

Emerging Diseases and Stress Fight Against Disease in Chad

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Abstract

The purpose of the study is to understand the concept of an emerging or re-emerging disease itself, to identify and prioritize emerging diseases by species, to know some factors favoring their emergence, to improve the situation of animal health. For this, two teams were formed to cover the study area in 10 days. The cards used to guide interviews focused on the following: the most commonly encountered diseases, the name of the vernacular illness, periods of onset, the clinical manifestation of these diseases, the major difficulties to fight against these diseases, etc. Individual interviews and groups have identified emerging diseases in the study area. Following these interviews, it appears that breeders seem to know most of the diseases, their emergence period and socio-economic consequences. Although well described by breeders, viral, bacterial and parasitic diseases remain an important issue for animal health in the area. Pastoralism is the operating system the best organized in the area seems to be one of the factors favoring the emergence of diseases. Access to veterinary services, products and the lack of breeders of respondents are also factors favoring the emergence of diseases. Risk factors are not known by farmers, health care and treatment techniques are not mastered by them. Preventive measures related to these diseases are poorly understood. Awareness and training should enable farmers to appropriate sound engineering practices and breeding behavior; livestock vaccination and structuring of farmers also contribute to improving the health quality of animals in the area.

Keywords: Emerging diseases; Incidence; Grazing; Cursed fields; Chad.

1. Introduction

The term emerging disease is a new conception of disease classification. This design, which originated in the work of Charles Nicolle [26] in his book "*Destiny of infectious diseases*." In the 90s the concept of emerging diseases had been introduced as part of the appearance of certain diseases [19, 22-25]. International conferences, journal "Emerging Infectious Diseases" have been devoted to it.

Currently, the terms "emerging disease" and "re-emerging disease" are used to describe many diseases, often wisely, but sometimes misused. As part of a mission of "*Action Contre la Faim*" (ACF) [1], a study was conducted in Hadjer-Lamis, Bahr-el ghazel, North Kanem and Lac Regions. One of the objectives of the mission was the identification of current and emerging diseases as described by breeders. This work aims to analyze the results obtained from this mission, understand the concept of an emerging or re-emerging disease called to identify and prioritize emerging diseases by species, to know some of the constraints related to the emergence of these diseases and offer anti tracks to improve the animal health situation of animals.

2. Materials and Methods

Study Area

It corresponds to the ACF intervention zone. It is a set composed of three administrative regions: Lake (Lake Region and its islands), Kanem (North Kanem, Northern Nokou) Bahr El Ghazal and (Soulia). They form what is called the "*Grand Kanem*". Breeders spend there the rainy season: the attachment of breeders' area. To these three regions are added Chari-Baguirmi and Hadjer-Lamis Regions, which are the reception areas of breeders from the *Grand Kanem* during the dry season (Figure 1). Two teams of 5 people were formed to cover the area in 10 days. A team has traveled throughout northern Kanem and Lake Chad, and the other, Bahr El Gazal and Hadjer Lamis. The routes to both teams by the technicians of the ACF were followed with more or less flexibility because of the difficulties encountered in the field: dispersion of farmers, car traffic trouble. In total 11 villages and 24 wells and ferrick were surveyed.

Investigations

The mission is first familiarized with the new concept. A listing has been developed and validated before going on the ground. Three investigative tools have been implemented in the field. *Focus Group*, individual surveys and observations. The different contexts in which we had to face, have led us to some flexibility in the implementation of these two methods. When meeting with farmers was around wells or to a place where there was a ceremony, the *Focus Group* has been systematically given preference over individual interviews.

It arrived in some villages visited ferricks the number of breeders present was insufficient to hold a *Focus Group*, in these cases, we conducted individual interviews.

The survey, conducted in the form of individual interviews and focus focused among others on the following points: breeding practices, the most commonly encountered diseases, the name of the vernacular illness, periods of their appearance, the clinical manifestation of these diseases, the major difficulties to fight against them, etc.

Observation In - situ

In this study we dealt with some sick animals that were presented to us. However, the different cases did not justify sampling.

The results obtained were discussed with representatives of the local veterinary Authorities and with representatives of the ACF to ensure knowledge of these diseases by livestock farmers. The Department of Veterinary Services, which has a bank of data collected over several decades, has been accessed, in order to reconcile the information collected and those that exist in the database. The analysis focused on the definition of this concept to prioritization of common diseases by species and site; the period and frequency of their occurrence; the clinical manifestation of the disease; the factors favoring emergence.

