

# INTRODUCTION

## What is the purpose of this guide?

The use of pesticides and certain veterinary products as well as the conditions of their use around the world are becoming increasingly alarming, particularly in developing countries. For many years, AVSF has worked on these issues and developing agroecological alternatives (cf. insert below). However, these problems persist and even continue to worsen in the cooperation countries. Moreover, initiatives undertaken in partnership with farmers' organizations to promote agro-ecological transitions do not always systematically and thoroughly consider this issue of the use of pesticides and veterinary products.

It is therefore **essential to strengthen the skills of farmers and technicians** in order to genuinely raise awareness of the risks<sup>3</sup> associated with the use of pesticides and certain veterinary products in all cooperation countries, and to demonstrate in a practical and concrete manner the full range of alternatives for reducing their use. Knowledge of the risks to health and the environment, the emergence of resistance, and knowledge of alternatives must be technically and economically sound in order to be able to compete with conventional pesticides, which are easy to use, exhibit adequate direct efficacy and are readily accessible because their marketing and distribution are poorly controlled.

**The objective of this training guide is, on one hand, to provide key elements for determining the ways in which pesticides and veterinary products are used and applied, and for raising awareness of the risks associated with such use, and, on the other hand, to illustrate the diversity of agro-ecological alternatives that enable farmers and technicians to eliminate the use of dangerous pesticides while preserving their plant and animal production.**

**The content of the modules presented here does not constitute a "turnkey teaching kit" that can be used as is in a training context, but rather as a toolbox enabling the development of training materials adapted to the context and specific target audience. Each trainer who uses this guide will therefore have to prepare the most appropriate material for the training and awareness-raising provided.**

The key elements of the training modules proposed in this guide are fully aligned with the process **of supporting agro-ecological transitions among smallholder farmers**. The primary goal is to improve the knowledge of farmers and technicians on the modes of action, targets and risks of treatments based on pesticides and veterinary products already in use and available, and to facilitate their acceptance of alternative techniques to be jointly tested and adapted with them.

Chapter I explains how to use this guide and presents an overview of its contents, in particular the training objectives of the six modules and corresponding topics.

Chapter II provides some examples of the situation of pesticide use and usage conditions in developing countries.

<sup>3</sup>That is, the hazard level coupled with the level of exposure to these products (cf. Glossary).

Chapters III to VIII present the six proposed training modules and corresponding topics. Their contents are supplemented by some appendices and documents accessible via internet link.

Finally, Chapter IX provides examples of strategies to reduce pesticide use and develop agro-ecological alternatives at the level of regional farmers' organizations, individual countries or groups of countries.

#### AVSF's position and convictions regarding pesticides and certain veterinary products

For two decades, AVSF has been working on these issues with various partners, particularly in Latin America and Africa. Faced with the challenges of public health (the health of humans, farmers and consumers, animal health), the preservation of biodiversity and the economic autonomy of farmers, AVSF advocates the following vision:

- **urgent elimination** of the use of the most toxic pesticides: Carcinogens, Mutagens, Reprotoxics<sup>4</sup> (CMRs) and certain endocrine disruptors (EDs);
- adopting a global vision for agro-ecological transitions by considering the use of pesticides (synthetic or of natural origin) only as a last resort when reliable agro-ecological techniques do not yet exist and are within the reach of farmers, making it possible to combat dependence on chemical inputs;
- the rational and controlled use of veterinary products (in particular antimicrobials) that respects the balance between animal health, human health and environmental protection;
- the priority given to research and training and the dissemination of agroecological alternatives accessible to all farming families, including those with few resources.

This vision is necessarily adapted to account for the realities of the practices and problems of farmers who are sometimes caught up in the "routine" of conventional practices without being aware of the many harmful conse-

quences associated with the use of pesticides and the improper use of veterinary products.



Thus, several training courses on the reduction of pesticide use and the promotion of viable alternatives have been carried out in partnership with farmers' organizations (FOs) in Northern Togo (2014 and 2016), in Kolda in Senegal (2016) and in Kita in Mali (in 2018 and 2019). In 2014, AVSF joined forces with other associations to promote alternatives to pesticides. In March 2015, a campaign was launched, concerning a ban on the most dangerous pesticides in developing countries and the effective application of the Rotterdam Convention. AVSF's actions on these issues are part of a global approach to support agro-ecological transitions at the level of farming families and territories, with coordinated consideration of issues and problems for human health, animal health and environmental health (One Health approach).

