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RESEARCH ARTICLE

SOCIO-ANTHROPOLOGICAL STUDY ON THE USES AND PERCEPTIONS OF CHEMICAL PRODUCTS (SYNTHETIC PHYTOSANITARY PRODUCTS AND ANTIBIOTICS) USED IN AGRICULTURE AND ANIMAL HUSBANDRY IN THE VELINGARA DEPARTMENT OF SENEGAL

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Abstract

This article deals with the uses and perceptions of synthetic phytosanitary products and antibiotics used in agriculture and animal husbandry in the Vélingara département. It aims to understand and analyze, on the basis of a socio-anthropological study, the behaviors and perceptions of the population and the competent services concerning the chemical products used in the communes of Linkéring, Paroumba, Pakour and Ouassadou, their modes of use and the risks they pose to users. The results of the research show that there is a lack of compliance with recommendations on the use of pesticides and antibiotics, often acquired through parallel supply circuits and uncontrolled areassuch as the religious site of Médina Gounass. This use appears to be a practice imposed by the Société de Développement et des Fibres Textiles (SODEFITEX), through the cultivation of cotton. This heavy use of products is leading to the emergence of new forms of human, animal and environmental diseases.

Introduction:-

In many countries today, such as France and Senegal, synthetic pesticides and antibiotics are seen as a means of combating pests in the agricultural and livestock sectors. Works such as those by H. M. G. Van der Werf (1997) evoke the idea that the first synthetic pesticides appeared on the market in the 1940s, with very positive results in terms of increased agricultural yields.

This proposed article provides information on the dynamics of solidarity around the management of the commons between farmers and stockbreeders, in particular family farming and family stockbreeding. It is based on an analysis of the discourses, perceptions and representations of the communities and stakeholders concerned. We attempt to highlight the determinants of "One Health" on a territorial scale, for a better view of the agro-ecological transition and better health for people, animals and the environment. This contribution also analyzes all the resources deployed by players in all chemical product use processes, from the beginning to the end of the activity cycle. This means studying and describing the formal and informal supply channels for these products. In addition, we highlight

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therelationships between the various players, and more specifically between farmers, breeders and companies such as the Société de Développement et des Fibres Textiles (SODEFITEX).

The department of Vélingara, located in the south of Senegal, comprises fourteen communes and is characterized by a high level of livestock farming and agriculture, both by local populations growing rice, cotton, peanuts and millet, and by companies. The Anambé basin is known for its intensive rice-growing. The presence of SODEFITEX, combined with various agricultural projects, such as those of the economic interest groups (GIE), have contributed considerably to its development.

Our contribution is based on the following research questions: What are the uses and perceptions of pesticides in agriculture and antibiotics in livestock farming in the département of Vélingara? How can they be both a source of yield on the one hand, and a source of disease on the other? What useful recommendations can be made to improve the health of people, animals and the environment?

We deal with people's uses and perceptions of chemicals and their effects on human, animal and environnemental health.

Issues

Antibiotics are the main class of veterinary drugs used since the 1950s for the treatment of infectious diseases of bacterial origin in food-producing and companion animals (Mensah & al., 2014).Various studies, such as those carried out by the Institut National de la Recherche Agronomique[1] (INRA) and the Institut national de recherche en sciences et technologies pour l'agriculture et l'environnement, confirm that before the advent of chemical products, cropping systems were designed to ensure the best compromise between phytosanitary risk and crop production potential.

Institutions such as the Institut national de recherche pour l'agriculture, l'alimentation et l'environnement (INRA/France), the Direction de la Protection des Végétaux (Senegal), the regional environmental service, the Comité Sahélien de pesticides, etc., have been set up to improve product quality, crop protection, plant protection and environmental protection, as well as the control and approval of chemical products, especially since their use is considered essential in agriculture and livestock farming.