3. Results and Discussion

3.1 Emergence: Concept and Définition

The concept of emergence deserves to be elucidated. In the literature, there are, besides the definition of "emerging disease", those of "emerging infectious disease" of "emerging zoonosis" and "emerging infectious agent" [13, 14, 17].

According to the Permanent Unit of emerging infectious diseases [20]: an emerging infectious disease is an infectious or suspected unexpected infectious phenomenon (referring to its intrinsic properties or knowledge of its biology), touching humans, animals or both. It may be: a clinical entity newly appeared or identified infectious origin; a known infectious disease, whose incidence is increasing or whose characteristics (clinical and progressive) are modified in a space or in a population group. It can result from a qualitative or quantitative change in the characteristics of the infectious agent, the affected population or its environment. Emerging infectious diseases can be defined as "newly emerging infections in a population or have existed but whose incidence or geographical area increases rapidly."

Emerging diseases cover a wide range of situations including: diseases due to the emergence of new agents; diseases whose host range has expanded receptive; diseases whose causative agent is newly identified while they were already widespread. "New" character of the disease results in such a change of host, vector, pathogenicity or strain. Of new infections can be caused by the change or modification of a pathogen or an existing parasite [19, 22 - 25].

Although emerging diseases are predominantly infectious in nature, it can also be other types of diseases, toxic, metabolic or other [28].

A disease may be both old, permanent and emerging in respect of variants of a pathogen in question (e.g. influenza). A disease may be endemic in part of the old world, but when called emerging appears in a previously unscathed. An emerging disease may not be new; a new disease is not necessarily emerging.

For Toma and Etienne [30], a "new" disease can be one of three situations:

- A disease whose cause (the pathogen, if it is transmitted) is actually new, that is to say not previously existed. If this condition is observed only episodically, it should not deserve the new disease qualifier, but not that of emerging disease that involves the idea of increasing incidence and re-emergence success, as defined below. The appearance of a new pathogen does not cause in any event an emerging disease;
- A disease whose cause is not new but is just newly recognized. As in the previous case, *and* certainly, this case also does not match an emerging disease if the incidence remains low;
- A disease whose cause is really new, or just newly recognized, and whose incidence is increasing. Only the latter case actually corresponds to an emerging disease.

A "disease whose causative agent is newly identified when it was already widespread" not entitled automatically to the name of emerging disease: it is simply a disease pathogen recently identified what very often facilitates diagnosing the corresponding disease and, therefore, may cause an artificial means of increasing its impact due to better recognition and not a real increase incidence.

According to the High Council of Public Health [20], the emergence or re-emergence of infection results from a complex interaction of factors related to infectious agents, sometimes with one or more vectors, their hosts (animals or human) and the environment in which evolve and adapt all these living beings. The contributing factors of environmental types can be physical (deforestation, climate change, agricultural practices, etc.), resulting in an imbalance of ecosystems, socio-economic (wars, massive displacement, urbanization, industrialization, etc.), and / or with organizational failure of structures and sanitary conditions. As such emerging disease will be the subject of forecasts of continued emergence, particularly if the factors held responsible for the increased incidence remain present.

The notion of emergence calls for a broad interpretation of the concepts including that of: risk, increasing the geographical area, the increase in incidence, etc. For this study we agree with Toma and Etienne [30] that a disease should be classified as emerging only from the time when its real impact has increased significantly above its usual fluctuations. This retrospective qualification is based on the analysis of the impact recorded in recent years and reflects the latest known values of the impact.

3.2 Animal Diseases

The diseases identified in ACF intervention zone are recurrent and endemic. Among them are particularly noted telluric diseases and trypanosomiasis in cattle, camels, sheep and goats; PPR in goats. The diagnosis of these pathologies in the Grand Kanem is solely based on clinical and epidemiological features. While considering the laboratory analysis results of some pathological material taken, confirmed in the study area and symptomatic treatments observed among farmers, it is appropriate to use the term to describe the suspicion results.

Ticks are not disease, but vectors that cause diseases. In some circles breeders notably North Kanem, ticks are considered as diseases. They are the cause of chokes, weaknesses observed among animals. The name of the disease is most often confused with the tick.

