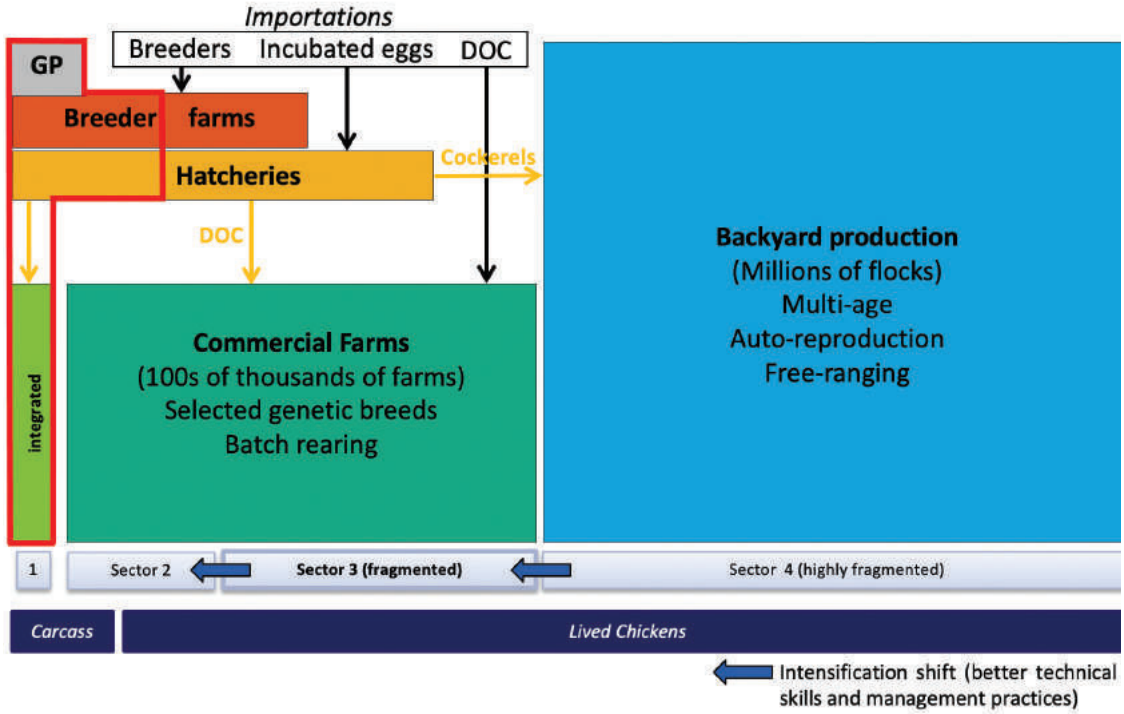
Definition	Commercial farming systems			Traditional farming system
	Sector 1: Integrated farms[1]	**Sector 2: Large Commercial farms**	**Sector 3: Pre-commercial farms**	**Sector 4: Backyard farming systems**
Objectives	Integrated cost management for more probability	Profitable sales of finished products	Profitable sales of finished products	Self-consumption and additional incomes
Technical level[2]	High	High	Medium to low	Low to none
Access to animal health services	High (integrated)	High	Medium to limited	Opportunistic
Breeds of poultry	Selected genetic breeds			Native (natural incubation)
Flock management	Batch rearing			Free ranging & multi-age

1 Integration from breeders to final production (meat/eggs) / 2 Human resources, equipment, building, feed, etc.
Figure 3: The major farming systems and their characteristics

Did you know?

The diagram below is a schematic representation of broiler production in Intertropical Africa based on literature and Ceva internal data. It can be read from top to bottom (production steps from grandparent flocks (GP) to live broilers) and from left to right (relative proportion of total production).

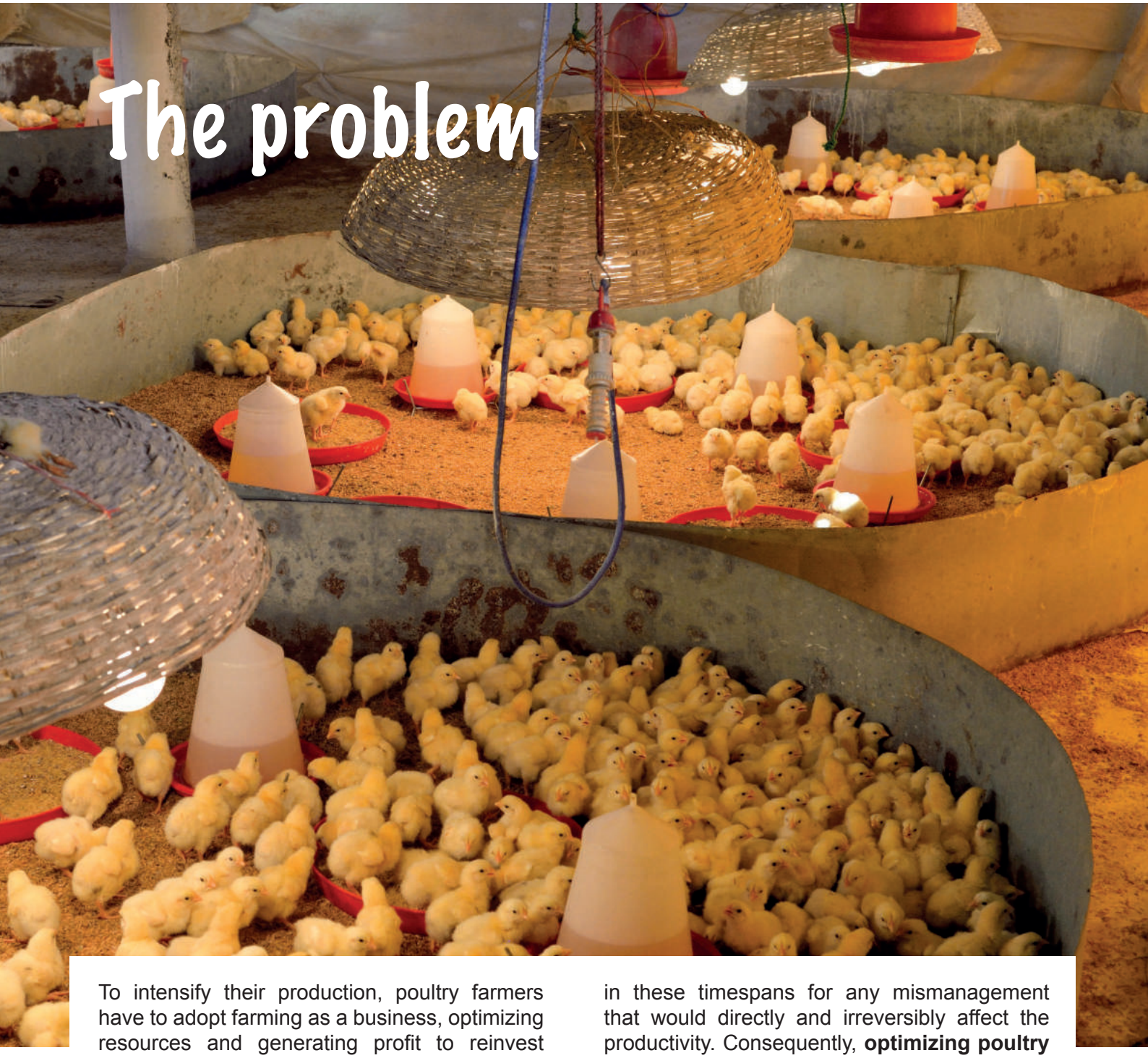
Intertropical SSA Poultry Production Pattern



This model highlights that the majority of meat production is derived from traditional farming (sector 4), which is characterized by auto-reproduction, selling live birds through small markets and home consumption. A few high-level intensive farms (sector 1) produce the majority of day-old chicks (DOC) (layers/broilers) and they mostly sell their DOCs to independent commercial farmers from sectors 2 and 3. Integrated systems (denoted by the red line on the schematic diagram) are rare the exception as the market is mostly fragmented.

To intensify production and meet the growing demand, efforts should therefore focus on commercial farms, especially those that have newly emerged (sector 3). These represent the bulk of the commercial production and have significant potential for improvement but currently have limited access to quality services and technical support. In this fragmented market of tens of thousands of commercial farms, can be observed huge variations in management practices and technical skills.

The problem



To intensify their production, poultry farmers have to adopt farming as a business, optimizing resources and generating profit to reinvest in their business and improve their access to quality services, regardless of the size of their flock. Backyard poultry farmers, who mostly consider their activity as a means to supplement their food and perhaps generate opportunistic complementary income, are not an answer to this challenge of intensification, unless they too embrace a business mindset.

Unlike most livestock farming systems, the poultry production cycle is very short for meat and medium for egg production: there is no room in these timespans for any mismanagement that would directly and irreversibly affect the productivity. Consequently, **optimizing poultry production almost exclusively relies on proper management and disease prevention**, a concept which confuses most emerging commercial producers who tend to skip preventive measures and focus on curative treatments only. **To achieve sustainable intensification of production it is therefore critical to support them in a paradigm shift towards better anticipation of potential problems and adoption of preventive approaches to flock and sanitary management.**

Figure 4: Farm audit carried out in Ethiopia to support an emerging commercial poultry farmer (Ceva, 2019)

The main constraint is that emerging commercial farmers, whose number have been rapidly growing in developing countries in the past few years, have little experience and poor technical knowledge in poultry management and they also lack access to quality services. They often experience low and fluctuating productivity and are also very vulnerable to disease outbreaks. Large numbers of birds housed in close proximity represent a high risk of large-scale disease outbreaks, which could easily decimate or even wipe-out entire flocks. This risk is exacerbated by: (i) the lack of biosecurity measures and vaccination programs, (ii) the higher susceptibility of improved breeds, as compared to local breeds, to diseases, and (iii) and self-medication without expert veterinary supervision or guidance.

Efforts should therefore focus on improving commercial farmers' access to well-trained poultry advisers who are able to support them in adopting this new approach and implementing good flock management practices, appropriate preventive measures (vaccination and biosecurity) and effective curative treatments when necessary.

However, **the rapid growth of the poultry industry in developing countries in the last decades has not been accompanied by a similar development of skills among animal health professionals.** They often had to learn on the job and their curricula are almost exclusively based on disease recognition and treatment, while effective avian production mostly requires a preventive vision and support. Naturally, the few specialized poultry health professionals are in demand from the main big commercial poultry farms (sectors 1 and 2). There is therefore a great opportunity and need to create and develop similar services for the fast-growing emerging commercial sector (sector 3).