# How to use the guide and overview of its contents

## Who is this guide for?

This guide was created to help **organize training courses for mixed groups of farmers, farmers in leadership positions and technicians**. Based on AVSF's training experience, a group made up of these different participant types leads to richer exchange and field observations than if these different profiles are trained separately. The presence of women is essential, as they are often most concerned about health issues and can be a driving force in the adoption and implementation of alternatives such as NPLCs (*Natural preparations of low concern*) and biopesticides. The presence of health services representatives involved in monitoring the toxic effects of pesticides can also be very beneficial.

**The guide is therefore intended to be used directly FO managers and technicians** in developing countries: its aims to help them develop such training courses by relying on the stakeholders and partners involved in supporting agroecological transitions.

In light of the professional experience of the authors of this guide, numerous examples and illustrations concern French-speaking regions, with a few examples from the French experience when the issues turn out to be similar to those of southern countries. However, the guide has been devised for a broader purpose. Some of the examples come from other parts of the world with even more such examples to follow in future versions of the guide.

## Objective of the guide

The main objective of this guide is to provide content to farmers and technicians participating in training courses in order to **develop greater awareness of the risks associated with the use of pesticides and certain veterinary products, and skills in connection with agroecological alternatives that help to reduce their use. This means being able to:**

- diagnose phytosanitary or animal health problems and determine what kind of action needs to be taken;
- be aware of measures for preventing risks associated with the use of pesticides and certain veterinary products for the health of humans, animals and the environment;
- identify alternatives to both crop and livestock products and know how to adapt them to local situations;
- mobilize target groups and carry out collective actions that improve application (or further development) of the regulations on the use of these products and create favorable conditions for the development of alternatives.

<sup>4</sup> **Carcinogen:** a factor, particularly a chemical compound, that causes, aggravates or sensitizes the development of cancer; **Mutagen:** agent (chemical compound, radiation) that increases the number of genetic mutations in the genome of an organism; **reprotoxic:** product that affects reproductive capacity by reducing fertility or causing sterility.

Depending on the profiles of the training participants and their expectations, the proposed training modules and the majority of their topics can be addressed independently.

Rather technical topics such as those concerning pesticide toxicity indicators or certain new biological control methods can be addressed in specific training courses. The same applies to veterinary issues or lobbying actions.

With respect to training on agroecological alternatives, including biological control, particular attention is paid to the most basic techniques which are accessible to farmers with limited income.

## **When and how should this guide be used?**

This guide can be used in a variety of ways depending on the needs and situations requiring intervention:

- With respect to the **training of trainers**, persons in charge of training will be able to use the modules in this guide to develop and provide participants with teaching materials that are adapted to local contexts to the greatest extent possible. The numerous weblinks in this guide give trainers access to up-to-date information.
- For “**basic**” training for groups of 20 to 30 farmers and technicians, which can be carried out by technician/farmer trainer pairs, the guide proposes key elements of content as well as concrete and illustrative examples in the various modules that they will have to familiarize themselves with prior to the training sessions in order to develop suitable teaching aids (presentations, posters, exercises, etc.). Educational guidance for implementation is provided for some modules. According to AVSF's experience, interventions by human health specialists are desirable, even for training courses that only concern crop production.
- For **self-training**, the guide can be used by farmer trainers, technicians, project managers or FO managers to deepen their knowledge of the range of risk prevention measures, measures for the reduction of pesticide use and promotion of agroecological alternatives.

For each of the modules and topics developed, additional information, survey guides and examples from AVSF pesticide training courses carried out in Northern Togo, Kita in Mali and Kolda in Senegal are provided [see project sheets on the AVSF website ].

Several documents or links complete each module, including training or outreach documents from CIRAD, African research institutes, the network of chambers of agriculture (RECA) in Niger, the national confederation of farmers' organizations (CNOP) in Mali, etc.

## **Contents and objectives of the six training modules**

### **MODULE 1: PRELIMINARY PARTICIPATORY DIAGNOSTICS**

**Educational objective:** To be able to carry out participatory village diagnostics in order to identify the main problems leading to the use of pesticides, their management and the agroecological alternatives already known to farmers.