3.2.1 Diseases of Cattle

Table 1: Recurrent pathologies in cattle

Some symptoms of pathological manifestations	Onset period		Suspicion	
		English	Local languages	English
Local Arab				
Flickering, tearing, hair bitten, anorexia, uremia, throat swelling, weight loss	Sef	Hot dry season	Gorane : Djoufour; Kanembou : Bou Foulani : I am; Arabic : Djoufar	Trypanosomiasis
Local swelling with crackling on palpation in muscle (Member), hair bitten, prostration	chité	Cool season	Gorane : Darkatchok; Arabic: Abouwarama, Ambeidi; Kanembou : Bantou foutouna	Blackleg
Diarrhea, prostration, sudden death of animals in good overweight	Kharif	Season rains	Gorane : Dachounou; Kanembou: Balto Fulani : Balki; Arabic : Amdrédimé	Anthrax
Significant edema, prostration, nasal discharge	chité	Cool season	Gorane : Goufoudou Kanembou : djourdjour	Pasteurellosis
Weakness, cough, dyspnea with noise, discharge, prostration, no diarrhea	Sef	Dry season	Gorane : Safo / dofonagna; Kanembou : Foufou; Arabic : Amfachfache	Contagious bovine pleuropneumonia (CBPP)
Sores in the mouth, teats and hooves, salivation, loss of appetite, weight loss.	Sef	Dry season	Gorane : Kagna Kanembou : Talam Fulani : Mborou Arabic : Ablissane	Foot and mouth disease
Mouth sores, hypertrophy of lymph maxillary	chité	Cool season	Gorane : Bouloum	Orf
Small nodules throughout the body, blindness	Sef	Dry season	Gorane : fourtoum	Smallpox
Thinning hair bitten	Sef	All seasons	Gorane : manassou Arabic : amgourdam	
Prostration, deep set eyes, died after drinking	Sef	Warm season	Gorane : Gire Fulani : Dam	Heatstroke

Table 1 is outside all the symptoms described by many authors; but the few markers signs, periods of occurrence of diseases linked by clinical diagnoses confirmed by the Laboratory show that farmers are well aware of the above mentioned diseases. The most recurrent were: the two diseases (blackleg and anthrax), pasteurellosis, trypanosomiasis, contagious bovine pleuropneumonia (CBPP) contagious ecthyma and foot and mouth disease (FMD). According to breeders these diseases are regularly and sometimes periodic (3-5 years) present in their herd. Angaya [4] considers this period of 3 to 5 years as a herd replenishment period. Because of losses and socioeconomic impacts they cause, these diseases on the list of diseases Renowned Legally Contagious (MRLC) and are subject to monitoring through 152 veterinary stations of the country. Regarding vaccination, the only blackleg and anthrax were made mandatory in cattle in areas where occurring outbreaks of these diseases [4, 5, 16, 21]. For all field officers encountered, measures against trypanosomiasis, CBPP contagious ecthyma and FMD should be mandatory, because of the consequences listed above and the frequency of their occurrence. Because of insufficient and fragmentary data on these diseases, the study focused particularly soil-borne diseases.

Anthrax

Anthrax is one of the oldest recorded diseases in both humans and animals. It is a soil-borne disease affecting mammals, mainly domestic and wild herbivores (cattle, sheep, goats, horses, donkeys, antelopes, elephants, and hippos), exceptionally some carnivores (lions, dogs, hyenas, jackals, etc.). It is caused by *Bacillus anthracis* belonging to the family Bacillaceae. The shape can be peracute (sudden death in 6 - 12 hours without symptoms); subacute extending for more than 3 days called "external" or "tumor" (oedematous reaction in a few hours up to 20-30 cm diameter, warm, painful, not crackling, located most often at the throat or at the entrance of the chest). The course of acute anthrax does not last longer than 2-3 days.

Breeders of Lake believe 40% the mortality rate in sheep/goats [1]. Exploiting the archives, Angaya [4] observed 17% of morbidity and mortality, 18%, 37%, 5% and 9%, 5%, 21% and 5% respectively in cattle, sheep / goats, donkeys/ horses and camels. These observations reveal an anthrax epidemic peak in July and December. Hadjer Lamis, Kanem, Bahr El Gazal and Lake Regions are among the most affected areas. In addition to a staff of 6174 transhumant cattle and 765 sedentary, over 90% of transhumant farms are affected against 8% in sedentary. Morbidity was 16% against 23% and mortality by 10% against 3% [4, 15]. This contrast shows a little knowledge of the disease and the mastery of farming practices. The incidence seems certainly varied over time because of insufficient veterinary services and inaccessibility of

pharmaceutical products. Moreover, even mastered the transhumance routes and can avoid areas at risk by learning about the weekly markets in nearby towns, they vaccinate less livestock. Sedentary them, usually have no choice of course. Nevertheless they are those, which after the onset of the disease in the village vaccinate their livestock against soil-borne diseases.