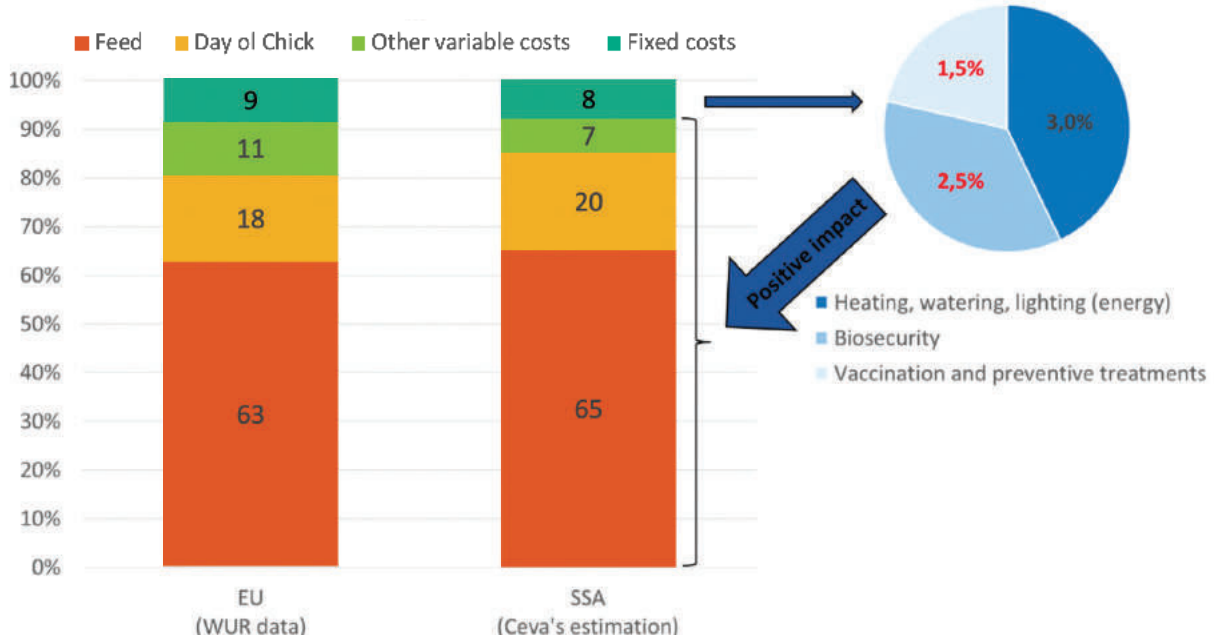
Did you know?

A meta-analysis (Asfaw et al., 2019) reviewing more than a hundred studies from 2000 and 2017 in Ethiopia showed a high prevalence of both viral diseases (Newcastle disease: 44%, infectious bursal disease (IBD): 41%) and parasitic diseases (avian coccidiosis: 37%, helminth infestation: 62%, and ectoparasite infestation: 50%) in extensive poultry farms. In this same country, Kinung'hi et al., (2004) estimated that avian coccidiosis contributed to an average of 12% and 8.5% loss in enterprise profit of the small- and large-scale farms they surveyed, respectively.

This data highlights the importance for poultry producers, especially commercial farms, to be given adequate support towards: (i) limiting catastrophic diseases outbreaks that could induce high mortality, by adopting appropriate biosecurity measures and vaccination, and (ii) controlling diseases, such as coccidiosis, that have less noticeable health impacts but which can significantly affect profitability (loss of weight, lower feed conversion ratio), through better monitoring, management and sanitary measures.

"In emergent commercial farms; vaccinated birds are still dying after bacterial infections. Vaccination and biosecurity is a Must but not sufficient to guaranty financial sustainability", Dr PM Borne.

Breakdown of broiler production costs



Investing in preventive approaches, such as biosecurity and vaccination, is highly profitable in poultry production. These costs are low compared to the other production costs, especially feed. Ceva estimates that biosecurity, vaccination and preventive treatments account for just 4% of total broiler production costs in Sub-Saharan Africa. These costs are comparable to those observed in other parts of the world, such as Europe. Although this breakdown may vary according to season, preventive management costs will always be negligible compared to feed or genetics (day-old chick) costs. Investing in preventive management also induces a leverage effect that secures and optimizes the other bigger production costs, reducing risks of productivity losses, diseases outbreaks and mortality that could negatively impact on income and feed conversion ratio, or cause additional costs for curative treatments.

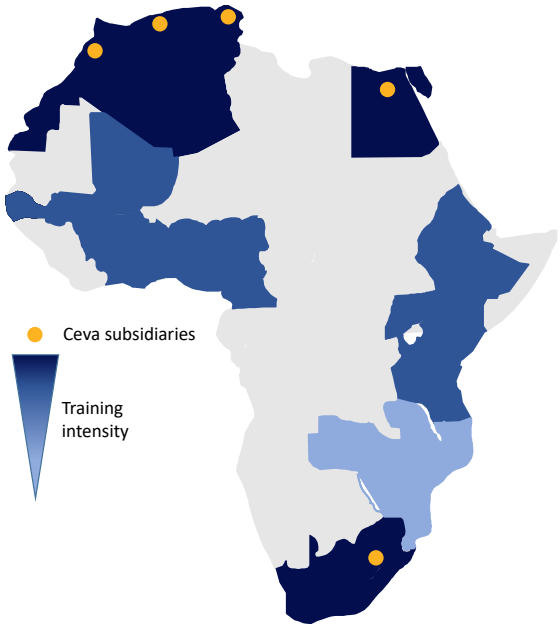
Who is Ceva?

Ceva has more than 20 years' experience as a global animal health company. During this time, it has emerged as a world leader in poultry vaccines and is active throughout the world, including in less developed regions. Its strong presence in the field and its close relationship with a broad network of public and private partners allows Ceva to have a very clear understanding of livestock sector development opportunities. Ceva is particularly aware that the emergence of a sustainable industry relies on the development of a set of skills that ensures the efficiency of each link of the value chain.

That is why Ceva has been involved for many years in training public and private stakeholders, especially from the poultry sector, to promote the implementation of the best preventive and treatment practices and to improve the technical and economical follow-up of poultry farms. To reinforce the poultry sector chain of skills, Ceva has particularly focused its support on animal health professionals in order to strengthen their autonomy and develop their operational capacity for field expertise in poultry diseases and health management. Through this training, Ceva aims to enhance professionals' practical knowledge in order to become competent field practitioners and supervisors, so they can help develop the competencies of extension workers, technicians and commercial farmers.

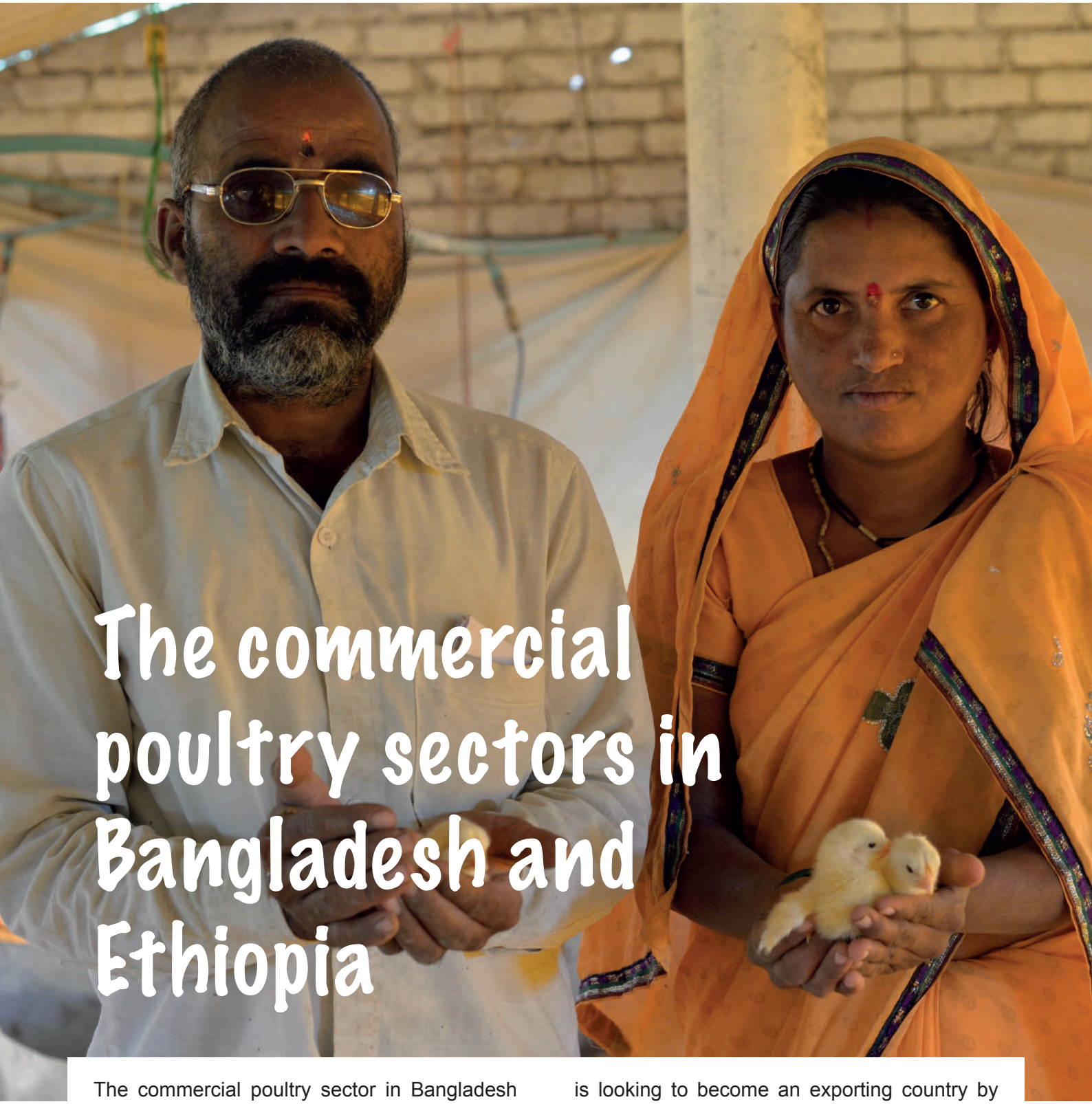
Through its commercial activities worldwide, Ceva was well-placed to identify countries that would benefit most from the Bill & Melinda Gates Foundation-supported training initiative, that is developing countries with an emerging and growing commercial poultry industry and where there are insufficient competencies among animal health professionals to adequately support this momentum.

Did you know?



Supporting stakeholders from the livestock sector has been in Ceva's DNA for more than 20 years. Each year, the company trains both poultry and ruminant farmers or animal health professionals on very diverse topics (vaccination, biosecurity, reproduction, etc.) around the globe.

For example, in 2020, despite the Covid19 crisis which completely suspended field activities for at least 3 months in most countries and hindered face-to-face meetings, Ceva organized about 90 training sessions in Africa, reaching more than 3,000 poultry farmers and animal health professionals and covering more than 40 topics in line with participants' needs. Topics covered included the main parasitic and viral diseases (E.coli, salmonella, pasteurella, coccidiosis, low pathogenic avian influenza, Newcastle disease, infectious bursal disease and infectious bronchitis), the rational use of antibiotics, biosecurity measures, good management practices and necropsies amongst others.