**Topic 1:** In the villages, identify where the persons undergoing training come from, **the main problems posed by crop pests and animal diseases, weeds, etc.**

**Topic 2:** Be aware of **the use of synthetic pesticides and veterinary** products in the villages and identify the places of purchase and sources of advice.

**Topic 3:** Identifier the **pesticide application methods**, the nature of protective equipment used, packaging management, accidents, previous accidents involving people and animals and their frequency.

**Topic 4:** Identify agro-ecological, **chemical-free alternatives** implemented by people from the villages for crop and animal care, collect opinions on their relevance and factors limiting more widespread use. To a greater degree, take advantage of local knowledge to devise new approaches based on solutions existing in nature (“*Nature-based solutions*”).

### **MODULE 2: RISK PREVENTION OF PESTICIDES**

**Educational objective:** Be able to prevent and limit risks associated with the use of pesticides and the management of their packaging.

**Topic 1:** Identify **the main forms of pesticide toxicity on humans and the environment** (contamination of water bodies and soil, reduction of biodiversity...). Know the meaning of the main pictograms, classes and hazard codes on the labels of chemical products (*including those on synthetic pesticides*). Identify the **active ingredients used in the villages if they are classified as CMR substances**.

**Supplements to topic 1** = Additional objectives for technicians leaders of FOs and local authorities: (1) Establish **the list of active ingredients used in the villages but currently banned by the country's pesticide legislation**; (2) **Define actions to improve compliance with this legislation** (e.g., ban the presence of pesticides not authorized in the country in the markets of the municipalities concerned); (3) Establish the list of active ingredients still used in their country although they are now banned in the EU.

**Topic 2:** Know **pesticides' main routes of entry into living organisms** and how they develop along the food chain to humans and animals; devise priorities in terms of **physical protection**, the method and place of **storage** of products and **management of their packaging** after use so that they do not disturb the ecosystems.

**Topic 3:** Identify **protective equipment** available in the region concerned, including its advantages but also limitations, and even the risks posed by certain equipment in rural and tropical conditions. Identify ways to improve farmers' access to the equipment considered most useful (e.g. gloves, boots, masks).

**Topic 4:** In the event of severe insect infestations, diseases, etc. and, if effective alternatives are not yet available, **identify the least toxic pesticides and use them more effectively by reducing risks and carefully adjusting dosages.**

**Topic 5:** List village practices for **managing pesticide packaging**. Identify improvements that can be made in partnership or not with input sellers, FOs and village authorities.

### MODULE 3: PROMOTION OF PESTICIDE ALTERNATIVES

**Educational objective:** Be able to prevent and limit risks associated with the use of pesticides and the management of their packaging.

**Topic 1:** On village lands, identify specific examples **of how pesticides have negatively impacted cultivated and uncultivated biodiversity.**

**Topic 2:** Together with participants, identify the crop pests causing the problems specified in the surveys conducted in Module 1 on village lands as well as beneficial organisms and endogenous solutions that could help resolve these problems.

**Topic 3: Identify and implement ecological transitions that minimize as much as possible the use of pesticides.** To achieve this goal, and based as much as possible on the participants' practices, identify possible options for crop rotations, choice of farmed plant species and varieties or livestock species, choice of sowing methods and mechanical weeding tools, etc.

**Topic 4:** Know and promote **biological control methods that can be used in African or other tropical farmers' agriculture.**

**Topic 5:** Improve and expand **local production of biopesticides and natural preparations of low concern (NPLC)**

### MODULE 4: REDUCTION OF HERBICIDES

**Educational objective:** Be able to propose improvements in agricultural mechanization in order to allow family farms to significantly reduce their use of herbicides.

**Topic 1:** Know the evolution of herbicide use by farmers in your region.

**Topic 2:** Know how the use of animal traction has evolved in your region and identify the problems encountered with the maintenance and replacement of animal traction equipment.

**Topic 3:** Analyze mechanization alternatives currently being proposed to farmers by governments.

**Topic 4:** Identify and promote mechanization options that help to reduce the use of herbicides.

### MODULE 5: IMPROVING HOW VETERINARY PRODUCTS ARE USED

**Educational objective:** Be able to prevent the risks associated with the use of veterinary products and recommend livestock farming practices and ethno-veterinary treatments which help reduce the use of these products in line with the "One Health" approach.

**Topic 1:** Know the types of livestock farming practiced by training participants and their context as well as the main pathologies present in these environments.