Records show a very low rate of vaccination against anthrax in the study area. It is 0.01% in Hadjer Lamis; 0.12% in Kanem; 0% in Bahr El Gazal and Lake [16].

Blackleg

Blackleg is a poisoning, inoculable, which mainly affected cattle and sheep, sometimes pigs and horses. The infectious agent is *Clostridium chauvoei*, the classical causal organism of gas gangrene. The spores of this pathogen are highly resistant. They can survive for years in the soil and contaminate the pasture. The disease results from the ingestion of spores of *Clostridium chauvoei*, anaerobic bacillus *Clostridium*, *septicum* or gasifier [28]. It is sporadic or enzootic. The symptoms can be in general (fever, total anorexia, depression, etc.) and local (single specific tumor or multiple, cold and crackling on palpation, hemorrhagic oedema)

Producers estimate that 30% of economic losses caused by this disease. Very little reliable data exist in the study area. However, it notes that in Kanem region 0.57% of cattle were vaccinated against blackleg [16].

Pasteurellosis

Pasteurellosis is bacterial disease of animal origin. It is a disease that affects humans and animals (cattle, rabbits, pigs, chickens, etc.). The pathogen, *Pasteurella* spp. are coccobacilli or rods, 0.3 to 1.0 µm in diameter and 1.0 to 2.0 microns in length [9]. According to the most widely accepted hypothesis, animal pasteurellosis is a disease, which is weakened, stressed and subjected to poor hygiene conditions. The infection can remain subclinical. Pasteurellosis is more often responsible for respiratory and systemic infections in acute or per acute during stress or transport among weakened animals. Mortality sometimes reaches 70% to 100%. Clinical signs are most often are: anorexia, respiratory form (pneumonia, rhinitis, sinusitis, tracheo-bronchitis), a deadly hemorrhagic septicemia form within hours, an intestinal form: mucous and hemorrhagic stools and *peritonitis* lesions suppurative (abscess, arthritis, endocarditis)

Animal is sources of the germ. Human is contaminated by direct inoculation of this organism during a bite, a bite or a scratch, cat or dog more often.

Although present on the list of diseases to be monitored for several years, the report indicates that Pasteurellosis has not been subject of any vaccination in the study area. No Data exist [16].

Contagious Bovine Pleuropneumonia (CBPP)

The period of invasion is the congestive phase and lasts for a maximum 5 days. The usual signs of all infectious syndromes settled: sadness, anorexia, irregular rumination, and drop in milk production high fever is not mandatory and intensity usually varies in the same direction as the speed of evolution of the syndrome; in most cases it does not exceed 40°C. As for soil-borne diseases, vaccination against CBPP is normally imposed on all cattle on the national territory in its entirety, although no regulatory text exists to formalize the mandatory nature of this prophylaxis. The Lake Chad region is a high prevalence area for CBPP (over 50%), and should therefore be subject to a larger vaccination effort. However, there is a vaccination coverage rate of 2.25% Lake; 3.53% in Hadjer Lamis; 0% in Bahr El Gazal and Kanem [16]. What remains very low for such a disease, recurrent in the beginning of rainy season?

Trypanosomiasis

It is usually transmitted by animals blood sucking: bugs, tsetse flies in Africa, vampire (vampire bat) in South America Trypanosomiasis is observed in sheep cattle, goats, camels, horses, dogs and cats. Cattle are particularly sensitive to the *Trypanosoma congolensis*, *Trypanosoma vivax* and *Trypanosoma brucei*. Some species and livestock breeds like African buffalo, Ndama and Keteku seem to be

trypanotolerant and do not suffer from clinical disease. Calves are more resistant than adults [18].

In Chad, the areas infected by tsetse flies, vectors of the parasite reaches 100000 square kilometers with over a million head of cattle exposed to the disease. Transmitted by tsetse flies, tabanids parasites cause in hosts: anemia, oedema, in places such as the abdomen, the sleeve; decline in milk production, abortion in pregnant females. Death can provide. In the Lake (Ngouri for example), farmers believe that it causes more than 40% mortality, loss in meat production - 28% and milk-40%. In most cases, the diagnosis of trypanosomiasis is focused only on the basis of clinical signs, as most suspicions are not confirmed by laboratory test.

The reality of the disease is therefore vitiated by an uncertainty related to the lack of sensitivity of clinical diagnosis.

Foot and Mouth Disease (FMD)

Breeders have good knowledge of this disease plaguing regularly in the area. In cattle the disease varied from 23 to 43% with a mortality of 5-52%; regarding small ruminants, it was 48% in sheep and 15% in goats with a respective loss of 6-7%. Loss of milk is estimated at 75% and labor, 67%. The disease causes 2% of abortions in pregnant animals [15]. Although part of disease monitoring, no reporting were observed for several years.