For more than three decades, Senegal has witnessed a continuous reduction in agricultural performance due to declining soil fertility and agricultural productivity (Diallo et al 2019). As a result, the country uses large quantities of chemicals. It is for these reasons that D. Badiane (2015) asserts, in this regard, that crop losses due to insect pests in cotton cultivation, remain significant in Senegal and West Africa. As a result, the solutions proposed to combat these pests focus on chemical control. Faced with difficulties such as declining soil fertility, pest pressure and high input costs, cotton cannot be grown without the use of pesticides (D. Badiane, 2015). This heavy use of chemicals is said to have negative effects on human, animal and environmental health. With this in mind, A. Thiam (1996), in his article on plant protection products in the Senegal River delta, argues that the problems associated with the use, storage and handling of plant protection products in the Senegal River delta manifest themselves in the form of direct or indirect, sometimes fatal, human poisoning and environmental pollution, the intensity and extent of which has yet to be established (Thiam, 1996).

Agriculture and livestock play a very important role in the Senegalese economy and population. These two sectors not only ensure the survival of their inhabitants through subsistence farming and livestock rearing, but are also seen as income-generating activities for communities. These sectors are much more prevalent in the country's southern regions, notably Kolda.

The Kolda region is an area with a diversity of ecosystems, agricultural and pastoral systems, and a diversity of productions conducive to a high consumption of chemical inputs. Add to this the presence of the weekly international market at Diaobé, and you have an area of high population, animal and chemical traffic, making it particularly vulnerable in terms of health. To this end, we have noted very few studies dealing with the use and misuse of chemical products in the area, in line with the "one health" concept based on human, animal and environmental health. The "One Health" concept **was** first put forward in the mid-1800s by Rudolph Virchow, a

[1] INRA was a French agricultural research institution founded in 1946. It was dissolved in 2019.

Prussian pathologist, who argued that there was no radical dividing line between human and animal health. That's why we're interested in this research, and why our article is so special.

Research Methodology:-

Our data come from a field survey carried out in eleven villages in the four communes of the Vélingara department: Linkéring, Paroumba, Pakour and Ouassadou. These villages include Médina Sékou, Lislam, Sansakoto, Dialadiang, Koufanbora, Panaghar, Manato, Médina Ansou, Demba Coula, Nianao and Saré Wonia. The aim is to understand the "One Health" concept in terms of human, animal and environmental health. We used the qualitative method for data collection (Pirez, 1997; Jodelet, 2003; Olivier de Sardan, 2008). We targeted several diversified categories representative of the population (rice growers, market gardeners, livestock breeders, veterinarians, agricultural and livestock service agents, hygiene service agents, SODEFITEX and SPIA agents).

Added to this, direct observation enabled us not only to observe the realities of our study area as closely as possible, but also to remain as faithful as possible to behaviours and lifestyles, and to grasp the ways in which communities use and perceive the products they use, through the observation grids we put together (Olivier de Sardan, 2008). Nineteen (19) semi-structured interviews with local populations, chemical product sellers in weekly markets and in the sub-region, and services and companies involved in the supply and sale of chemical products, enabled us to gather the views, perceptions and representations of the interviewees on themes defined in advance using an interview guide. We also carried out 8 focus groups with men and women of varying ages living in our study area, with the aim of questioning and obtaining a diversity of responses on the same theme.

Finally, the multiple open discussions also enabled us to capture the unspoken in the formal discussions. The data collected wasprocessed and analyzed using content analysis techniques (Miles and Huberman, 2003).

Results and Discussion:-

Uses and perceptions of chemicals used in agriculture and livestock farming

Our observations and interviews suggest that the populations of the various villages studied are more involved in subsistence agriculture than mass farming. Indeed, the general objective of agriculture for these communities is to meet family needs. However, it must be stressed that these same populations produce to sell. 2/3 of their production is destined for family needs, and 1/3 for the coming year's peanut seeds. In the case of cotton, all production is destined for marketing. The survey data show that most farmers do not have all the resources needed for mass farming. Large-scale farmers are the owners of the largest herds in the village. This explains why they have no difficulty in cultivating large plots of land.