**Topic 2:** Understand the "One Health" approach and why it is needed for more sensible **use of antibiotics and anti-parasitic products.**

**Topic 3:** Identify and implement **herd management practices that reduce the need to use veterinary products.**

**Topic 4:** Recover and disseminate **relevant** alternative traditional practices from the areas of training participants.

### MODULE 6: INFORMATION AND MOBILIZATION OF CITIZENS

**Educational objective:** To reduce the use of pesticides and prioritize the elimination of the most hazardous ones, understand the objectives of citizen initiatives which are: (1) the application and strengthening of national laws on pesticides; (2) compliance with related international and regional conventions; (3) support for the implementation of alternative agroecological solutions.

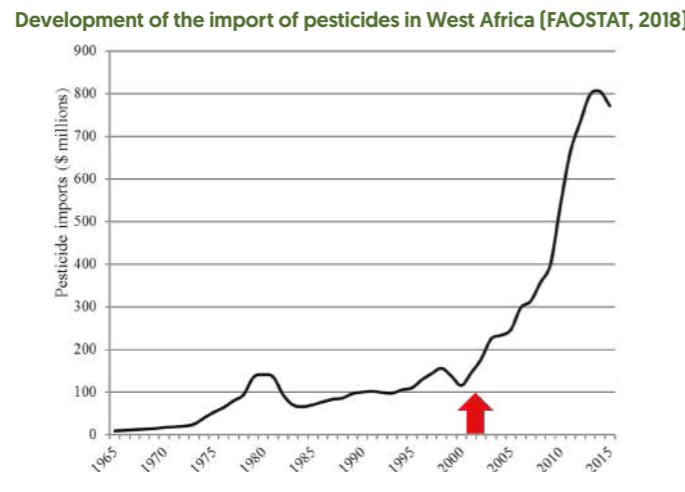
**Topic 1:** Determine and summarize mobilization challenges **to be overcome** for genuine alternatives to the use of hazardous pesticides and explore **examples of mobilization** in France, Africa and South America.

**Topic 2:** Initiatives for the implementation of **international conventions** on pesticides.

# Some information on the use of the pesticides and certain veterinary products in developing countries: a situation which is growing more alarming by the day

Increasing consumption and dangerous flaws in the application conditions of pesticides and veterinary products are a cause for growing concern worldwide, particularly in developing countries. In these countries, the volume of these products used remains limited due to poverty, but the registration rules are less strict and difficult controls, we often find pesticides banned elsewhere because of their impacts on health and/or the environment<sup>5</sup>.

**With regard to pesticides**, since the 2000s there has been a sharp increase in imports into West Africa [see the FAOSTAT graph below] and a fairly recent dominance of herbicide imports [ see table below, from Haggblade, 2019]. They are often old active ingredients with numerous negative effects on populations and the environment<sup>6</sup>.



<sup>5</sup>L'Afrique risque de devenir un déversoir pour des pesticides bannis d'Europe [Africa risks becoming a spillway for pesticides banned in Europe], article by Laurence Caramel, Le Monde, published November 15, 2019.

<sup>6</sup>Le Bars M. et al, 2019. Evaluation des risques liés à l'utilisation des pesticides en culture cotonnière au Mali [Evaluation of the risks associated with the use of pesticides in cotton cultivation in Mali]; in Soumara, In Mamy & Havard (Coord.). African cotton zones. Dynamic and durability. Proceedings of the Bamako convention, 21-11/23/2017. CIRAD, IER, USSG Bamako. <http://agritrop.cirad.fr/593138/>

Importation de pesticides en Afrique de l'Ouest (Import of pesticides in East Africa), 2015\*  
(Source: Comtrade, 2017; FAOSTAT 2017)

Pesticide products	Imports	
	Millions of \$	Percentage
Herbicides	552	62%
Insecticides	229	26%
Others **	104	12%
<b>Total</b>	<b>885</b>	<b>100%</b>

\*Average from 2014 to 2016

\*\*Fungicides, growth regulators, rodenticides, nematicides

Moreover, as the box and table [Haggblade et al - 2018 and 2019] indicate, a significant portion of pesticides marketed in Africa are not authorized and are counterfeit<sup>7</sup>.