Table 2 clearly shows that disease surveillance is very low or non-existent in the area of ACF project.

Table 2: Reporting in the ACF area

Regional delegation Livestock	Number of monitoring stations	Total pages / Month	Forecast	Achievements	Rate of achievement
Hadjer -Lamis	14	5	70	0	0.0
Lake	13	5	65	0	0.0
Kanem	14	5	70	0	0.0

Source: DVS, 2010

The causes of this contradiction derives are the deprivatization of the livestock sector. Accompanying means have not followed the privatization process. The public services cannot vaccinate in areas where private veterinarians settled so that they do not have enough resources to meet the needs of breeders. Also, training in one or two weeks of breeding auxiliaries, appointed by the livestock community has not solved the problems of access

to veterinary services. At present it is these auxiliaries, who are all in the field, ranging from primary treatment and health care to the administration and vaccination. Quality, origin and dose of products and vaccines still far from meeting the needs of the animal. This lends to the complication of health of livestock, hence the duty of supervision and reporting of public services.

3.2.2 Pathologies of Camels

Table 3: Identified pathologies in camels

Some symptoms of the disease outbreak	Onset period		Suspicion	
		English	Local languages	English
Local Arab				
Swelling of the hind limbs (shoulders), uremia, lameness	Kharif	Rainy season	Gorane : Darkatchok Arabic : Abouwarama, ambeidir	Blackleg
Pasty diarrhea, weight loss, abortion of female	Kharif	Rainy season	Gorane : Cherchina Arab Somal	Haemonchosis
Tearing, hair dive, edema in the lower abdomen, emaciation, agalactia, loss of appetite, urinary retention and / or strong odor.	Sef	Dry Season	Gorane : Djoufour Kanembou : Bou Arabic : Djoufar	Trypanosomiasis
Swelling of the neck and mandibular lymph nodes, hair bitten, constipation, diarrhea greenish abortion	Kharif	Rainy season	Gorane : Djahdir Kanembou : ndjourndjour	Pasteurellosis
Sore on the lips, swelling of the head	Kharif	Cool and rainy season	Gorane : Bouloum Arabic : Amededèche	Ecthyma contagious
Hair loss, itching sores on the skin, weight loss,	Sef	Dry Season	Gorane : tourkom Arabic : Djarab	Hygroma Galus
Emaciation, edema lower neck, agalactia, abortion	Sef	Hot and Dry Season	Gorane : Kouli Arabic : Dout	Intestinal worms
Thinning hair bitten	Sef	Dry Season	Gorane : manassou Arabic : amgourdam	Parasitic external
Prostration, deep set eyes, died after drinking.	Sef	Warm season	Gorane : Gire Fulani : Dam	Heatstroke

In the project area, especially the lake Region is known for worms (flukes) in camels. They are usually treated with antihelminthes (levamisole and *albendazole*). Blackleg and pasteurellosis are recurrent; vaccinations against these diseases are not the subject of an obligation regulated since 2001.

Trypanosomiasis is recurrent in Lake Region. Over 40% of deaths attributed to this disease, which occurs in cattle and camels in the area.

Some ectoparasites are also worth noting: the haemonchoses, intestinal worms, ticks, Gallus hygroma. According to breeders these parasites play an important role in the impairment of the quality of meat and milk.

3.2.3 Diseases of Small Ruminants

Table 4: Identified pathologies in Small Ruminants (Ov/cap)

Some symptoms of the disease outbreak	Onset period		Suspicion	
	English	Local languages	English	English
Local Arab				
Cough, purulent nasal discharge and watery eyes, swollen lips and edematous, profuse diarrhea or soft	Chité	Dry season and fresh	Gorane : Ari Kanembou : Kourfou Fulani : Fufu	Plague of Small Ruminants
Cough, nasal discharge, dyspnea, no diarrhea, legs apart	Chité	Dry season and fresh	Fulani : Karganguel	PPCC
local edema (members), diarrhea, hair bitten, prostration	Chité	Dry season and fresh	Gorane : In in Kanembou : ndjourndjour	Pasteurellosis
Jitters, diarrhea, high mortality, sudden death	Kharif	Rainy season	Gorane : Dachounou Kanembou : Balto Fulani : Balki Arabic : Amdrédimé	Anthrax

Diseases of small ruminants in the area identified on the list of diseases to be monitored in Chad. It should be noted that among the diseases mentioned Peste des petits ruminants (PPR) dominates in this species.