When it comes to the use of chemicals in agriculture and livestock farming, we can observe a lack of distrust, overuse and non-compliance with terms and conditions of use. Our observations and interviews in the Vélingara area revealed heavy use of pesticides (insecticides, fungicides, herbicides and chemical fertilizers) by farmers. Indeed, people in the various villages consider that pesticides help to protect their plots by controlling weeds and insects. I. D, a respondent from the village of Médina Sékou, asserts:

"Pesticides help us a lot, because in cotton growing, if you don't use these products, the insects will destroy the wholefield and you won't have any yield, whereas we grow to feed the family and build buildings".

The choice to use pesticides is also linked to the increase in production plots, which coincides with a decrease in family labor. According to the fathers of the families, the children no longer want to get involved in field work, even though farming is the only way to feed the family, hence the need to use pesticides. As this veterinary auxiliary and SODEFITEX manager explains: "It's impossible to get a yield without chemicals these days. We may not use pesticides, but we've seen huge losses. So it's not just a pleasure to use them". These findings were echoed in other contexts. Indeed, S. Adétonah et al (2011), addressing the issue of perceptions and adoption of alternative methods of insect control for vegetable crops in urban and peri-urban areas in Benin and Ghana, show that almost all vegetable growers believe that synthetic chemical pesticides act promptly and have the capacity to control a wide range of insects and/or diseases and are available in directly usable form (Adétonah et al, 2011).

The inhabitants of the various villages consider that pesticides are the only means of helping farmers to achieve a yield, although paradoxically they have contributed to the degradation of the land. Indeed, according to farmers, since the introduction of these products, the land has become less fertile, forcing them to use them every year.In

addition, our interviews with various stakeholders, particularly farmers, revealed that SODEFITEX is a key player in the agricultural sector of the villages studied. Farmers claim that it is the company that is forcing them to use pesticides with the almost enforced cultivation of cotton. For many farmers, thetextile fiber and development company is the source of pesticides in the eleven villages covered by our study. As the most heavily parasitized crop, cotton cannot be grown without pesticides, according to the heads of the sectors. They affirm that pesticides not only enable pests to be controlled, but also provide a yield that will satisfy the grower and enable him to pay his debts to SODEFITEX. It also enables other needs (family and personal) to be met. It is in this sense that the SODEFITEX sector manager for the Linkéring zone shows the usefulness of pesticides through the plots treated with pesticides and those not treated. In his view, pesticides make a big difference to production. Yields are not the same, but pesticides kill pests around the cotton plant, as well as weeds. This facilitates rapid, unimpeded development of the cotton field. That's why pesticides are used at every stage, from seed to production.

Alongside agriculture, livestock farming is an essential activity for the populations of the various villages surveyed. Our observations revealed the importance attached to this activity by the local population. Herds (cows, sheep and goats) exist in almost every family. Livestock farming enables people to meet many family needs. As one of our respondents from the village of Panaghar put it: "Livestock farming enables us to meet certain family needs. Indeed, if the stock of production obtained during the winter season starts to dwindle, we sometimes sell oxen to feed the family". This interview extract illustrates the importance of owning livestock. Over and above this need, livestock farming provides financial income and savings that can be used to cover various expenses, such as wedding or christening expenses, medical expenses in the event of illness of a family member, building construction, or financing a family member's migrationproject. In addition, animals are used for certain tasks in the fields, as stated by M. D. D, a respondent from the village of Sansakoto: "Animals help us with our work. They replace the machines, and on top of that, their waste is used to fertilize the fields".

Breeding thus becomes a means of financing family needs, both economically and materially, hence the need to take good care of this breeding and to ensure its preservation and renewal. As one 50-year-old breeder told a focus group: "We found this activity through our ancestors, which is why we are breeders. We do family and subsistence breeding (to meet the family's needs)". The same statement was also made by several respondents from other villages, such as Panaghar, Saré Wonia and Médina Sékou.