The commercial poultry sectors in Bangladesh and Ethiopia

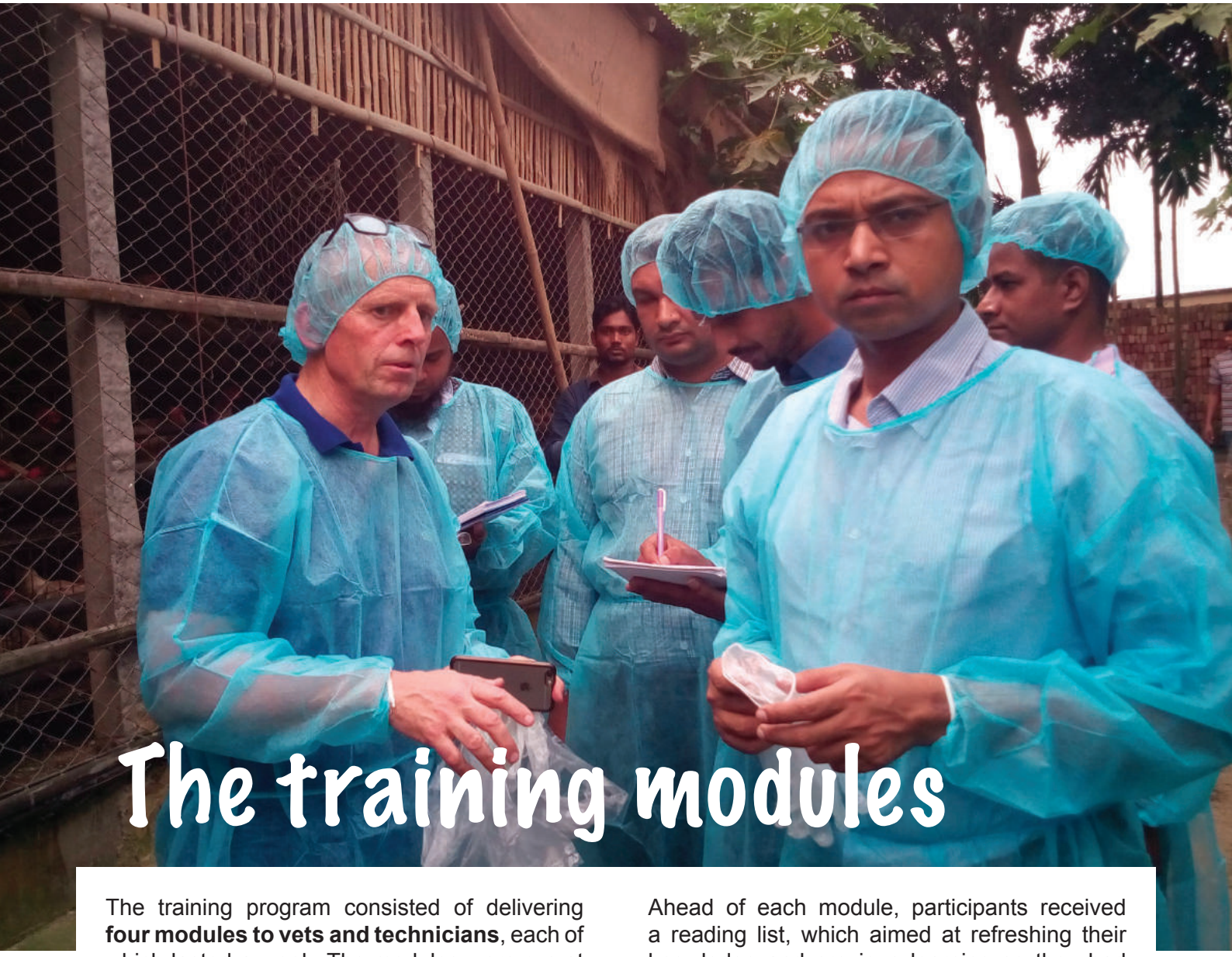
The commercial poultry sector in Bangladesh has grown rapidly in recent years and is mostly in the hands of small-scale (up to 3,000 birds/batch) and medium-sized producers (between 3,000 to 20,000 birds/batch). Between 1990 and 2018, production of chicken meat increased by a factor of three. The country is approaching self-sufficiency in poultry meat and eggs, albeit at a low level of per capita consumption, and is looking to become an exporting country by 2024. There is therefore considerable scope for the commercial poultry sector to grow further. The poultry industry is, however, considered to be vulnerable and would benefit from becoming better organized and also better educated in disease control to avoid frequent outbreaks and associated losses.

In contrast, the commercial poultry sector in Ethiopia is far less developed than in Bangladesh but has grown very quickly in the last two decades. The first investments focused on egg production; in 2015 a study by the Ministry of Livestock and Fisheries identified only 58 commercial poultry farms in Ethiopia, three-quarters of which focused on layer production. Only major companies specialized in standardized genetics produce broilers, but a new and innovative model is emerging with Ethiochicken (www.ethio-chicken.com), which supports the development of the fast-growing sector 3 by using dual-purpose breeds (hardy breeds producing both eggs and meat) adapted to local conditions. Despite the low consumption of chicken meat, mostly due to cultural habits, its production has almost doubled in the last two decades. This trend should continue as the poultry sector plays important roles in the country in terms of food security, employment and women empowerment. The emerging Ethiopian commercial poultry sector needs support to professionalize and to build solid and sustainable foundations for the sector's development.

Figures 5a - 5b: Examples of commercial farms - Ethiopia (Ceva, 2018)

In both Bangladesh and Ethiopia, per capita consumption of poultry meat is low, even by developing country standards. Although their respective commercial poultry sectors were at very different stages of development, both countries faced similar challenges: (i) high economic and demographic growth rates increasing demand, (ii) high incidence of poultry diseases, (iii) lack of animal health professionals with expertise in poultry and (iv) farmers who lack access to information on effective biosecurity and other preventive approaches. Therefore, both were considered to be ideal candidates to benefit from the training program.

Also, Ceva representatives were well placed to identify from their networks of contacts local private and public sector partners in Bangladesh and Ethiopia with whom they could work to develop and deliver the training program.



The training modules

The training program consisted of delivering **four modules to vets and technicians**, each of which lasted a week. The modules were run at monthly intervals over a four-month period and became progressively more complex as participants gained competencies. They **focused on the critical skills that an animal health professional should acquire to support commercial farmers in shifting towards more preventive practices, in order to sustainably intensify their production and promote adequate management of clinical cases.**

Ahead of each module, participants received a reading list, which aimed at refreshing their knowledge and previous learning so they had the basics required for the training program. At the beginning of each module, they were given a test to ensure those prerequisites were well understood. This meant the week-long training sessions could focus on both theoretical sessions, aiming at upgrading participants' knowledge, and more importantly on practical sessions (post-mortem examinations, group work, farm visits) to capitalize and apply this knowledge in very practical cases. The overall focus of the program was on preventive approach.

Figures 6a - 6b : Farm audit training in Bangladesh - Participants taking an exam in Bangladesh (Ceva)

The topics covered were:

Week 1: Introduction to basic farm economics and principles of poultry management and husbandry. Differential diagnosis through a syndromic approach focusing on bacterial diseases and parasitic infections such as digestive and respiratory disorders, systemic infections and lameness.

Week 2: Refresher on applied immunology. Differential diagnosis through a syndromic approach focusing on viral diseases, such as respiratory disorders.

Week 3: Farm audit and case management, principles of designing a vaccination programme and vaccination technique.

Week 4: Biosecurity principles and field implementation. Practical management dedicated to small-scale commercial farming in hot climates. Introduction to feed management and nutritional disorders.

The five-year project started in Bangladesh and Ethiopia in 2016 and 2018, respectively, with the intention of training 30 vets a year over three years in each country (see Fig 9). To ensure participants had understood and retained the material taught, they were tested at the end of each module. Those who achieved a score of 50% or above in all four weekly tests received a certificate signed by a representative of the local and French veterinary schools, which were Ceva's partners on this project.

Simultaneously, a mentoring program, aiming at training future lecturers, was also implemented. It consisted in selecting the best participants from the first and second sessions (called mentees) and to assign a mentor to them, according to their specialist topic of interest. After following a comprehensive mentoring program developed by Ceva and their mentor, mentees were expected to be able to provide quality training to future participants without external supervision.

Did you know?

Week	Topic	Time	Day 1	2	3	4	5
1	Field clinical and syndrom approach (bacterial diseases)	am					
		pm					
2	Field clinical and syndrom approach (viral diseases)	am					
		pm					
3	Farm audit Vaccination	am					
		pm					
4	Feeding & General Management Biosecurity	am					
		pm					

Refresher lectures represented 35% of the effective training time (135 hours) and were mostly concentrated during the first week (40%). Tutorials represented 25% of the training time (maximum 30% during the first week) and were organized as group work to deal with the priority topics, through clinical cases, lesion recognition and preventive sanitary plans. Hands-on activities such as necropsies, field visits and vaccination workshops represented 20% of the training time with an intensification during the third week (40%). 5% of the training time was dedicated to tests (at the beginning and at the end of each week, covering the reading list and the material taught) while the remaining 15% was used for trainees' clinical cases and business plan presentations, as well as administrative registration and end of week back-up sessions.

	Refresher lectures	Tutorials	Field activities and necropsies	Social activities and work groups	Tests	Total hours per week
1rst week	14	10,5	3	4	2	33,5
2nd week	11,5	10	6,5	3,5	2	33,5
3rd week	8	7	13	3,5	2	33,5
4th week	13,5	7	6,5	5,5	2	34,5
Total hours per activity	**47**	**34,5**	**29**	**16,5**	**8**	**135**
Percentage of the training time	**35%**	**26%**	**21%**	**12%**	**6%**	

Delivery partnership

The program was delivered through a partnership between the public and private sectors and local and international partners who played complementary roles. They were:

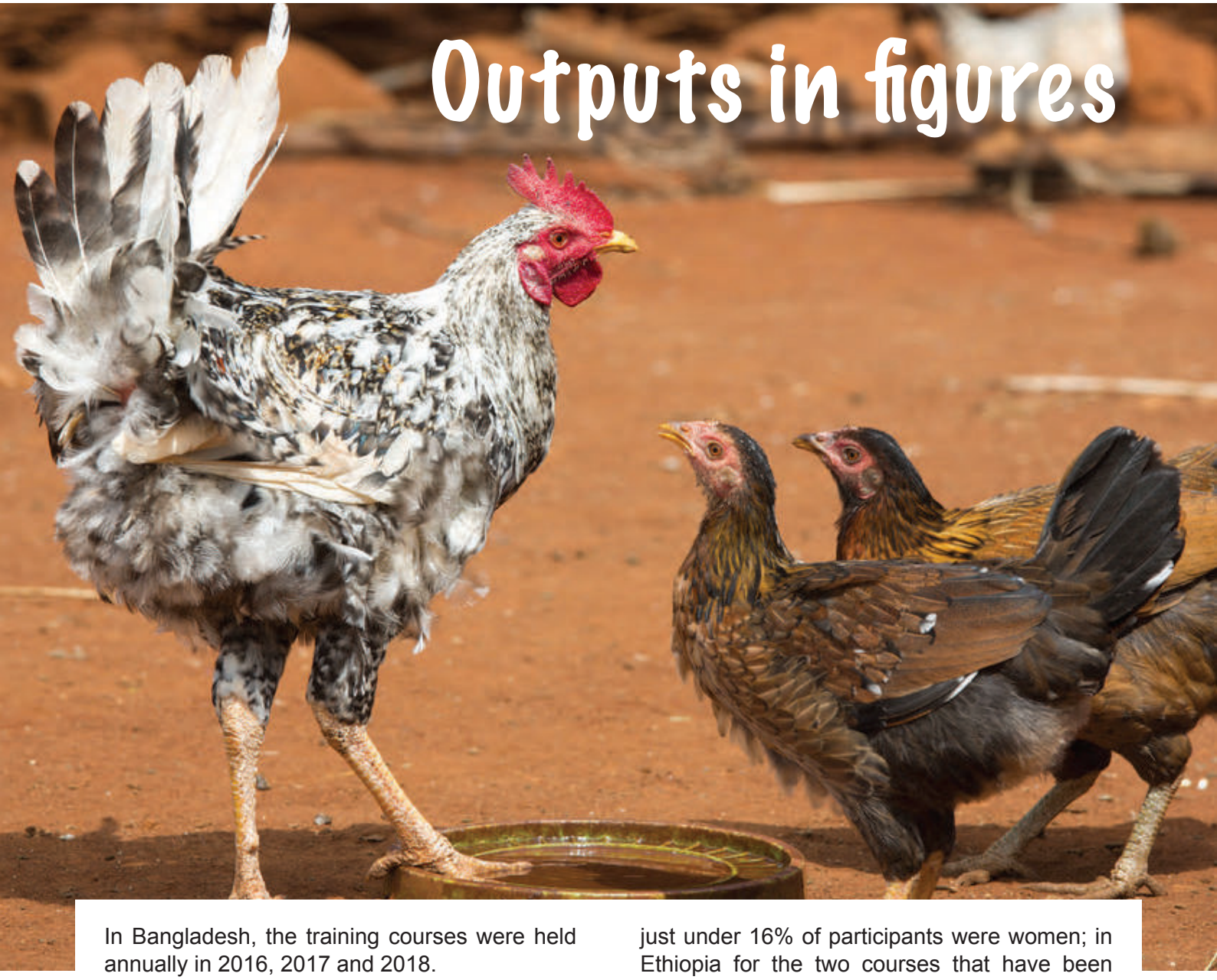
A French academic partner which developed the curriculum. For Bangladesh this was the National Veterinary School of Alfort (ENVA) and for Ethiopia this was the National Veterinary School of Toulouse (ENVT).

A local veterinary school which coordinated the operational implementation of the training program at the local level and validated the curriculum. In Bangladesh this was the Faculty of Animal Science and Veterinary Medicine (FASVM), Sher-e-Bangla University and in Ethiopia this was the College of Veterinary Medicine and Agriculture (CVMA) of Addis Ababa University. The course was run from the two local vet colleges.

Local private sector partners who worked in the poultry sector provided support in implementing activities. Jointly with the local university partner they also helped to contextualize the course content to the local situation and were responsible for finding potential private sector candidates for the training, since they were already in contact with many of them through their commercial activities in the sector.

Figure 7: MoU signing ceremony between SAU, ENVA and Ceva in Bangladesh (Ceva, 2017)

Outputs in figures



In Bangladesh, the training courses were held annually in 2016, 2017 and 2018.

In Ethiopia, training courses were held in 2018 and 2019. The course scheduled for 2020 was delayed due to the coronavirus pandemic. It is hoped that the third course in Ethiopia can take place soon: if it cannot be delivered by the international experts, local vets who have completed the course and who have benefitted from the mentoring scheme will be asked to take the lead.

The vast majority of the veterinary profession in developing countries are men. The local partners who were responsible for recruiting the applicants for the courses were sensitized to the need to encourage female vets to apply. However, in Bangladesh over the three courses, just under 16% of participants were women; in Ethiopia for the two courses that have been completed, just over 18% were women. All participants were aged 35 years or under.

There was a low drop-out rate (less than 3%, or four trainees) for course participants.

All participants surpassed the minimum pass rate for the test, 50%, and were awarded certificates acknowledging their achievements. Any participants who were found to be struggling after the second of the four modules were given additional coaching by the experts. They were also required to submit additional case studies and post-mortem and farm audit reports to strengthen their learning and to earn extra credits towards the test score.

Figure 8: Certificate giving ceremony in Bangladesh (Ceva, 2017)

Up until April 2021, 152 animal health professionals (150 vets and 2 technicians) had attended the training program and 11 mentees have joined the mentoring program.

Country	2016	2017	2018	2019	2020	2021	Total
Bangladesh	30	32	30				**92**
Ethiopia			30	30	0[1]	*30*[2]	**60**

[1] *Cancelled due to Covid-19,* [2] *Pending*

Figure 9: Number of animal health professionals trained per year and per country

The strategy for the training program was based on a cascading approach: the objective was to create a cadre of trained animal health professionals who could then share their new skills and knowledge about poultry diseases and management with their colleagues and farmers, thereby enhancing their impact. Consequently, the program did not aim to train a large number of vets and technicians; rather it aimed to create a dynamic group who were able to reinforce the chain of skills and to initiate the shift of paradigm towards more preventive approaches on poultry farms.

Key success factors

The project's delivery team identified five key factors which they believe contributed to the success of the initiative. These were:

1. Using a transformative public-private partnership approach to deliver the training

Ceva had previous experience of working successfully in partnerships involving public and private sector partners and so decided this approach was best suited to this program. Moreover, involving the public sector whose tasks include the supervision of animal health professionals' education was also necessary to ensure the sustainability of the training program.

Bringing together public and private sector, as well as local and international players, enabled synergies to be exploited that made the best use of the respective skills and expertise of all the partners. Together the resultant partnership achieved much more than the individual partners could have achieved alone.

Building and maintaining effective public-private partnerships (PPP) is, however, not easy. As the project manager, Ceva ensured sufficient time was invested at the outset to enable the partners to come together to discuss the project and reach agreement on who did what and on their respective roles and responsibilities. Once agreed, this was then formalized through a memorandum of understanding.

To ensure smooth running of the project, a steering committee was formed in both countries to monitor progress and handle any issues which emerged during the course of the project. The committee was made up of representatives of Ceva and the French and local veterinary schools. The committee met formally two to three times a year and informally, including virtual meetings, to discuss specific topics that arose and to undertake urgent troubleshooting.

Figures 10a - 10b : Vaccination exercise in Ethiopia - Planning meeting for Bangladesh training in France (Ceva)

2. Select the right participants

The main objective of this program was to train competent candidates capable of supporting commercial farmers in developing their businesses. To be selected for this program, participants had to prove that they significantly impact the downstream target of the program, commercial farmers, in their everyday activities, either directly (practitioners) or indirectly (decision-makers). This criterion can be considered as the main key success factor of this training initiative.

In addition, participants had to meet some basic technical criteria in terms of professional training. They also needed to have 5-years relevant experience and good knowledge of English as this was the language used throughout the training program.

They also had to show personal commitment to participate actively in the intensive training program. Despite having a full-time job, they had to attend all sessions, which represented 4 weeks of their time over a 4-month period, embrace very participative activities, and also undertake preparatory reading for each module.

Local partners helped to define the most harmonious composition of the participants, which had to represent each role in the field. In both Bangladesh and Ethiopia, participants included private practitiners, employees of poultry companies, lecturers and policy makers. In Ethiopia, two-thirds came from the private sector and one-third from the public sector; of the latter, half were lecturers at veterinary schools and half government vets. In Bangladesh, half of the participants were from the private sector, and among the public sector, half were lecturers and half were government vets.

Including participants from both public and private sectors was considered to have been highly beneficial. Through interaction with their colleagues from the private sector, participants from the public sector gained better insights into how the commercial poultry sector worked in their countries, which would enable them to better support the sector through their roles in policy making and teaching future vets. In turn, private vets could learn how public animal health officers could act in amending existing official sanitary regulations, if needed.

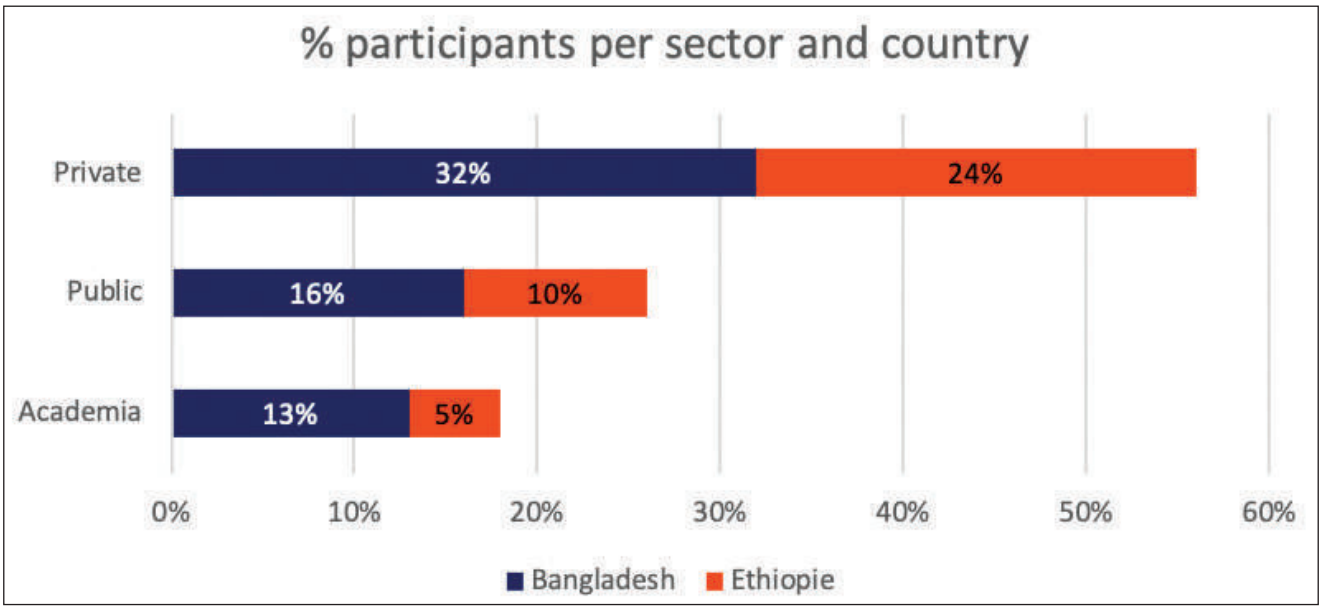


Figure 11: Percentage of participants per sector

3. Focus the training on the skills necessary to support the paradigm shift

Through this training program, **the objective was that all trainees developed sufficient skills in poultry management to be autonomous and support the paradigm shift** among their colleagues and farmers towards more preventive approaches.

To this end, each module was developed and delivered by a team of seven international experts who had complementary expertise and specialist knowledge on poultry medicine and production management.

Time was limited and could not be wasted on duplication or irrelevant content. Therefore, the experts identified the basic tools and knowledge that participants should learn and use to be efficient in their everyday activities. They met beforehand with other project partners to ensure each knew how their sessions fitted in to the overall module and how they could complement and be complemented by sessions d elivered by other experts. Also, prior to the training sessions, the experts were provided with comprehensive briefings on the status and features of the poultry sector in each country so they could adapt their material to the specific national local context.

Recognizing that for the vets to do their jobs they need a combination of theoretical knowledge and practical skills, the modules combined both elements, although more than half the time was allocated to practical sessions such as clinical case studies, post-mortem examinations, and farm visits and audits.