Peste des petits ruminants also known as the "goat plague", is a viral disease of goats and sheep characterized by fever, mouth lesions, diarrhea, pneumonia and sometimes death. The disease is caused by a virus of the genus *Morbillivirus*, family of Paramyxoviridae). PPR virus is not resistant to the external environment, which implies a close contact for transmission. It is excreted early, at the onset of hyperthermia, in conjunctival secretions, the nasal discharge, saliva and feces. Transmission is by air through

the nasopharyngeal mucosa. The animals were either dead or heal with long term immunity [27].

In Chad, PPR is enzootic with low mortality, but affects most small ruminants. Nearly 70% of the goats have anti-PPR antibodies [10]. According to farmers, the appearance of PPR is cyclical (4-5 years) with a mortality rate that varies between 40-80%, in the affected villages. This frequency seems to correspond to the reconstitution of a susceptible population. Vaccination is not performed in the ACF area, where the mortality due to this virus is approximately 50%.



Figure 1: Sheep PPR reached Kanem



Figure 2: Goat reached PPR (FAO)

3.2.4 New Pathologies

Table 5: Diseases to be identified

Some symptoms of the disease outbreak	Period	Animal species	Cases by farmers	Local name
Diarrhea with traces of blood	Dry season	Cattle	Dirty water, fed	Gorane : Cherchina
Crack teeth, contraction, torticollis, death	Warm season	Camels, Cattle, Sheep / Goats, donkeys	Kangar (Tree bafon) or <i>Propropis</i> sp.	Gorane : Shemei / Guefiri
Maxillary swelling and paralysis	Warm season season indicate otherwise remove the line	Camels	<i>Leptadenia pyrotechnica</i>	indicate the name otherwise remove the line
Ingestion of foreign bodies, earth, corpses, urine	Dry season	Cattle	Mineral deficiency	Gorane : Sorop
Swelling of the head and neck, runny nose, gasp, cough	Dry Season	Small ruminants	Unknown	Gorane : Daoufoudi
Stiff neck, torticollis, death	Dry season	Camels, Sheep / Goats	Unknown	Not

Some breeders Gorane report that oasis Yeguil I, II and Bour home to plant flowers, Kangar (mesquite). Consumption of these flowers causes contractions and

torticollis in camels, teeth crackling in cattle and goats. In camels food bowl usually remains in the mouth. Others say that it is rather the "*Leptadenia*" that causes this jaw paralysis. Death occurs thereafter.



Photo 1: *Leptadenia pyrotechnica*, very species present in the study area

By cons, in the Lake Region (Ngouri), consumption of *Leptadenia* and *mesquite* causes abortion in cows in the last quarter of gestation. This is why the animals are sent to Lake Months from December to March: a form of prevention against this phenomenon, which is observed in recent five years.

Cases of neck stiffness and torticollis, followed by death in camels were reported in Bahr El Gazal. In the Hadjer Lamis region, it's early in sheep / goats that similar symptoms have been described. The cause of these diseases is poorly understood.

It would be interesting to conduct a study to determine the nature of these species, consist essentially of *Leptadenia* and *mesquite* in Kanem and Lake Regions. It is the same for other diseases such as sorop, cherchina daoufoudi in Gorane and those that are not known in French and Gorane.

In general, all the above-mentioned diseases have been well described by breeders. Periods of disease occurrence, onset is also well known by breeders. This shows not only familiarity those breeders of these diseases, but also the level of knowledge of diseases by livestock farmers. They are known to the socio-economic, cultural impacts they cause. But as for treatment, the source of disease and especially prevention, they are far from known and controlled by them.

3.3 Factors Promoting the Emergence

Five factors have been formally identified in the study area: the production system, cursed fields, the concentration of animals around water points, the presence of some disease vectors, and the failure of the privatization of livestock sector.

3.3.1 Livestock production system

In the area of our study (Figure 3), the most common production system is pastoralism. Pastoralism refers to both a productive activity and a way of life that can be seen as an occupation arising from a true vocation [2, 3, 8]. According to Bourget [11], pastoralism is "a form of production in which the material existence and social reproduction of a group are organized around ownership, operation and movement of the flock".

We consider these two definitions as part of this study embody both an economic, cultural and historical dependence primarily related to raising animals in a herd composed [29]. This is in most cases of ruminants (small and large ruminants) conducted on rangelands and the name associated with it is that of the pastor.