Impacts of pesticides on livestock farming and environmental health

The use of pesticides is not without consequences for livestock farming. In most cases, farmers report that pesticides have a major impact on animal health. Pesticide-related illnesses are noted every year in the various villages. Animals graze on treated plots (cotton, groundnuts, maize, etc.); their owners report that the animals fall ill after the winter period. Pesticide residues in feed constitute a hazard for animals. Pesticides (insecticides and herbicides) are also used in peanut cultivation, leading to poisoning of the animals from the peanut hay they eat.

Heavy use of chemicals, a source of new forms of human, animal and environmental disease

People believe that pesticides are the cause of many illnesses in both humans and animals. They point to the emergence of new diseases as evidence of this. In their view, since the introduction of chemicals into rural areas, people have become vulnerable and exposed to the risks of contamination. In this regard, Rahmoune et al show in their study of pesticide use and risk perception among farmers in the Biskra region (south-east Algeria) that the most frequent symptoms of mildness are headaches. Farm workers' knowledge of the toxic properties of pesticides and basic hygiene standards is very low (Rahmoune et al, 2020). These words from A.B. below point in the same direction:

> "These days, everyone talks about foot disease. Certainly, it's due to the products we use, particularly pesticides. We work without protecting ourselves, so our feet always hurt. Another thing we think is due to the use of pesticides is headaches. Because, if you treat your field without protecting yourself and you breathe in the product, it can lead to headaches and even breathing and lung problems".

In a focus-group extract from Koufanbora, we find this same idea in the words of a man in his fifties. He claims to have come into contact with pesticides during spraying sessions, the consequences of which are now revealed by a foot ache. In his own words:

> "Me, I can't even wear shoes, you see. I walk barefoot. My body gets hot too. We were the ones growing cotton. And we sprayed without any protection.

Non-compliance with protocols and methods for pesticide and antibiotic use is one of the major problems in our subject area. Farmers, for the most part, expose themselves by treating their plots. They are driven by the sole aim of achieving a good post-harvest yield. In many villages, wearing protection kits is not a priority, despite their availability at SODEFITEX for cottongrowers, but also at other sales outlets such as weekly markets. I.D asserts :

> "We very rarely protect ourselves against pesticides, to tell the truth. When Sodefitex brings the products, they bring masks, gloves and all, but we don't use these means of protection. Even if we buy the kits, we don't use them at all. Because the kits are very hot. And that's why we don't wear them. So, we don't use the protection methods when it comes to using the products. It even happens that when spraying cotton or peanuts, the caterer checks whether the product's liquid is coming out or not by putting the device on his feet so that the liquid touches him and he knows it's working".

People's failure to respect pesticide treatment times is also a problem, as is the failure of many users to respect the time allowed after treatment with these same products. A 60-year-old farmer in the village of Koufanbora said:

> "We don't protect ourselves with pesticide protection kits. We don't respect the advice and instructions for use. People want to finish treating one or more plots quickly on the same day, even though it's forbidden not to treat in hot sunshine or when there's too much wind. Even the remanence period is not respected by many users".

