



Causes of ovine's mortality at the National ovine Center of Bétécoucou in Benin

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Abstract

The management of animals in pasture at the National ovine Center in the breeding farm of Bétécoucou is confronted by some constraints that make the level of production remain low for several years. This study aims to identify the causes of animal's mortality at the national ovine center of the Bétécoucou breeding farm in Benin. The biological material consisted of sheep from the National Ovine Center. It is a flock of pregnant ewes, lactating ewes, rams and lambs. The sampling unit is consisted of the small ruminants of the Bétécoucou breeding farm. The study included a population of 576 sheep of the center of which 41 rams, 21 male yearlings, 18 female yearlings, 301 pregnant and lactating ewes, 83 lambs and 112 ewes. The analyzed data relate to the feeding, livestock management, livestock buildings and watering animals at the National ovine Center. During the study, we recorded 38.46% mortality of lambs of the study sample and 15.46% mortality of the total study sample. Thus, we have shown that animal mortality at the center is not only related to pathologies but to feeding, livestock management, operations carried out on animals, consanguinity and livestock buildings.

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Introduction

To cope with the constraints and improve the breeding of small ruminants in Benin, several farms have been created to strengthen them and improve the breeding of small ruminants including that of Bétécoucou oriented in the production of ovine, bovine and vegetable. Sheep breeding of National Ovine Center is semi-intensive and characterized by management of animals in the pasture. This management is confronted by some constraints which make the level of production remain low for several years. Indeed, parasitosis, pneumonia, enterotoxaemia and dermatosis are the diseases that are the basic of animal mortalities (Lancelot *et al.*, 1995; Mourad, 1993; Abadie and Thiery, 2006; Bhanuprakash, 2006; Everett-Hincks and Duncan, 2008; Gautier *et al.*, 2012; Gokce *et al.*, 2007; Green and Morgan, 1993; Khan, 2006; Lacasta, 2008; Mandal, 2007; Faye and Alary, 2001). These diseases from year to year affect the health of animals and are the major problems of the National Ovine Center and the breeding farm of Bétécoucou. But given the multiplicity of care, preventive and curative treatments given to animals, mortality has remained considerable for years. That's why we oriented our research on the causes of mortality at the National ovine Center of Bétécoucou in Benin.

Materials and methods

Study area

The study area is represented by the breeding farm of Bétécoucou which shelters a multitude of animal species, which also implies a multitude of livestock management. This diversity of animal species and their management has made it possible to characterize the farm as one of the largest farms of the country. Located in the district of Akoffodjoulé between 2°20' and 2°27' E longitude and 7°45' and 7°50'N altitude, the farm covers an area of 10780 ha 89 a 46 ca of which about 2/3 are being exploited by animal and vegetable production. We chose the National Ovine Center of the Bétécoucou farm because it has a large small ruminant herd and is an important center of production of meat and fodder.

Biological material

The biological material was consisted of ovine from the National Ovine Center. It is a flock of rams, yearlings, pregnant and lactating ewes, lambs and ewes.

Technical material

For the work, the material used was consisted of:

- Records sheet of the working sample;
- Birth and death registration cards;
- A logbook of animal operations;
- Plates marked with numbers used to identify births;
- Wheelbarrows, machetes and hoes;
- A range of drugs to treat sick animals and to do the preventive treatment.

Methods

This work was carried out in three stages which are documentation stage, data collection stage and data processing stage.

During the documentation and enlightenment stage, we consulted the available literature on the causes of animal mortality in a sheepfold, in libraries and interviews with the resource persons.

The data collection stage consisted of collecting of essential data for the identification of practices that are risk factors for animal mortality through structured interviews. The National Ovine Center on the Bétécoucou breeding farm was selected and analyzed. During this phase, we participated fully in all activities of the center to understand how they work and how these activities relate to animals health. During this phase, we recorded the chronology of the practices and all the anomalies related to the practices able to affect the health of the animals.

Choice of sampling unit

The sampling unit is constituted of the small ruminants of the Bétécoucou breeding farm. A small ruminant from the Bétécoucou farm is defined as any sheep living on the National Ovine Center of the farm. Thus, the defined population is all ruminants of the Bétécoucou farm. A reasoned sample was used. The sample is consisted of 41 rams, 21 male yearlings, 18 female yearlings, 301 pregnant and lactating ewes, 83 lambs and 112 ewe.