Figure 12: Lecture on biosecurity in Ethiopia by an expert from the University of Montréal (Ceva, 2018)

Figure 13: Practical session on post-mortem examination in Bangladesh (Ceva, 2017)

To make the most of the time available for those practical courses, important background information was included in the reading that participants were expected to complete ahead of each 5-day-long training module. To ensure this information had been internalized and understood, at the start of each week's module the participants were tested on the material included in the reading list. The courses could then focus on increasing their knowledge and, most importantly, putting it into practice.

Each session involved a maximum of 30 participants; numbers were limited to ensure a high-quality learning experience for all, especially during practical sessions.

4. Create a cohesive and dynamic group of autonomous animal health professionals

During the five-year long project, the objective was to create an impactful pool of diverse professionals able to support the development of the poultry sector towards a more sustainable management model based on prevention. To this end, participants had first to develop their self-confidence and autonomy, as they will have to make their own decisions in the field, based on their observations. The program was therefore very participative, encouraging vets and technicians to regularly contribute, especially during the frequent group work sessions, and by presenting case studies that they had to prepare between each module. They also had to work on their personal business case, which describes the way they intend to use their new knowledge and skills after the training.

Figure 14: The Ethiopian team of specialists in avian sanitary management (Ceva, 2019)

To complement individual capacities to support commercial poultry farmers, the training modules were also designed to include activities and features that facilitated team building. For instance, preparing their personal business case also encouraged participants to consider and share with the group how they were going to put their training in practice in their everyday activities. It allowed participants to better know each other and to understand each other's experience and choices. Besides, many other activities, such as clinical cases and farms audits, were conducted in small groups. All groups had to designate their leader, taking it in turn to play this role, to frame their discussions and present their conclusions to the other groups. It encouraged health professionals to work together and reach consensus, as well as remaining open to the constructive comments of other participants. It was also a way to develop their communication and soft skills.

Figure 15: Group work and its spokesman in Ethiopia (Ceva, 2019)

To facilitate this esprit de corps, vets and technicians who participated in previous training sessions were also encouraged to attend the award ceremonies held at the end of the later course so the different batches of health professionals could meet each other.

In addition, the participants were encouraged to structure their group to make it sustainable. As a result, in each country they formed Facebook discussion groups to enable them to discuss challenging cases, share and receive advice, and discuss any 'hot topics' that emerged. Some of them also chose to create their own association or to join an existing one.

Figure 16: Facebook group in Bangladesh

In these ways, it is anticipated that a community of practice will emerge that will continue after the project finished and enable the trainees to support and encourage each other in the future.

5. Include an exit strategy from the outset

The nurturing of a community of practice amongst the animal health professionals who participated in the training sessions was one element of the exit strategy.

Another part of this strategy was achieved by reinforcing the competencies of the public sector, as they are in charge of training the future animal health professionals in their country. To this end, some of the lecturers from the local veterinary schools were selected to participate in the training program, to refresh their knowledge and discover new educational approaches they could use in their own programs.

A complementary part of this strategy was also to select and train some participants so they could continue training other vets and technicians after the end of the project. To achieve this, the best performing participants from the first training sessions were selected to take part in a mentoring program.

Each chose an area of specialisation, such as syndromic approach to disease diagnosis, vaccination techniques, or biosecurity and farm audits, and they were paired up with the appropriate international experts, who acted as their mentor. During the training session held in year two, they attended the training as their mentor's assistant, facilitating some classes and tutorials. The objective was that in the third year, they could give lectures and oversaw tutorials on their own, assisted by their mentors as needed.

Figure 17: A mentee and a mentor participating in the training program in Ethiopia (Ceva, 2019)

Figure 18: A mentee giving lecture on farm audits in Ethiopia (Ceva, 2019)

Beyond ensuring the technical continuity of this training, an important part of the exit strategy consisted of transferring the organizational competencies necessary to implement such program. Following the same pattern as the mentoring scheme, someone in each country was supported in supervising all the operational activities, such as the selection of participants, the logistics and the budget analysis. By the end of the program, this person was expected to have developed sufficient competencies to be able to adapt the training model according to the local needs, budget and targets.

All of these features of the training initiative were designed to ensure a legacy that would build on the foundation laid down by the project and live on after the end of the training program.

Limitations of the approach

Assessing impact

In common with most programs aiming at building capacities and changing practices in the long run, it is difficult to assess the impact this initiative has had on the poultry sector in the two countries. Collecting the data to enable such an assessment to be made would be difficult and costly and there would inevitably be a lag before impacts became apparent.

To maximise the chance of achieving impact, the project team first took care to select countries where there was an obvious need for capacity building in the sector. In those contexts, the usual pattern is that even without adequate support, stakeholders tend to invest in the industry because of favourable market opportunities. However, prices skyrocket because the increasing gap between the production curve and the competencies curve induces very high risks of failure and, in most cases, seasonality of production. Consequently, the development of the sector is precarious and not sustainable.

Secondly, the project team included features in the design of the training program to help maximise the chance of achieving impact in the future. Key features included:

• Implementing the project in countries where vets lacked technical skills in avian pathology and poultry management and where there was also an opportunity for the commercial poultry sector to grow.

• Carefully selecting participants who would have real impact in the field: especially practicing vets but also vets who held public sector roles such as policymakers, researchers and veterinary school lecturers.

• Providing high-quality learning opportunities that focused on the most relevant knowledge and practical skills needed by poultry vets and technicians.

• Facilitating the emergence of a community of practice to ensure strong and enduring links between participants.

• Involving the public sector and ensuring the technical and operational continuity of the program through the mentoring scheme.

To obtain a broader insight into the training impacts, the project team collected some quantitative and qualitative data about the number of vets trained and the rate of success, and also about the quality of the training and how it affected their employability.

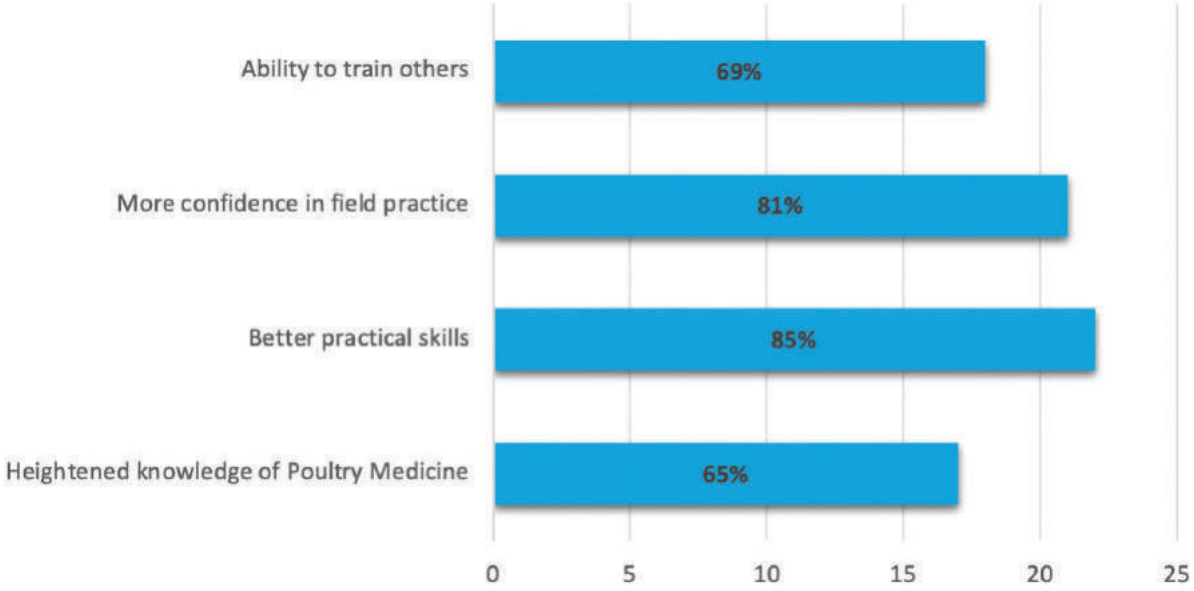
Furthermore, as the mission of the animal health professionals was to support the paradigm shift among their network, an evaluation was made one year after the end of the training to assess its impact on their practices.

Did you know?

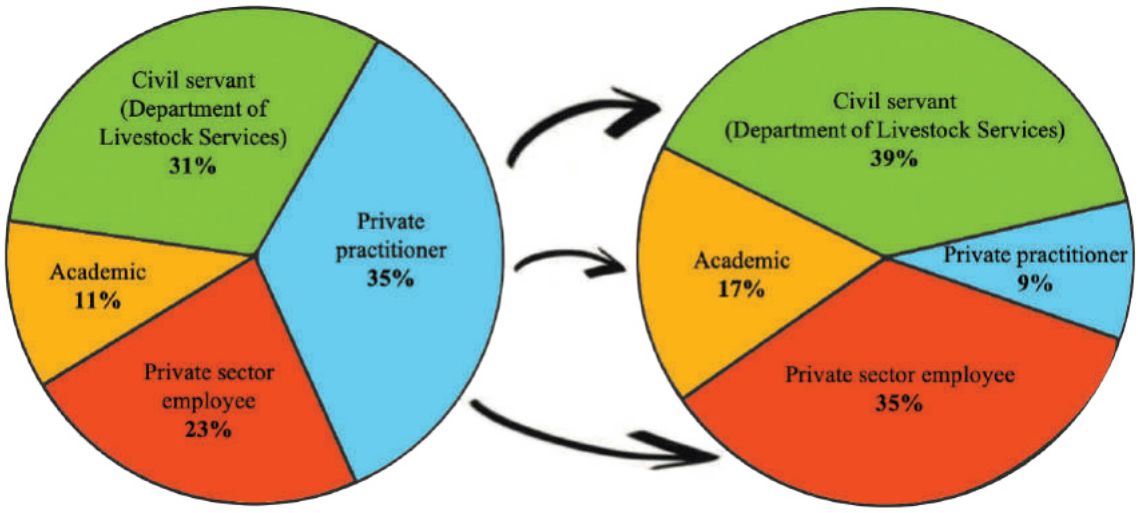
A questionnaire was distributed to evaluate the impact of the three training courses delivered in Bangladesh between 2016 and 2018. 26 responses were collected (equally distributed across the years of training and representative of the different sectors):

25 respondents evaluated training as 'excellent' (score of 5 on scale of 1 to 5) and 26 respondents as 'highly beneficial to their professional life as a vet' (score of 4 or 5).

How the training impacted participants' professional life as a vet



More specifically, the results of this survey highlighted the positive impact the training has had on the security of vets' job. Indeed, of the 9 vets who were private practitioners before the training (i.e. insecure activity depending on job opportunities), 7 were recruited by public or private services, thanks to the training.