## Estimates in 8 African countries [Source MirPlus2012]

Unregistered products: 27%

Counterfeit products: 7%

**Total fraudulent products 34%**

Percentage of fraudulent herbicides in Mali: 25 to 45%

## Dosage of fraudulent and registered products [Source: Haggblade et al., 2019]

	Laboratory dosage/indicated dosage			
	Average	75%	75-89%	90-100%
Status				
Fraudulent <sup>[1]</sup>	0.82	35	35	30
Registered [CSP]	0.91	0	35	65
<b>Total</b>	<b>0.87</b>	<b>18</b>	<b>32</b>	<b>50</b>

[1] Fraudulent products account for 39% of products not approved anywhere and 6% that are approved in neighboring countries and therefore illegally distributed in Mali.

The IRSS (Research Institute of Health Sciences) in Burkina Faso has conducted several large-scale studies on methods of pesticide use and health-related incidents involving pesticides. The findings reveal a very worrying situation, both in terms of distribution conditions and the manner in which pesticides are used, and cite multiple cases of intoxication (see box below).

<sup>7</sup> Haggblade S., 2019. Pesticides frauduleux en Afrique de l'Ouest: croissance des marchés et faiblesse du suivi post-homologation [Fraudulent pesticides in West Africa: growing markets and a lack of post-approval follow-up]; <https://www.canr.msu.edu/fsp/outreach/presentations/haggblade%20fraudulent%20pesticide%20overview%20west%20africa%20ver5.pdf>

### Overview of the 2015-16 IRSS study on the impact of pesticides in western Burkina Faso.<sup>8</sup>

"The intensification of agriculture has led to an increase in the use of agricultural inputs, particularly pesticides. In order to improve the health of populations and preserve the environment, the Rotterdam Convention financed this study in Burkina Faso on the use of agricultural pesticides during the 2015-2016 agricultural season. Its purpose is to study the different practices of farmers in the use of pesticides and to analyze agricultural pesticides residues in sediment, soil and water.

This study was conducted through surveys of 509 agricultural producers, 353 pesticide distributors and 69 health centers in three regions [*Boucle du Mouhoun, Cascades and Hauts-Bassins*]. The evaluation of the state of environmental contamination is based on the collection of 27 soil, water and sediment samples at 9 sites. The main findings are as follows:

- 95 % of the distributors surveyed do not have approval from the National Pesticide

Management Committee and are not aware of the existence of the Sahelian Pesticide Committee.

- 216 pesticide formulations were identified, of which only 112 (52%) are registered in Burkina.
- 52% of the farmers did not attend school.
- 82.5 % of the farmers did not wear personal protective equipment when using the pesticides.
- 107 cases of intoxication were reported in the sample of 509 producers surveyed. The symptoms reported were dermatological (itching, tingling, burning of the skin, rash, sores, complete destruction of the contaminated area), respiratory (tingling, burning and itching of the airways, breathing difficulties and coughing), ocular (burning of the conjunctiva, visual disturbances, tingling and burning of the eyes, loss of sight), gastrointestinal (abdominal pain, nausea, vomiting), as well as headaches and dizziness.
- From 2010 to 2015, 341 cases of pesticide intoxication were identified in 69 of the health centers surveyed <sup>9</sup>.

In many developing countries, there is still an insufficient amount of user information regarding the increasing number of intoxications, serious accidents or chronic diseases linked to pesticide exposure. As mentioned by the authors of the study summarized above, **training on these topics and on alternatives is essential.**

The increase in the sale and use of pesticides identified in Burkina Faso is also dramatic in other Sudanese and Guinean countries in West and Central Africa. The data below concerns the Ivory Coast and Ghana (source Traoré and Haggblade 2017).

### Development of the number of approved importers of pesticides, sellers and applicators (Source: Traoré et Haggblade, 2017)

	Millions of \$	Percentage	Annual growth rate
<b>Ivory Coast</b>			
Importers	12	67	11%
Resellers	113	779	13%
Applicators	44	396	15%
<b>Guinea</b>			
Importers	2	21	16%

#### ► A significant number of these pesticides come from China whose herbicide exports were \$2 billion in 2015, up from nearly zero in 1990.

In addition, problems of biodiversity destruction, soil, water, air and food contamination were increasingly verified, while demand among consumer and citizens is growing for safe and healthy food, also with respect to the environment.