Data processing phase

During the data processing phase, after having written a bibliographic synthesis on the topic, the data resulting from our observations and analyzes are treated with the Excel 2013 software, commented and discussed.

Results

Evolution of the ovine population of the National Ovine Center

The National Ovine Center is a company that advocates the fattening of ovine species since its creation in 1990 during the second phase of the Animal Production Development Project II. Thus, since 2011, the number of animals has remained virtually unchanged because each year, the center puts on the market, a large number of animals to satisfy the population in terms of demand of ovine meat. Table 1 summarizes the number of animals in the center since 2011.

Table 1. Number of ovine since 2011.

Years	2011	2012	2013	2014	2015	2016	2017
Populations	427	429	371	361	371	543	576

In addition, the animals in the finishing phase that the center puts on the market, the diseases also persisted and they decreased the number of the herd each year. In fact, parasitic infections, pneumonia, enterotoxaemia and dermatitis are the main diseases recorded by the center every year.

In the last six years, these diseases have reduced the performance of animals. These diseases have undergone a great evolution in the center. Thus, the morbidity related to enterotoxaemia, pneumonia and dermatosis decreased from 2011 to 2016. During this period, the animals affected by the parasitosis increased from 2014 to 2015 before falling suddenly. In total, due to the number of animals affected by parasitosis and pneumonia, animal morbidity remained considerable from 2011 to 2016 (Fig. 1).

Mortality recorded per disease at the National ovine Center

In the last six years, the National Ovine Center has gone through a period of time when parasitic

infections, pneumonia, dermatosis and enterotoxaemia were severe. These diseases are responsible for the large loss of animals recorded by the center. In addition, these diseases attacked all animal categories without exception. Interviews and data collection allowed us to record deaths caused by each of the disease in the center. Fig. 2 shows the evolution of deaths for each disease in the center from 2011 to 2016 (Fig. 2).

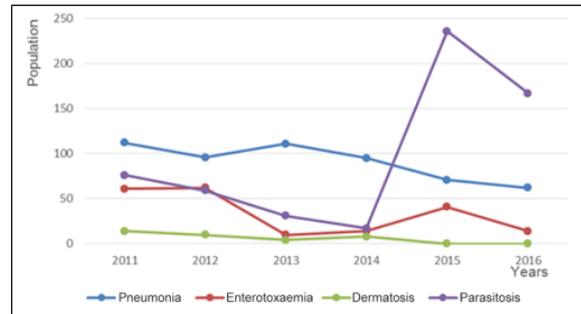


Fig. 1. Evolution of diseases morbidity cases at the National ovine Center.

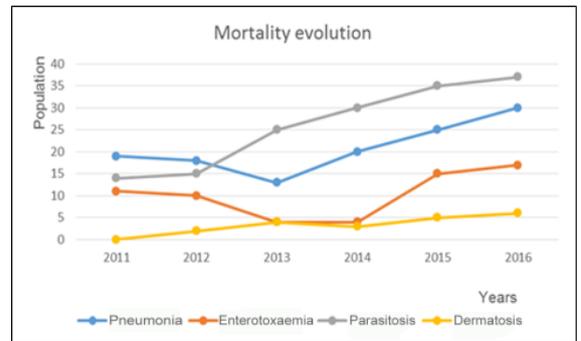


Fig. 2. Evolution of the mortalities caused by diseases at the National Ovine Center.

A multitude of drugs have been used to treat diseases. From 2011 until the moment our research was done. The drugs used to treat parasitosis, pneumonia, enterotoxaemia and dermatosis remained the same. Table 2 presents the drugs used for the treatment of these diseases.

Table 2. Diseases and medicines used for their treatment.

Diseases	Drugs used for diseases treatment
Dermatosis	Oxy 10% ^(R)
Parasitosis	Albendazol ^(R) , Stress Vitamine ^(R)
Pneumonia	Oxy 10% ^(R) , Albendazol ^(R) , Boluvit ^(R)
Enterotoxaemia	Oxy 10%, Fercobsang ^(R)

Total mortality recorded

Pneumonia, dermatosis, enterotoxaemia and parasitosis have caused considerable loss of animals since 2011 as shown in Fig. 3.