It is clear from these comments that people underestimate the effects and risks of acute and/or chronic toxicity. This represents an enormous health hazard. Non-compliance with usage measures is starting to worry people, because of the problems raised. Villages such as Paroumba, Panaghar, Manato, Médina Ansou, Demba Coula, Nianao and Saré Wonia are reporting illnesses caused by pesticide use. This is the case of Mr. K.M, aged 62, in the village of Panaghar, who claims to have contracted an illness linked to pesticide use. The symptoms include "a body that's always hot, backache, feet that have taken on a different color and pimples". Some, like the village of Demba Coula, have become aware of these dangers and taken asomewhat surprising decision. The villagers are unanimous: "In our village, we have given up growing cotton because of the dangerous products that SODEFITEX brings us". In their logic, cotton growing is the cause of all the village's ills, and since this crop cannot be grown without pesticides, they have chosen to abandon it in favor of others that do not require the abusive use of products in the fields. In this way, we were able to identify the various illnesses encountered by the local population, which, according to their perception, result from the use of pesticides. They cause: foot diseases, the body heats up from the inside, blurred vision, lung diseases, breathing problems, fevers, headaches, problems with the sense of smell, body paralysis. A 2013 literature review by the 'Journal of Toxicology and Applied Pharmacology', revealed a huge body of evidence showing the relationship between pesticide exposure and high rates of chronic diseases such as different types of cancer, diabetes, neurodegenerative disorders such as Parkinson's, Alzheimer's as well as amyotrophic lateral sclerosis (ALS), birth defects and reproductive disorders.

Compliance with recommendations on the use of pesticides and antibiotics: a cross between tradition and modernity

People's lack of protection against products can be explained, on the one hand, by the fact that they don't have the means to buy kits and, on the other hand, by their perception of PPE. According to the people interviewed, PPE prevents them from working properly; protective gloves or shoes, for example, are a nuisance. We can say that it is this representation of PPE that prevents people from using it. In animal health, the use of antibiotics isabused and uncontrolled, despite the existence of veterinarians and livestock auxiliaries. According to the heads of veterinary posts, this situation is due partly to the free sale of products at weekly markets (with the local population themselves buying and reselling them, as well as hawkers from neighbouring countries such as Gambia and the two Guineas), and partly to livestock farmers treating their animals on their own initiative, sometimes without consulting a specialist.

However, this view of veterinary station chiefs is disputed by farmers. According to the latter, they self-medicate because access to professionals is difficult. As one farmer in the Linkéring commune put it: "Not only is it a big problem to get them to come, but even if they do come, they always ask for a price. That's why we don't call them.

In response to this problem highlighted by breeders, vets say that they cannot cover all areas due to a lack of resources (equipment, transport, logistics, etc.). They face enormous difficulties in managing animal health problems in their areas of intervention.

Added to this is the lack of customs control in the area, which explains this abusive use of products. We find fraudulent products from border countries such as Gambia, the two Guineas and even Mauritania, notably in the religious site of Médina Gounass, where "when a product enters, it is saved! According to our interviewees, the customs and gendarmerie services do not intervene in this site. In the Linkéring area, all the hawkers who sell these products get their supplies from Gounass. It's the same for livestock farmers, who treat their own livestock. In open discussions, they freely admit that they go to Gounass or theweekly markets. Sometimes it's their children they send to make the purchase.

In the other communes as well (Pakour, Paroumba and Ouassadou), the observation is the same: control is not rigorous. In fact, it rarely takes place. Services are almost non-existent. Breeders can easily find the products they need.

Alongside this, we note the reuse of chemical product containers such as bottles or sachets. After using the products, they take them home, wash them and use them for drinking water or storing other foodstuffs. In market gardening, we noted a misuse of prevention tools, particularly among women who use impregnated mosquito nets to protect their crops against pests.

In animal breeding and feeding, antibiotics are often administered as growth promoters. This is because they help livestock to develop more rapidly. But in reality, they are often used to offset the negative consequences of poor hygiene and animal husbandry practices. However, overuse of antibiotics has led to the emergence of bacterial strains resistant to a growing number of antibiotics, at such a rate that pharmaceutical research and industry can no longer develop new, more powerful antibiotics fast enough (Report by the Parliamentary Assembly of the Council of Europe, 1999). This phenomenon, although still ignored by breeders, can be an enormous risk factor in the area. This is because of the problem of tracking and storing antibiotics. As mentioned above, most farmers treat their herds on their own, without consulting veterinary surgeons. And this can lead to other diseases.