This alarming diagnosis of health and environmental risks linked to pesticides is widely shared by the scientific community<sup>10</sup>. With applications for both crop and livestock production, agroecology is also recognized by scientists and international institutions (FAO, IFAD, UN) as a sustainable alternative to the excessive use of pesticides and certain veterinary products.

The March 2017 UN report <sup>11</sup>entitled "Human Rights and Pesticides" accurately describes the use of pesticides in agriculture globally and its negative impact on human rights. It notes the numerous impacts on human health, the environment and society, impacts that are often monitored under the limited perspective of "food safety". It notes that environmental and human rights provisions do not sufficiently protect farmers and agricultural workers, consumers and vulnerable groups. It encourages farmers to "adopt agroecological practices that improve biodiversity and eliminate pests through natural methods".

<sup>8</sup> Ouedraogo J.B, Ouedraogo R, Ilboudo S., Bayili B., Pare T., Kekele A., Sawadogo B. 2016. Study on the use of agricultural pesticides in three regions in West Burkina Faso and the evaluation of their impact on health and the environment. [http://www.pic.int/Portals/5/download.aspx?d=UNEP-FAO-RC-Workshop-BurkinaFaso-Report-201212\\_Fr.pdf](http://www.pic.int/Portals/5/download.aspx?d=UNEP-FAO-RC-Workshop-BurkinaFaso-Report-201212_Fr.pdf)

<sup>9</sup> 341 cases of pesticide intoxication have been recorded at 69 of the health centers surveyed, but in only 81 of the cases has the pesticide at fault been identified: 22.2 % of the known cases were attributed to glyphosate-based products, the same amount for cypermethrin, 19.7% to paraquat, 13.6% to thiram and 11.1% to lambda-cyhalothrin.

<sup>10</sup> Cf. Appel d'Arusha à l'action sur les pesticides (Arusha call to action on pesticides/May 2019), French version: [https://www.centrepsp.org/sites/default/files/Appel%20dArusha\\_FR\\_FINAL.pdf](https://www.centrepsp.org/sites/default/files/Appel%20dArusha_FR_FINAL.pdf)  
<sup>11</sup> <https://www.refworld.org/cgi-bin/texis/vtx/rwmain/opendocpdf.pdf?relid=y&docid=58ad94774>

**Additional data on pesticides from the IUTA** (International Union of Food, Agricultural and Allied Workers) pesticide training manual<sup>12</sup>

"Since the vast majority of pesticides are synthetic products that do not exist in nature, there are often no naturally evolved organisms which break down these poisons into less harmful substances. Consequently, if they are not broken down by hydrolysis, redox, decarboxylation ..., many pesticides remain persistent in the human body, soil and water, and some of them accumulate in the food chain and the environment. They are one of the few groups of chemicals deliberately released into agricultural places of work and the environment". Their persistence and ability to accumulate in fatty tissue means that traces are found in most humans and in all kinds of wildlife, even in remote areas of the planet [= far from their point of use].



For example, persistent organochlorine insecticides (such as DDT) can be found in the breast milk of Inuit women in the Arctic in quantities exceeding the safety limits prescribed by the WHO. Therefore, there is no "safe use" of pesticides, **there are only measures to try to protect against their effects.**

Developing countries use only **20%** of the world's pesticides but account for **80% of deaths and poisonings**. In these countries, as well as in countries in transition, many highly toxic pesticides are used on farms and plantations, especially for the production of export crops such as cut flowers and fresh vegetables. Many industrialized countries continue to export pesticides, which have been banned or severely restricted in their own countries, to the world's poorest regions. For example, it is estimated that 70% of the gross tonnage of pesticides used in agriculture in India are products banned or strictly regulated in countries of the Northern Hemisphere.

**Despite the existence of numerous international conventions prohibiting the use of certain pesticides [see Appendix 1 for a list of these substances], developing countries and many middle-income countries often lack the regulations, enforcement framework and resources necessary for the sound management of pesticides and monitoring of their marketing.**

It will be impossible to reduce the number of poisonings and level of contamination as long as numerous highly toxic active ingredients and formulations continue to be traded internationally and are not replaced by less toxic pesticides and especially by other less dangerous methods of controlling diseases, pests and weeds".

**With regard to veterinary products**, several issues are also important, such as the insufficient regulatory framework for the evaluation of the quality, marketing and conditions of use of veterinary drugs. This concerns in particular antimicrobials whose use is increasing rapidly with a number of studies estimating that their use in connection with livestock activities will increase by 67% between 2010 and 2030 (Van Boekel et al. -2015<sup>13</sup>).