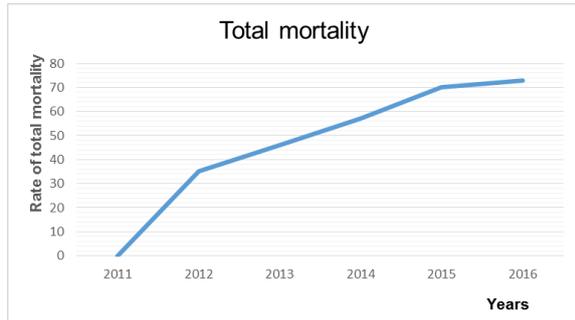


Fig. 3. Evolution of total mortality caused by diseases.

Prophylaxis of the National Ovine Center

In any breeding structure, disease prevention is the primary objective of the breeder because prevention is better than cure. Our collection of data at the National Ovine Center allowed us to highlight the prophylaxis plan used since 2011 to prevent diseases. This prevention is done by bathing and injection

methods. Table 3 is the functional prophylaxis plan at the National Ovine Center.

The prophylaxis plan presented is used every year at the National Ovine Center. If this prophylaxis plan has been used rigorously and the treatments have been carried out on time to treat any disease, what could have been the causes of the high mortality rates observed each year? In as much as we have not done the laboratory test to confirm or invalidate the state of these cases of mortality, we admit to involve the part of some zootechnical parameters.

Feeding, livestock management and building are also the zootechnical parameters that we suspect to be involved in the causes of animal mortality at the National Ovine Center because a malfunction can harm the health of the animals and cause their mortalities. Moreover, the persistence of mortalities may be due to the fact that it is the same products that are used for the treatments. Let's analyze the farming practices.

Table 3. Prophylaxis Plan of National Ovine Center.

Categories	Treatment	Frequencies	Duration of operation	Products used
Ewes and rams	Internal de-worming	Once a month	1 day	Vetalben® or Benzal® by oral route
	Prevention against plague of small ruminants	Every year	1 day	Capri Pesto Vaste® by Intramuscular route
Male yearlings, Female yearling, Lambs pre-weaning	Vitamin intake	Everyday		Fercobsang® by oral route
	External de-worming	Twice a month	1 day	Alfapor Spry & Dip® by bath
	Internal de-worming	Twice a month	1 day	Bensal® by oral route
	Vitamin intake	Everyday		Fercobsang® by oral route

Animal management at the National Ovine Center of Bètécoucou

The animals of the National Ovine Center are mostly of Djallonke sheep but there are some Sahelian sheep. The animals are distributed in the buildings according to the sex, the development stage and according to their adaptation to the different available buildings. Each lot of animals has a building with a feeder and a drinking trough installed outside the building. The animals are driven each morning into farm meadows to graze *Panicum maximum Cl*. The animals benefit from the preventive care according to

the plan of prophylaxis and as a cure in case of appearance of disease. They also benefit from a diet that is common to all animals of the center. An organization of couplings is practiced. Thus, each year reproductive rams are selected from the males of the flock of the center. The selection method used is the mass selection. Indeed, this method consists of choosing reproductive according to their own performance among the mass of animals.

In addition, the method of management adopted by shepherds can affect the growth and health of

animals. Indeed, in a sheepfold, if the male reproductive animals are chosen in farm from the mass selection method, there may be possibility of consanguinity. Consanguinity can also affect the growth of newborns and subsequent mortality in livestock. So besides the diseases that are responsible for the mortality of animals, we suspect that consanguinity can also be the cases of animal mortality that continues to grow every year.

Animal Feeding at the National Ovine Center

The animal feeding at the National Ovine Center is based on artificial fodder installed from the *Panicum maximum C1* since 2010. The ewes, pregnant and lactating and their lambs are subjected to the same food. There is no food supplement. The pasture meadows of the *Panicum maximum C1* plant are degraded with a high rate of bare soil. The fences of the parks where the *Panicum maximum C1* is well developed are also spoiled. This does not allow a good rotation of the pasture. The density of animals is on average 45 heads per meadow of about one hectare.