As far as the environment is concerned, critical analysis of the discourse points to soil degradation linked to pesticide use. It isgenerally agreed that the environmental impact of a pesticide depends on the degree of exposure (resulting from its dispersion and concentration in the environment) and its toxicological characteristics (Severn and Ballard, 1990). In a study devoted to pesticides and in particular to the quantities applied and those reaching pests, the authors emphasize the role of pesticides in pest control. They state that plant protection active ingredients are most often applied in the form of liquids sprayed onto plants and/or the soil. In some cases, they are incorporated or injected into the soil, deposited in granular form or coated onto seeds. During an application, the treatment product is distributed in variable proportions, depending on the crop stage, target, application technique and weather conditions, between the soil, plant foliage or crop residues, and losses due to "drift" (Pimentel and Levitan, 1986).

Chemicals supply circuits

The department of Vélingara borders three countries in the sub-region (Guinea Conakry, Guinea Biseau and Gambia). It also links different regions of the country (from north to south). There's also a highly influential religious site called Médina Gounass. It plays an important role in the pesticide supply circuit. There's also the weekly international market at Diaobé, which brings together several communities from different countries every week. This makes the chemical supply circuit highly complex. In fact, the supply circuit is very complex in some communes, such as Linkéring, which is very active in cotton growing. It uses a lot of pesticides in agriculture. According to data from SODEFITEX and cotton growers, cotton cultivation is subject to many pest attacks. As a result, we were able to observe that SODEFITEX is the main supplier of chemical products tothe various villages surveyed. This may lead us to believe that the local population, and cotton growers in particular, buy their supplies from SODEFITEX.

However, it is not the only player in the chemicals market. There are products from the sub-region, such as antibiotics. These products, unlike SODEFITEX's, are not approved by the authorities responsible for pesticide approval procedures. They enter the department of Vélingara bypassing the services responsible for ensuring the application of border standards and regulations. The religious site of Médina Gounass plays an important role in this circumvention, which we classify as fraudulent. The power of this site through its religious leaders means that there is a lack of control by the Customs, Gendarmerie and Hygiene departments. According to a respondent we met in Linkéring during an open discussion:

> "There's the influence of the sub-region with the two Guineas, Gambia and the site of Médina Gounass. I think the department of Vélingara's geographical situation is a bit special. So some people go to "Bassé" (in Gambia) to buy the products. Because some people prefer products from the sub-region because they are less expensive".

In addition to SODEFITEX products, the villagers surveyed also buy pesticides and antibiotics in the main towns, at weekly markets such as Diaobé, in stores and from street vendors known in the Pulaar language as "Banabanas".

Waste management and environmental impact

The management of pesticide and antibiotic packaging (sachets and bottles) is a problem in the Vélingara area. People don't attach much importance to the way packaging is disposed of after use. It should be noted that disposal methods vary from village tovillage. As a result, we need to look at the different processes in place for disposing of packaging.

Many villages have reported that packaging is thrown away in the fields after use. Without realizing it, this packaging not only degrades the environment, but also causes health problems for those who reuse it for other purposes. They are unaware that the washing facilities they have at their disposal are far from capable of completely removing the pesticide residues that seep into the walls. People who used to store drinking water (as in the case of herders in the bush), foodstuffs and cattle feed are now contaminated. This exposes people and animals to the risk of poisoning. This practice was mentioned in particular in the villages of Panaghar and Médina Ansou. In the former, people interviewed said: "We don't have a place to dispose of packaging. We just throw them away after use. Some people even take pesticide bottles, wash them and use them for drinking". In the second village, the story goes: "We throw packaging everywhere. And sometimes a child even takes the bag or the bottle to play with. If we see this, we tell him to throw the packaging away".

At the same time, packaging that is thrown into the environment pollutes water and soil. Packaging comes in a wide variety of types and volumes, and is widely scattered across the country, particularly in our study area. Stray animals can also suffer the consequences of discarded packaging.