Pastoralism therefore is the result of an overlapping of several factors anthropological, sociological, environmental, and economical and animal husbandry. The definition of pastoralism becomes difficult if you want to stick exclusively to a single discipline. This difficulty accurately define pastoralism term led each specialist to adapt its definition, each according to his conception of this rural reality.

Nomadic pastoralism, therefore, refers to a form of pastoralism in which the mode of residence and occupation of space is based on mobility. One of the most completed forms and more organized nomadic pastoralism is probably transhumance. It is a pastoral production element that is to get the pasture where it is located. It is induced by a movement whose structure is based on annual cycles dictated by ecological and climatic conditions. It is exercised by an almost unvarying pattern within a space is successively operate several sectors (depending on availability in quantity and quality of the different pastoral resources) during the year, which is renewed for year by year as the rainfall conditions, social and economic remain relatively stable.

Through these definitions we note that the factors of pastoralism described by some authors [8, 11] are the same as those listed by the High Council of Public Health related to the emergence of an infection. As such these factors deemed responsible for the emergence of infections will require forecasting, control measures.

Pastoralism, as the operating system of the animals in the study area has enough advantages and disadvantages. Without going into detail, the advantages include a good diet along paths of transhumance. As for drawbacks, contact between animals from different types of households favor the onset of disease; the scarcity of water, which induces a concentration of animals of different physiological states around the water points increases the virulence of the infectious agent and certain diseases that occur periodically during the course or year. [7, 9, 20]

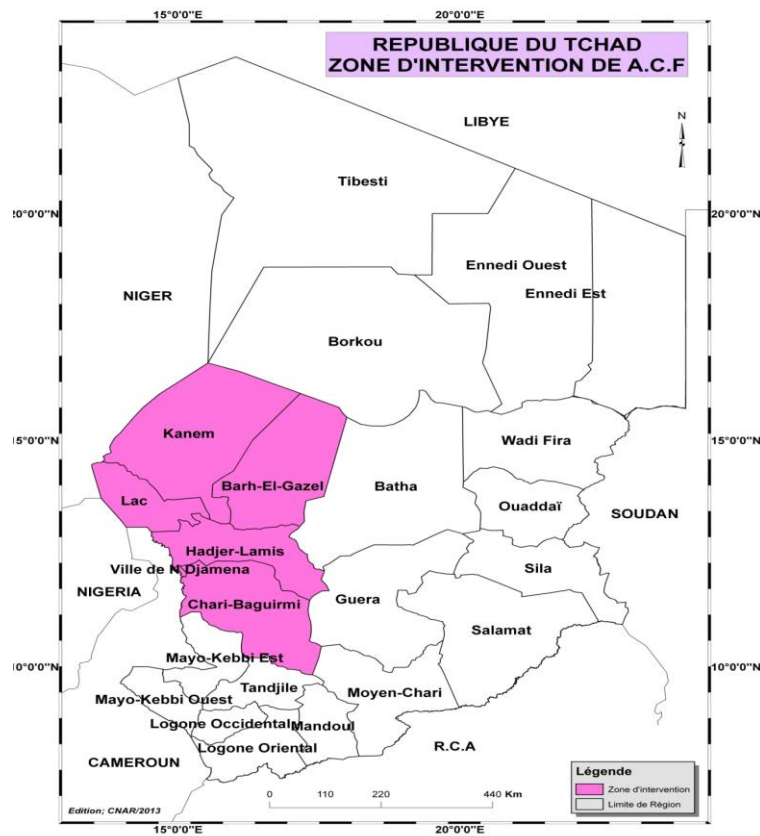


Figure 3: Study Area (pink)

3.3.2 Fields cursed

Infectious agents of soil-borne diseases are bacteria (*Bacillus anthracis*, *Clostridium chauvoei* or *septicum* and *Pastereulla miltocida* or *hemolytica*). Spores of *bacillus* and *clostridium* are very resistant infectious agents in nature. They can survive for many years in the soil and contaminate the feed surfaces. This is why the diseases are observed during the rainy season. Poor management of dead bodies, disease sources is a handicap for the breeding of the region. During the period of poor pasture from May to June, (scarcity of grass and wood heaters) corpses dumped in nature are counted in the hundreds. These animals died

because of disease that is usually not diagnosed. Some breeders say burying the dead animals' suites contagious diseases like anthrax and blackleg. Others believe that the corpses littering the corridors are the corpses of starved animals (Figures 4 and 5).

In all cases after death, the animals are to be burned, or left in the wild. The lack of control over corpses destruction technology make these places, which are called "cursed fields" and in turn become sources of infection. They intervene in the cycle of occurrence of soil-borne diseases. This is why anthrax, blacklegand pasteurellosis are endemic [9].