Thus, in a breeding, the ewes must be distributed according to their stage of development and their physiological state. The distribution of ewes in the center can affect the growth and health of the animals. Indeed, pregnant ewes must be separated from other classes of ewes because the pre-parturient behavior of ewes can affect the monitoring of animals of the lambs of other ewes in a building. In addition, if the density of pre-parturient ewes is high, synchronized lambing can also be observed, which may affect the follow up of newborns. This way can lead to a removing phenomenon that can lead to removing of lambs and subsequently lead to mortality in the farm. The mortalities of the animals at the center can be linked to these phenomena. On the other hand, the degradation of livestock farms, high brushing rates and bare soils in an artificial path can lead to underfeeding of livestock. Also, in the absence of a food supplement in a farm where the paths are degraded, the animals can not cover their needs and will always be cachectic. This phenomenon of underfeeding can be at the base of the mortality of animals in general and in particular lambs.

Livestock building and hygiene at the National Ovine Center

Livestock building is one of the zootechnical parameters whose functionality can influence the monitoring of animals. At the National Ovine Center, the livestock buildings are improved buildings. They are constructed and well oriented to prevail the winds blowing from the East to the West and from the North to the South. A building at the National Ovine Center is built in a rectangular shape with a size of 128 m² at a height of 16 m by 8 m and a wall of one meter in height. Each building of 128 m² is divided into 4 lodges of 32 m². A lodge of 32 m² contains an average of 45 ewes. The floor of the buildings is made of concrete. In short, the National Ovine Center has 6 buildings of 128 m² divided into 22 lodges of 32 m². In addition, the hygiene of buildings at the National Ovine Center is provided by an employee. She is responsible for regularly cleaning of the interior and exterior of buildings. But it is found that the buildings are always dirty without maintenance. In addition, animal monitoring is closely linked to the functionality of buildings. But it is important to know that the construction of these buildings or their disposition can affect the health of animals. Indeed, if the buildings are oriented in the opposite direction to the prevailing winds, this can cause permanent infestation of buildings. In addition, ventilation that influences the body temperature of animals plus uninsured building hygiene can cause physiological dysfunction of animals. All of these factors can be responsible for animal mortality.

Other operations carried out on animals

Several operations are conducted on animals in the direction of strengthening their health and facilitate their identification of animals. These operations concern the internal de-worming, the external de-worming and the identification of the animals by a numbered plate.

The struggle against internal and external parasites is the treatment that the shepherds of the National ovine Center practice to give better health to their animals. Operations are conducted according to the prophylaxis plan and appropriate drugs. Concerning

the struggle against internal parasites, they use Vetalben® for ewes and rams and Albendazol® for lambs that are under their mothers.

The struggle against parasites of the skin concerns all animals. The operation consists in diluting Alfapor Spray & Dip in a drinking trough of 1.89 m³. The dosage method adopted is not in the manufacturer's norms. Then he dipped the animal into the solution for about a minute before leaving it.

The external de-worming method adopted at the National ovine Center may have an effect on animal health. Indeed, we found that when the animal is dipped in the solution, it begins to lap the drug. In addition, lambs that undergo the same operation begin to drool a few hours after the operation. Through this method of bath and the drugs used, the risk of intoxication would exist and may be the basic source of weakness of animals and especially for lambs.

Mortality of animal

On a sample of 480 ovine monitored, with the cares provided, we recorded a mortality of 75 lambs, 9 ewes and 5 rams of which 38.46% mortality of lambs and 15.45% mortality of animals in the sample.

Of all deaths recorded in the growth phase, with care, it appears that females are too fragile to the breeding system and die more than males.

The analysis shows us that single births are more resistant than double births. When in a farm there is a problem of feeding or management, double births are sensible and die more than single births.

Discussion

Livestock management

According to our results, the animals are distributed in the buildings in terms of the sex, the stage of development and in terms of their adaptation to the different buildings available at the National Ovine Center. This distribution was approved by Meyer *et al.* (2004), in the case of animal management in an extensive system. Conversely, from this distribution, Sagot *et al.* (2011) found that animals were distributed

in terms of breed, sex and physiological status. This, according to them, would reduce the effects of contamination in case of appearance of pathology. In our research results, animals are subjected to the same diet. Meyer *et al.* (2004) do not admit this way of feeding animals into an improved state farm. Mass reproduction applied at the National Ovine Center is not a good method according to Youssaou *et al.* (2008). These authors highlight the high risk of consanguinity in the application of the mass selection method in a farm. Xavier and Anthony, (2014), have pointed out the high risk of mortality in a farm by consanguinity when it appears in a farm.