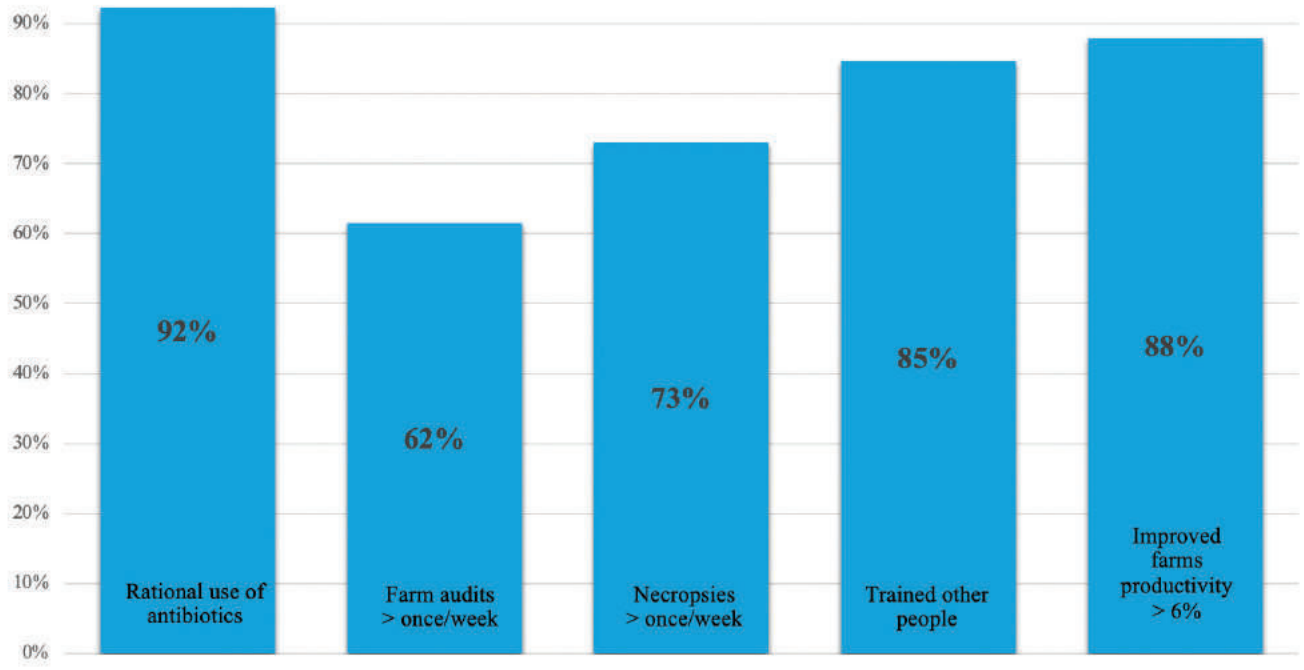
Since the training program, all respondents to the questionnaire have performed on-farm vaccinations and given advice on vaccination programs and biosecurity.

62% and 73%, respectively, have undertaken a poultry farm audit/visit or poultry necropsy once a week or more often. 92% think the training has helped them advise on rational use of antibiotics (score of 4 or 5 on scale of 1 to 5).

85% have trained other people on the themes of the training, mostly farmers, technicians and vet colleagues.

36% of respondents reported that their contribution on these farms has resulted in very good improvement (>10% increase), 52% in a good improvement (6-10% increase) and 12% in a fair improvement (1-5% increase) in farm productivity.

Operational impacts of the training



The 26 respondents report having a joint annual impact on 45 million broilers and 5 million layers, which corresponds to an average of 2 million broilers and 200,000 layers per vet for an average farm size of 1,500 broilers and 2,000 layers.

Impact on backyard poultry sector

The training program aimed to develop the chain of skills within the poultry sector in Bangladesh and Ethiopia, to intensify production and help meet rapidly growing demand for meat and eggs. As previously explained, only farmers with a commercial mindset can meet this challenge, which excludes the majority of backyard poultry farmers as final targets for this program. Therefore, modules were focused on the needs of emerging commercial poultry farms, which need thorough technical support and have potential to improve their productivity.

However, one benefit of training professionals is that they can also adapt and share the package of knowledge and skills they have gained with NGOs, farmers groups and other institutions working with backyard poultry farmers. Furthermore, even if the intensification of the poultry production cannot rely on backyard farmers, some innovative models can be designed to include them and support them in developing more productive business. For instance, 'mother units', which involve rearing chicks from day-old to 40 days on farms having access to higher level of management and services, is one model that could benefit backyard farms. Indeed, chicks' first days are crucial for their future performance; by receiving the adequate management and health care during this period, it will ensure better production for finishing units (which will rear them afterwards to slaughter) and will also limit risks of disease outbreaks.

Financial sustainability

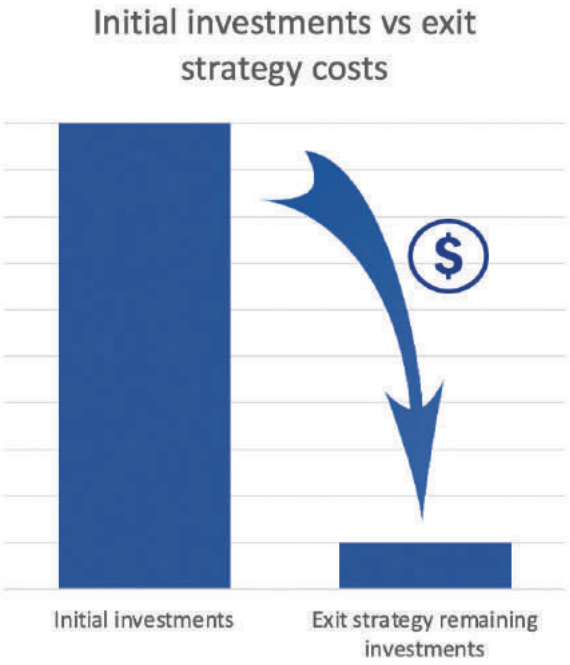
The project described in this report relied very heavily on the grant provided by the Bill & Melinda Gates Foundation, without which it could not have taken place. The cost of a 4-week training session was about USD 174,000, including the human resources (management, logistics, lecturers), the logistics (transport, facilities and equipment maintenance, meals, other fees), or the other operational expenses (course material, etc.).

Although some of the private sector companies involved in the training program were happy for their employees to take on the role of trainers, no definitive solution was found to the fundamental question – who pays?

Indeed, by only considering the direct return on investment of implementing such a program, the economic equation does not seem very favourable, since it does not generate immediate financial gains. However, through this training, it is the development of a whole chain of skills in a fast-growing sector which is targeted: it means that that there can be a good return on investment in the long run for both public and private sectors. It is clear that the poultry sector is going to expand in developing countries in the coming years, generating considerable employment and improving food security. Everyone would benefit more from a stable and sustainable industry than one characterised by fluctuating productivity.

Other solutions could also be found to reduce the costs of the training programs. For instance, as part of the project, a cadre of local animal health professionals were trained in a specialist topic, such as biosecurity or vaccination techniques, and benefited from the support of one of the international experts who acted as their personal mentors. This means that in future, courses could be organised and run locally at much lower cost, saving on international airfares, consultancy fees and other costs. Furthermore, renovated facilities, equipment and courses material from the first trainings could also be reused and a financial contribution from participants could be required.

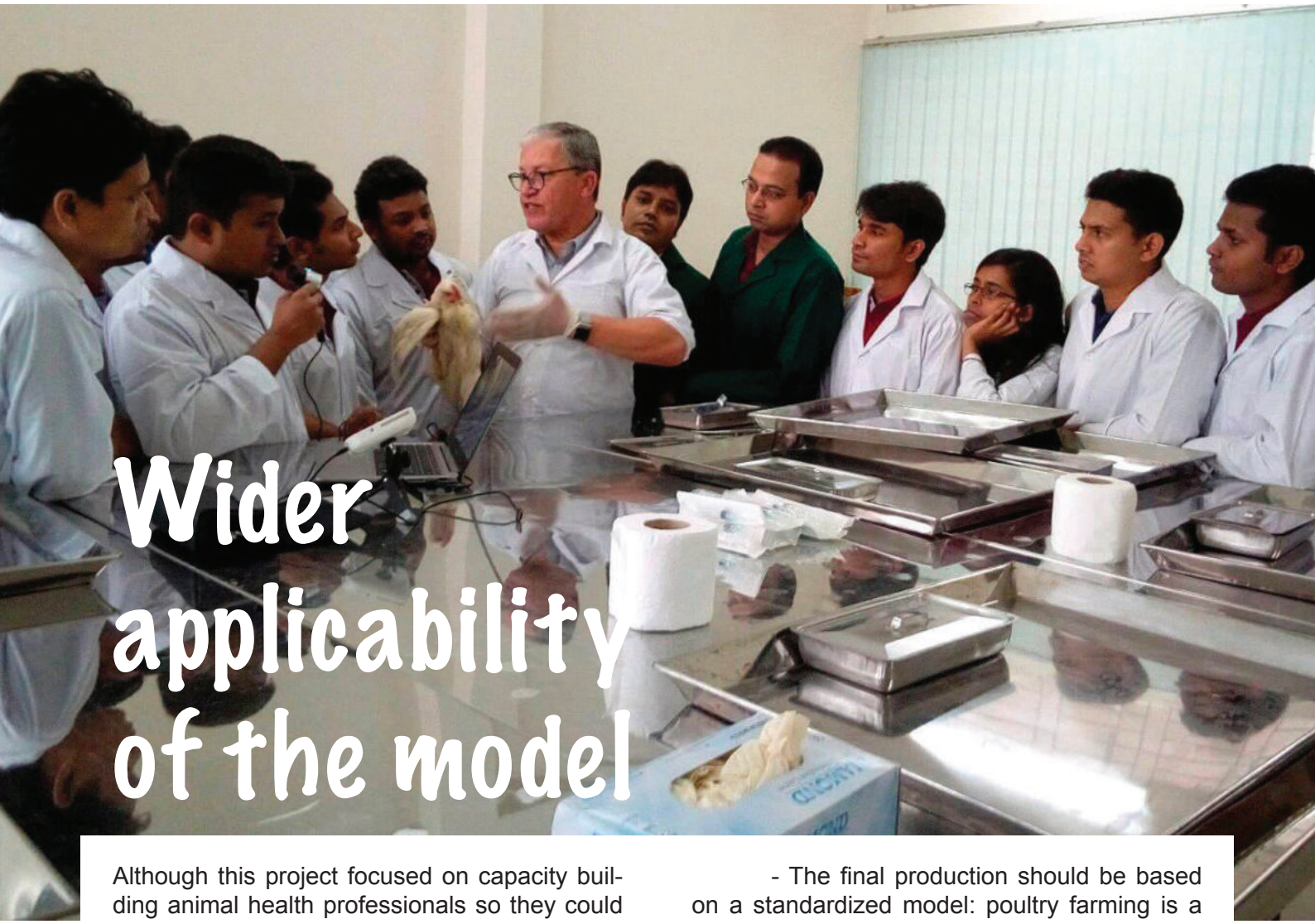
Did you know?



The exit strategy, which included leaving behind local trainers who could continue delivering the training after the externally-supported program ended, should result in additional returns on the program's investment. Future local delivery of training courses could be achieved with a significant cost saving compared to that delivered during the program, which relied on international trainers and during which the big equipment was delivered, and course materials were designed. It was estimated that local training could be delivered at a cost of around USD 20 per person per day – less than one-tenth of the cost incurred by the externally supported program. This would cover the local lecturer costs, equipment and consumables, as well as part of the trainee costs, for example the prize giving ceremony.