Figure 4: Goat thrown in nature (Lake)



Figure 5: Cattle kouri badly burned (Lake)

3.3.3 Concentration of animals around the water point

Animals typically are hosting or are carriers of microorganisms including viruses, bacteria and other. In their travels, cattle are accessible to all weather conditions. The extension in space and time the duration of transhumance, the decrease in food resources are losing enough energy to animals, reducing their growth performance. The animal health conditions can vary during this period leading to the weakening of its resistance to various attacks. The momentary interruption of transhumance by natural factors such as crossing the "Ouadis" and rivers, water shortages and depletion of natural ponds, etc. drive the crowds and so a forced proximity of various herds of origin, because contamination by various pathogens. The concentration and the contact accelerate the onset of certain diseases [6].

Animals drink water from different sources during the year, which remain more or less prone to livestock contamination by microbes. The risk of contamination significantly increases during the rainy season by the consumption of surface water including the beginning and end of the season when animals are concentrated around water points. A high density of animals in the urine and feces contaminate water already disorders, stagnant conditions for the proliferation of certain parasites. Recognizing this, some breeders do water their animals than with a half-barrel, collecting water themselves not following the edge of the heavily polluted pond.

3.3.4 Presence of some disease vectors

Besides the stress of transhumance along travel, the animals spend a lot of energy, which weakens their resistance to various attacks. A forced proximity of various herds of origin, linked to the scarcity of surface water, ponds and wells, promotes exchange carriers hosts pathogens. Around Lakes, "Ouadis", ponds, etc. we encounter flies, mollusks, and others that ticks are carriers of parasitic diseases [7]. No measure of consistent struggle is organized. Breeders take deworming products for livestock and not fight against the hosts. However traditional control measures are sometimes observed in some communities. During the period of high concentration, they send their animals in areas where vectors are fewer.

3.3.5 Failure of privatization

Since the privatization of livestock sector, farmers and auxiliaries are not attended as in the past. Self-medication is common among breeders. Auxiliary trained

have become "doctor Choukou". The products all comers are often administered to animals for the most cases eventually die. The lack of control health care is a real problem that most often leads to death of the animal. There is also the problem of under dosing of veterinary products is recurring. The non-technical mastery health care can develop some resistance in animals that will eventually become a source of re-infection in the herd.

Access to inputs is strongly related to veterinary structures in the area. Apart from veterinary pots, there are no other structures. To meet the specific invocation, the veterinary officials are forced to guard a few products (antibiotics and vaccines). The real problem is the movement of the agent. Although a minimum of 1,000 animals seems to be exaggerating to move a veterinary technician to more than 50 km, it is recognized that no agent can move if he is not sure to cover its expenses. Pharmacies and drug stores are almost nonexistent. Private veterinarians are not installed in the study area. Access to veterinary structures seems to be very difficult. Access to quality products is also limited, which promotes the proliferation of "doctor Choukou" and all the products coming in the weekly markets; resistance and the emergence of diseases.

4. Conclusion

The diseases mentioned by the farmers of the regions of Kanem, Bahr El Gazal, and Hadjer Lamis are well-known diseases of veterinary services. Most of them are on the list of diseases called "Legally enowned Contagious Diseases of Animals in the Territory of the Republic of Chad" because of the socio-economic consequences they entail. This situation makes them so-called emerging and re-emerging diseases. The endemicity of some of these diseases is due to the presence of reservoirs and contributing factors include: (i) the permanent presence of potential disease vectors (ticks, flies, snails etc.); (ii) inadequate pastoral wells in the area that causes a concentration of patients and carriers can infect animals or reinfect them; (iii) lack of access to veterinary products and treatment favoring the microbial load in animals; (iv) insufficient qualified staff dealing promoting non-technical mastery of treatment and health care; (v) the low level of organization of farmers, which is the main cause of lack of respondents in terms of action to be taken on the ground.

Some identified diseases appear to be recent. According to farmers, the *Leptadenia* and *Prosopis* cause maxillary paralysis and abortion in camels and cattle. These plants have a long history and are consumed by livestock, but the clinical manifestation of the disease in camels and cattle is recent and deserves special consideration.

The organization of farmers worth studying because auxiliaries, which usually disappear and leave farmers to their fate. It also allows for respondents on the ground to act in real time, and to solve the issue of access to the products. The appropriation of sound technical and practical action is long term. Awareness and training should be the basis of this activity, which can improve the health quality of animals in the area.

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