Feeding

The mode of feeding ovine used at the National Ovine Center is different from that proposed by Meyer *et al.* (2004), for feeding ovine on a state farm. They show that in the breeding of state farms, housing, prophylaxis, cares, and especially food and reproduction are improved. The struggle is reasoned. The food supplementation is much followed. This is not the case for our studied farm but can be the basic cause of mortality. Sagot *et al.* (2011) show that it is very important to give a stronger ration at two moments: around fertilization and around calving to obtain good numerical productivity through good fertility and young mortality low. In a large herd, not all animals can be fed individually. Thus, a common ration is calculated with coarse fodder and some complement to cover the average needs of the herd. This way of feeding is not that found in our results. Thus at the National Ovine Center, the animals are put together and receive the same diet. What is rejected by Xavier and Anthony, (2014) who say that in a farm, more demanding lots of animals are constituted (ewes for coupling, pregnant ewes, ewes in lactation, productive rams) and receive a richer ration, calculated according to their needs. Bourassa, (2006), supports our result when he cited the absence of grouping of ewes according to their stage of production in the causes of mortality. Xavier and Anthony, (2014) further that feeding the ewe during the last weeks of gestation has a significant impacts on the life of the ewe and on the weight of the offspring at birth and on its life.

It is therefore advisable to provide a supplementary food at the end of gestation while trying to mitigate environmental factors (especially heat stress) likely to reduce the ewe's food intake during this period. In contrast, underfed ewes have less milk and tend to wean their lambs earlier. These lambs and their mothers are more likely to have lower resistance to diseases.

Building

Gbangboche *et al.* (2016) have found that small ruminants must have the most liberty possible. The building is simply a shelter in case of rain and if it is cold at night. But they pointed out that when the building is badly built, it generates mortality for the farmer. Contrary to what we found at the National ovine Center, Gbangboche *et al.* (2016) show that the building must have a roof, preferably with double slope and sometimes in metal sheet or thatch. The roof must descend from 1 to 1.20m high, with a door allowing the passage of a cart. The floors of the National Ovine Center buildings are in concrete and without litter. This way of construction is rejected by Meyer *et al.* (2004) where they say that the floors of buildings should not be in concrete. Sagot *et al.* (2011) incorporated litter placement in a ruminant lodge. The dimensions of the buildings found in this document are not approved by Adama *et al.* (2010) when they show that a 135m² enclosure was suitable for about 50 Ovine. They found that the buildings of the pregnant ewes must be separated from the buildings of the lactating ewes as well as the empty ewes, which is not the case in the results found for our research. According to the age of the animal, they recommend the following norms. According to Bourassa, (2006), a badly maintained building is responsible for animal mortality at 12%. The absence of footbaths observed in our research center may be a weakness in the struggle against diseases according to Sagot *et al.* (2011).

The installation of a footbath at the entrance of the farm or in front of each building with a length of 4 m and a depth of about 10 cm was imposed by PRODEX, INRAN, MAEP, (2011) to reduce infestation of buildings. Contrary to what we have found, a livestock

building must be oriented in the East-West following the direction of prevailing winds (Xavier and Anthony, 2014). It must have a general height from 2.5 to 3m. Opening of the doors for the passage of animals and personnel placed North and South side with the following dimensions; width 1.5 to 2 m, height 2.2 to 2.4m (PRODEX, INRAN, MAEP, 2011). All of these forms and norms are not in compliance with building norms at the National Ovine Center which may justify the persistence of bacterial and viral diseases.

Mortality of animals

The mortality rate of lambs is 38.46%. This rate is much higher than that obtained (20 to 48%) by Gbangboche *et al.* (2005) at the Okpara farm. However, this rate is higher than those obtained in Ghana, Nigeria and the Kolokopé Support Center in Togo, which are respectively 13%; 14% and 11.7% (Amadou, 2002). As for that obtained on all the animals which from 15.45% this mortality rate is lower than that obtained by Pellicer-Rubio *et al.* (2009) which is 20%. It is also less than 33% that found by Poivey *et al.* (1982) at the Kolda Zootechnical Research Center.

Conclusion

At the end of our research at the Bétécoucou livestock farm, we learned about the technical and practice of breeding small ruminants. It has allowed us to better understand the various problems faced by state farms in Benin. It also allowed us to better understand the management of a sheepfold and to understand the advantages and constraints of breeding small ruminants. These constraints are related to animal mortality. This research has made us to understand that animal mortality is not only linked to pathologies but also to feeding, livestock management, operations carried out on animal, consanguinity and livestock buildings.

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