These costs are affordable and could be co-sponsored by private and/or public sector stakeholders. Additional savings could be made by adjusting the number of participants or the duration of the training, although care should be taken not to impact on the quality of the learning experience.

In the target countries, the net margin per broiler is around USD 0.20. If one considers that the training will enable a vet to improve productivity by 5% (as stated by participants in the survey carried out in Bangladesh), this will reduce mortality from 5 to 4.8% and improve the feed conversion ratio from 1.85 to 1.80, which increases the unit margin per broiler to USD 0.25. If a vet supports 30 farmer clients who rear 4 batches of 1,500 to 2,000 broilers per year, this represents a productivity impact across 200,000 broilers, equivalent to an extra gain of USD 8,000 per year per vet, which is more than the cost of training per participant, even before considering the additional and ongoing return generated by the exit strategy.



Wider applicability of the model

Although this project focused on capacity building animal health professionals so they could better support emerging commercial poultry farmers in Bangladesh and Ethiopia, it is considered that the approach used could be adapted more widely. This includes extending the approach to other countries where both the need for vets and technicians to be trained in poultry disease control and other management aspects, and the opportunity to grow the poultry sector exist – which is likely to be most developing countries.

Also, the approach could be extended to include other animal health issues, other livestock species, or even other industries, both to impart new knowledge and to act as refresher courses as part of vets' continuing professional development. Two main criteria will determine the feasibility of implementing similar specialized training models:

- The final production should be based on a standardized model: poultry farming is a resilient activity which depends very little on the context. Therefore, it was possible in a limited amount of time to focus training modules on topics that could be put in practice widely in the field, regardless of targets specificities.

- A limited number of trained professionals could have a large impact in the field: the strategy of the training program was based on a cascading approach, which consisted in a small number of people being trained who then shared their new knowledge with their networks, through their activities or through other specific actions. It leveraged the investment and indirectly reached many people.

Did you know?

A simple template, based on the key success factors, allows self-assessment of the quality and impacts of a specialized training project:

Context	Partnership	Selection of participants	Quality of the training	Exit strategy (if necessary)
Could capacity building a small group of specialists significantly impact the whole sector?	Does the partnership established ensure the good management of the project?	Can selected participants meet the project objectives?	Does the training programs allow ALL participants to acquire the minimum set of skills and knowledge required to meet the identified needs?	Is the training program viable and sustainable?
Note:__/5	Note:__/5	Note:__/5	Note:__/5	Note:__/5

Each question should be given a mark from 1 to 5, according to how the project meet those goals. Less than 3 points in a column indicates that there are some issues that you should address before going any further, or that this model of training may not be adapted to your objectives. More than 3 points in a column means that the potential weaknesses of your project will not significantly affect the expected impact but should, however, be considered.

The model in the appendix will help you to assess your score for each column.

The adaptability of this training model was really put to the test with the Covid-19 pandemic. So far, no courses have been taught independently of the project. In Bangladesh, the private sector partner was planning to co-sponsor an autonomous version of the course jointly with Ceva to be held at FASVM from 2019. Unfortunately, the 2019 course was postponed due to business reasons and the impact of Covid-19 means that this did not happen in 2020 either. In Ethiopia, where the third course has not yet been held, it is too soon for a locally led course as the vets selected for the mentoring program are not ready. As in Bangladesh, the impact of coronavirus has led to the training program being put on standby.

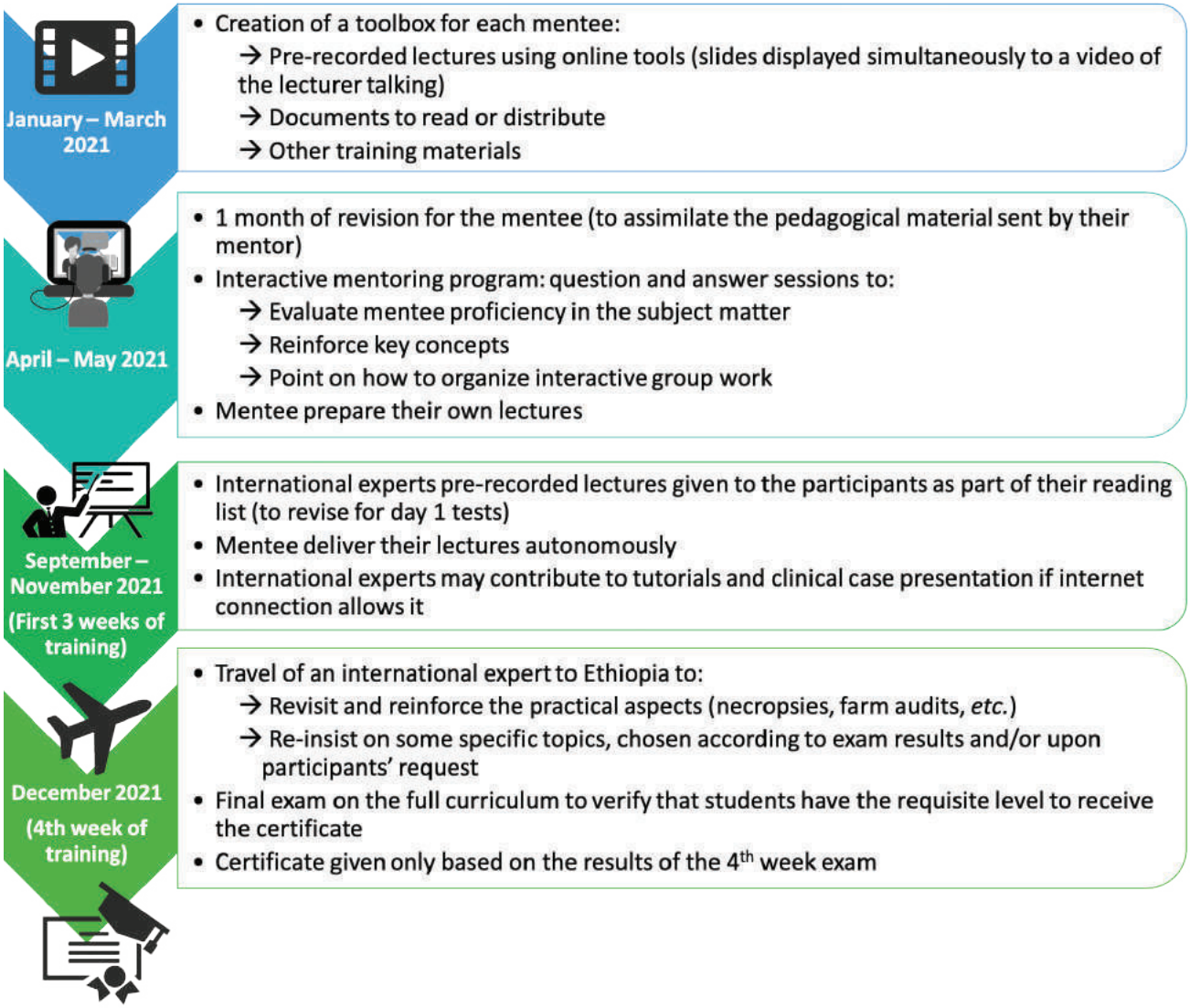
It became necessary to find new ways of transferring competencies to ensure the continuity of the training program but without compromising on its quality. As experts could not give lectures in person due to the travel ban, they focused their support on reinforcing the network of mentees and other local stakeholders that could take the reins of the next training sessions, hoping that their group is sufficiently large and heterogeneous to continue the training process. Obviously, they had to adapt their mentoring strategy by adopting a distance learning approach based on the development of digital tools, and also by spending more time on pedagogical techniques, for mentees to have the bases on how to teach.

In conclusion, the Covid crisis may have been an unexpected opportunity for project managers to find innovative ways of teaching that optimize costs by reducing on-site trainings and which rely more on local (human) resources and distance learning tools.

Breaking news: a new organization to deal with the Covid19 situation!

The original plan to train a further 30 Ethiopian veterinarians in poultry medicine from September to December 2020 could not take place as the international experts could not travel to Ethiopia to deliver the training, due to the Covid19 pandemic. As travel restrictions are unlikely to change between now and the end of the project, a new work plan was proposed. This took into account the unreliable internet connection in Ethiopia, which makes real-time, online mentoring difficult.

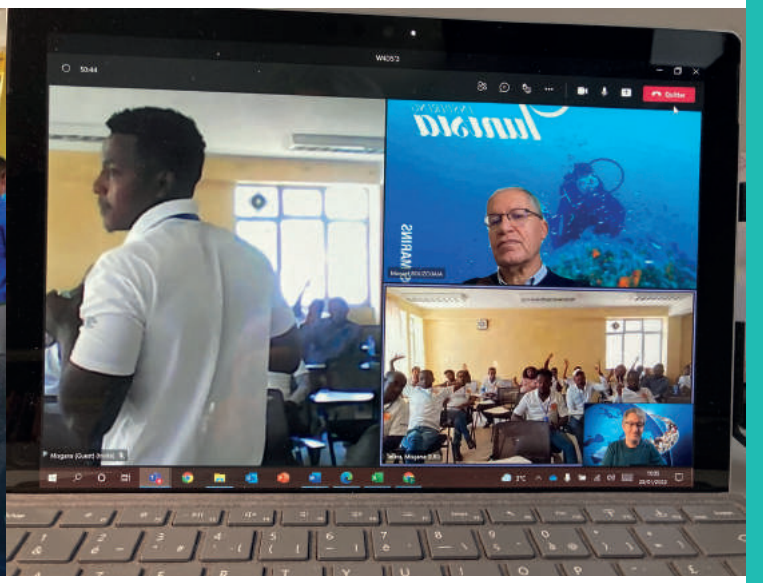
Each training week will have a specific theme and has been assigned to two mentees. A topic specific 'toolbox' for each theme will be sent to the corresponding mentee for a preliminary re-familiarization with their specialist topic. The lead mentee will be trained on the administrative and organizational aspects of the training and will be given a specific toolbox (forms for recording attendance, exam sheets for each day 1 test, database for recording of participant data etc.).



The preparation phase will allow mentors to answer mentees' questions about the topics covered and also to give them some tips about how to deliver lectures and keep participants' attention.

International experts' pre-recorded lectures will be sent to participants as part of their reading list before each training session, while mentees will prepare their own lectures that they will deliver either unaided or with limited assistance from their mentor during the first three weeks of training.

Then, an international expert will travel to Ethiopia for the last week of training to reinforce some specific topics and on the practical aspects which are essential for vets to fulfil their roles once in the field. Finally, participants will have to pass one big final test to determine if they will obtain their certificate of achievement.