With regard to the quality of veterinary drugs, according to a study published by the OIE in 2008 (Teko-Agbo A. et al.), respectively 69% of the drugs obtained from markets in Cameroon and 67% in Senegal were found to be inconsistent with their formulation, which could alter both their efficacy and safety. In 2 to 4% of cases, no active ingredient was present in the marketed drug.

Furthermore, a summary review of literature published by the OIE in 2014 ("Résidus d'antibiotiques et denrées d'origine animale en Afrique : risques de santé publique" [Antibiotic residues and food of animal origin in Africa: public health risks], Mensah S.E.P et al.) specifies that the prevalence rates of veterinary drug residues in food of animal origin is less than 1% in Europe, while it is reportedly as high as 94% in some African countries. In particular, it cites the following examples which demonstrate the high level of antibiotic residues in foodstuffs of animal origin (beef and milk):

- in Ghana, the prevalence rates of antibiotic residues are 30.8% for beef, 29.3% for goat meat, 28.6% for pork, 24% for sheep meat and 6.8% for eggs;
- in Niger, even higher rates have been reported, 33.1% in broiler chickens, 52% in gizzards and 81% in chicken livers (and also in Senegal, Kenya, Tanzania...).

Similar to pesticides, **professional support** for livestock farmers in connection with the use of these products and a dose appropriate for the pathology to be treated and the compounds used is very insufficient. For instance, in West Africa, land pressure and the reduction of collective grazing areas are leading to a decrease in pastoralism and the development of sedentary agricultural livestock farmers practicing small-scale fattening and dairy farming. This development has led to access to and the use of veterinary products, often poorly controlled, with very limited professional supervision of the breeders, which means there is no guarantee that veterinary drugs are used in a sensible and relevant manner (antiparasitics and antibiotics in particular). This situation creates risks for animal and human health and for the environment:

- **Emergence of pathogen resistance, in particular to antibiotics**, leading to a decrease in the effectiveness of treatments, with economic impacts for farmers (failed treatments and increase in morbidity and mortality), as well as in human health<sup>14</sup> due to possible resistance of zoonotic germs that will then affect humans and decrease the possibilities of treatment;

- **The diffusion of product residues in the environment** could accelerate the development of resistance and have adverse effects on the environment, such as the excessive use of antiparasitic treatments with consequences for soil fauna and eventually on their fertility.

With respect to the use of veterinary drugs, AVSF's establishment in several countries (Togo, Senegal, Mali, Madagascar, Cambodia) of networks of Community Animal Health Workers (CAHWs) supervised by local veterinary services has helped give livestock farmers access to treatment methods, advice and technical supervision on the use of these products<sup>15</sup>.

<sup>12</sup> Thomas P. Van Boekel et al -Global trends in antimicrobial use in food animals, Proceedings of the National Academy of Sciences, 112[18] -March 2015. PDF version can be downloaded via the following link: [https://www.researchgate.net/publication/274248344\\_Global\\_trends\\_in\\_antimicrobial\\_use\\_in\\_food\\_animals](https://www.researchgate.net/publication/274248344_Global_trends_in_antimicrobial_use_in_food_animals)

<sup>13</sup> World Bank October 2019 report on the "Lacunes dans les connaissances et la mise en oeuvre pour lutter contre la résistance aux antimicrobiens" (Lack of the knowledge and implementation necessary for fighting antimicrobial resistance): it is estimated that Anti-Microbial Resistance (AMR) already costs up to 700,000 lives per year (O'Neill, 2016), although the true burden of resistant infections remains unclear. The number of deaths caused by multidrug-resistant organisms (MDROs) could be more than six times the widely cited figures (Burnham et al. 2019).

<sup>14</sup> Cf. <https://www.avsf.org/fr/posts/644/full/dispositifs-de-sante-animale-de-proximite-et-de-qualite-les-enseignements-de-l-experience-d-avsf>

<sup>12</sup> Source: [http://www.iuf.org/w/sites/default/files/2004%20Manuel%20de%20formation%20sur%20les%20pesticides\\_0.pdf](http://www.iuf.org/w/sites/default/files/2004%20Manuel%20de%20formation%20sur%20les%20pesticides_0.pdf)