Various mechanisms have been identified:

- In holes, wells and toilets: These practices are more common in animal health. In fact, it has been observed that farmers and veterinarians use wells, termite mounds and abandoned pits to dispose of products that have alreadybeen used or have expired. But it's very rare to find out-of-date products in livestock services. This is because they don't stock up on antibiotics in large quantities. On the other hand, this is not the case among the general public. A person may go to a "louma" and buy a medicine without knowing the expiration date. There may be abandoned wells in villages which are used to store used packaging. These wells are often used by services such as the Pakour veterinary service. In the case of the Vélingara veterinary service, there's a fenced-off plot just outside the town where the packaging is dumped. In this case, they are burned. It has also been noted that people in the villages where the service is provided flush the packaging down the toilet.
- Incineration: Incineration is a technique for burning packaging. Veterinarians, like other services, incinerate products that have already been used or have expired. In the case of veterinarians, they find a place a little away from inhabited areas, and it's there that they carry out the incineration. As for local people, once they've used the products, they put them in the garbage can, after which they incinerate them. It should be noted, however, that they don't do this all the time, as pesticide or antibiotic packaging is sometimes found in the wild.
- Recycling: SODEFITEX recycles its own packaging. It has entered into a partnership with a company called the FAO (Food and Agriculture Organization of the United Nations) to recycle the packaging it uses, as well as that used by its producers. As a result, producers are made aware of the need to collect packaging after use. It should be noted that this packaging is purchased by the company from productusers. In this way, local people have begun to mobilize all the packaging they use.
- The DPV (Direction de la protection des végétaux) also plays an important role in the recycling of chemical packaging. As the plant protection directorate, it is also responsible for environmental protection. For all these reasons, the department has drawn up a manual for the proper recovery and destruction of packaging. In 2009, 184 packages were recovered and 255 transferred to Dakar for treatment and recycling, according to the DPV.

Conclusion:-

Pesticides and antibiotics are today considered indispensable in the agricultural and livestock sectors, due to the numerous results that people obtain after using them. Our research reveals that, on the one hand, people are increasingly demanding the use of pesticides. The reasons for this are based on the fact that land has become infertile and unproductive. Pesticides can be used to increase production, control insect pests and weeds, fertilize arable land, and so on. On the other hand, pesticides are having a negative impact on human, animal and environmental health in the communes of Linkéring, Paroumba, Pakour and Ouassadou. For the latter, phytosanitary products are the cause of numerous infections and illnesses among many users.

As for antibiotics used in livestock farming, the emphasis is more on their usefulness and the role they play for breeders. For the latter, if there were no antibiotics in animal health, the practiceof livestock farming would be non-existent in the communes due to the numerous diseases. Using a socio-anthropological approach, the study also showed that the use of pesticides in agriculture has had a major impact on livestock farming. The main problems in the livestock sector, particularly in terms of animal diseases, are caused by the use of these pesticides. Farmers maintain that animals are always in contact with pesticide-treated plots throughout the dry season. In other words, the survey revealed that arable land is also used for grazing in the villages studied, due to the lack of space. This ultimately explains the poisoning of wandering animals by pesticide residues. In order to reduce or eradicate the abusive and uncontrolled use of pesticides and antibiotics in the Vélingara area, it would be useful to :

1. Set up control systems to ensure compliance with measures on pesticide and antibiotic use in the area;
2. Take into account the experiential knowledge of breeders and farmers (local techniques for combating pests and animal diseases);
3. Involve sports and cultural associations, movements and notables in the communes in raising awareness and also in monitoring the objectives of the "Thiellal" project;
4. Implement toxicovigilance measures ;
5. Promote agricultural and veterinary research focused on the priorities set out in national and sectoral strategies, particularly in rural areas;
6. Provide sufficient resources (human, material and financial) and efficient infrastructures in the relevant departments to ensure control of chemical supply circuits;
7. Implement a policy to control environmental pollution, which must include a major control system (essential to the success of the environmental policy) with appropriate penalties for any failure to comply with the regulations in force. This helps prevent fraud.

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