"*The training has developed competencies at the level of field and academic vets. In view of the future needs and thanks to the leader position of CVMA in Ethiopia, we are exploring ways to perpetuate the graduation of specialised poultry vets by implementing a Masters program based on the foundations laid by the CVMA-ENVT-Ceva program.*" - Prof. Hika Waktole - Dean CVMA

Bangladesh

ENVA
Ecole Nationale Vétérinaire d'Alfort – International academic partner

Prof. Marc Gogny - Director ENVA until 2017
Prof. Christophe Degueurce - Director ENVA
Prof. Karim Adjou - Lecturer and Head of Department of Farm Animal Pathologies

FASVM
Faculty of Animal Science and Veterinary Medicine - Bangladeshi academic partner

Prof. K.B.M. Saiful Islam - Chairman & Professor, Dept. of Medicine & Public Health
Prof. Md. Mufazzal Hossain - Dean FASVM until 2017
Prof. Md. Jahangir Alam - Dean FASVM

ACI
Bangladeshi private partner

Dr. Ansarey - Managing Director Agri Business
Dr. Md. Moynul Islam - Business Manager Animal Health
Dr. Md. Sharifat Ali Khan - Product Manager Animal Health

International experts

Prof. Karim Adjou - ENVA - Lecturer and Head of Department of Farm Animal Pathologies
Prof. Moncef Bouzouaia - ENV Tunis - Poultry Veterinarian and International expert
Dr. Imre Horvath-Papp - PPS - Veterinary Advisor
Dr. Dominique Balloy - Réseau Cristal - Poultry Veterinarian and Specialist
Dr. Xavier Chatenet - Réseau Cristal - Poultry Veterinarian and Specialist
Dr. Christophe Cazaban - Ceva - Poultry Scientific Director
Dr. Reza Bentaleb - Ceva - Poultry Business Unit Manager Africa
Dr. Pierre-Marie Borne - Ceva - Director Public Affairs Africa and Middle East

Mentees

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Dr. Md. Moynul Islam - ACI - Business Manager Animal Health
Dr. Md. Sharifat Ali Khan - ACI - Product Manager

Ethiopia

ENVT
Ecole Nationale Vétérinaire de Toulouse – International academic partner

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Prof. Pierre Sans - Director ENVT
Prof. Jean-Luc Guérin - Professor Poultry Production & Medicine

CVMA
College of Veterinary Medicine and Agriculture - Ethiopian academic partner

Prof. Fikru Regassa – Dean CVMA 2019
Prof. Hika Waktole - Dean CVMA
Prof. Yonas Tolosa - Asst. Prof. Biomedical sciences

Alema Farm P.LC.
Ethiopian private partner

Major Alemayehu Amdemariam – General manager and owner
Dr. Solomon Terekegn - Poultry Veterinarian

International expert

Prof. Jean-Luc Guérin - Professor Poultry Production & Medicine
Prof. Moncef Bouzouaia - Research Director
Prof. Jean-Pierre Vaillancourt - Professor and researcher, Swine and Poultry Infectious Disease Research Centre
Dr. Léni Corand - Poultry Veterinarian and Specialist
Dr. Christophe Cazaban - Poultry Scientific Director
Dr. Reza Bentaleb - Poultry Business Unit Manager
Dr. Pierre-Marie Borne - Director Public Affairs Africa and Middle East

Mentees

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Dr Tewodros Tsige - Ethiochicken - Veterinary services and lab. Manager
Dr. Benyam Mulat - Bora Farm - Poultry Veterinarian
Mr. Misgana Terefa - CVMA - Chief technical assistant
Mrs. Tsedale Teshome - CVMA - Senior technical assistant
Dr. Robel Girma - Merngistu Yeshitla Layer Farm - Poultry veterinarian
Dr. Solomon Terekegn - Alema Farm - Poultry Veterinarian

Project management

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Mr. Diego Raffo - **Mr. Younes Nabih** - Ceva - Financial Controller
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Mrs. Marie-Elodie Le Guen - Rapporteur

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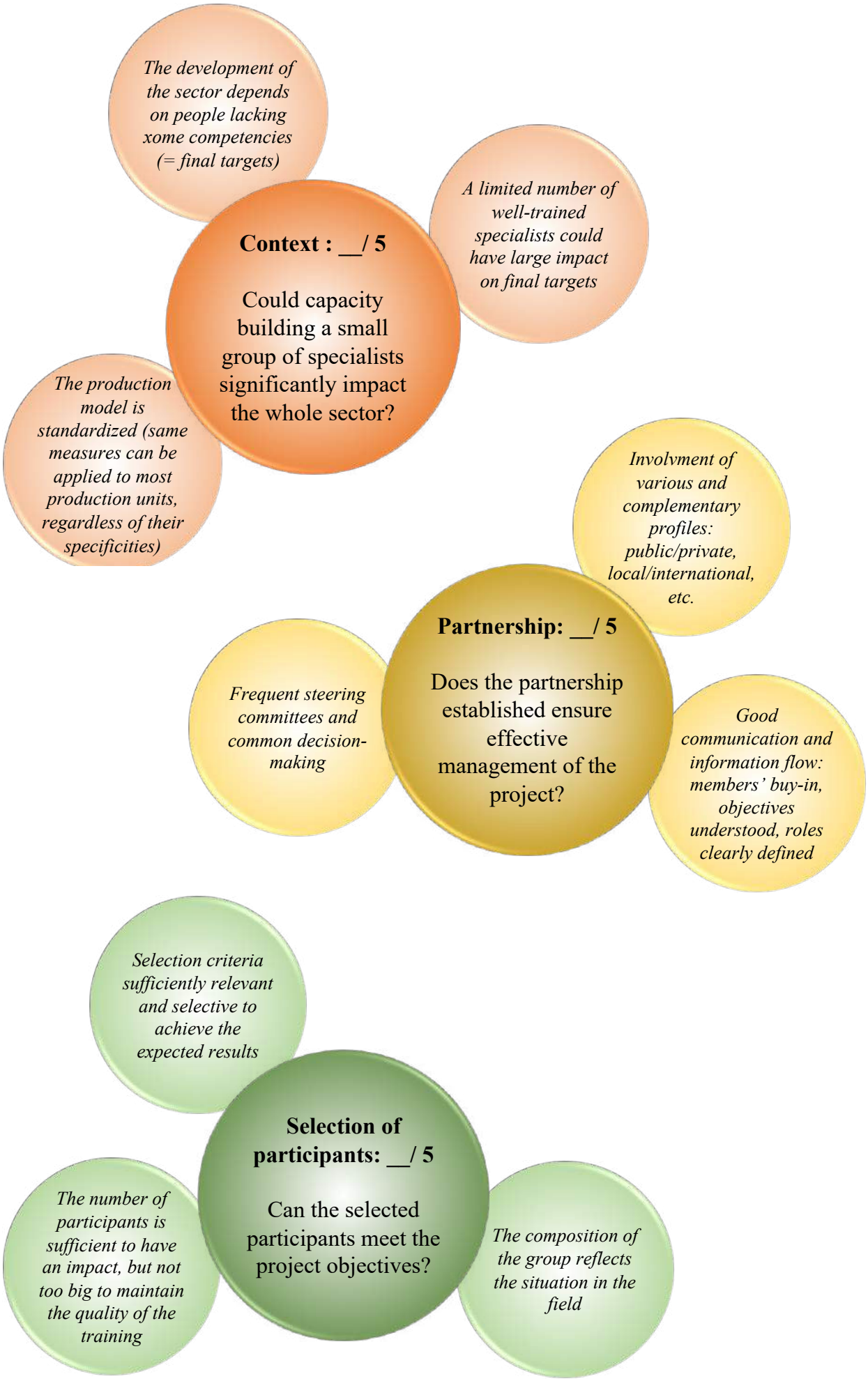
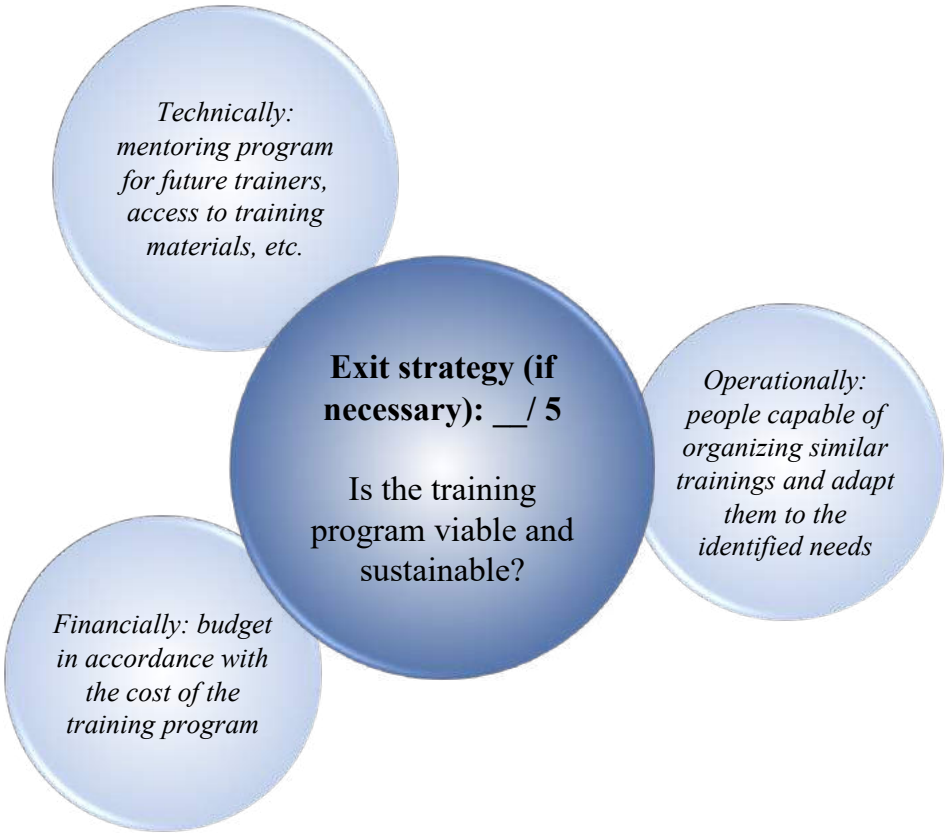

The development of the sector depends on people lacking xome competencies (= final targets)
A limited number of well-trained specialists could have large impact on final targets
Context : __/ 5
Could capacity building a small group of specialists significantly impact the whole sector?
The production model is standardized (same measures can be applied to most production units, regardless of their specificities)
Involvment of various and complementary profiles: public/private, local/international, etc.
Partnership: __/ 5
Does the partnership established ensure effective management of the project?
Frequent steering committees and common decision-making
Good communication and information flow: members' buy-in, objectives understood, roles clearly defined
Selection criteria sufficiently relevant and selective to achieve the expected results
Selection of participants: __/ 5
Can the selected participants meet the project objectives?
The number of participants is sufficient to have an impact, but not too big to maintain the quality of the training
The composition of the group reflects the situation in the field


Time distribution in line with the objectives of the project (topics, theory/practive, etc.) and with the availability of participants
Quality of the training: __/ 5
Does the training program allow ALL participants to acquire the minimum set of skills and knowledge required to meet the identified needs?
The content of the program is in line with the context specificities and focus on the most fundamental topics
Creation of a group dynamics that will help meet the identified needs


Technically: mentoring program for future trainers, access to training materials, etc.
Exit strategy (if necessary): __/ 5
Is the training program viable and sustainable?
Operationally: people capable of organizing similar trainings and adapt them to the identified needs
Financially: budget in accordance with the cost of the training program

Together, beyond animal health

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