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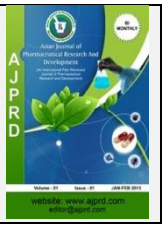

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Research Article

Causes of Abortions Occurring in Red Goats from Maradi, Tessaoua and Madarounfa-Niger

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ABSTRACT

Abortion, the termination of gestation with expulsion of a non-viable fetus, is a complex process that includes embryonic death and clinical abortion. This subject is of major concern because of its economic and health implications.The aim of this study is to identify the various possible causes of abortion, particularly in the Maradi Red goat. This study used targeted sampling at the Maradi Caprine Centre and in two other departments. From a total of 452 sera analysed by indirect ELISA, 65 (32.5%) were positive for chlamydia, 45 (22.5%) for toxoplasmosis and 0 (0.00%) for brucellosis. To this end, the veterinary and public health services need to reinforce their collaboration in order to establish a programme for controlling the most common zoonoses.

Key words: Abortions, causes, red goats, Maradi, Niger.

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INTRODUCTION

Niger is an agricultural and pastoral territory where livestock is the second most important source of export revenue after minerals, contributing around 12% to GDP. Small ruminants play an important role in the household economy of the Sahelian region, with a total livestock population of 20,867,000 head in 2018. In Niger, goats are represented by three main breeds, including the Sahel goat, the Maradi red goat and the dwarf goat. Among these breeds, the Maradi red goat is of great socio-economic importance to breeders, particularly women. This breeding represents an activity that generates substantial income. The most emblematic goat breed in the region is the CRM, with double, triple or quadruple litter frequencies from the first litter (generally a single litter), continuing until the end of reproduction (6 to 7 years) [1].

Despite this socio-economic importance, goat farming in Niger is limited by climatic and health effects. Among these various restrictions, abortions are a major concern because of their economic and health impact, and represent a major obstacle to livestock farming. The causes of these abortions are generally multiple, whether infectious or not.

In France, studies conducted by Rodolakis A. (2006) [2] observed a seroprevalence of abortions due to Chlamydia abortus of 10% in females that had recently given birth. In Morocco, a survey performed by Berrada J **&** al. (2004) [3] showed a seroprevalence of Chlamydia of 19.2% in aborted goats, compared with 12.7% in goats that had calved normally and 16.9% in adult females that had been slaughtered.

This field is currently attracting a great deal of research attention, along with the zoonotic risk. The importance of abortions on a small ruminant farm is linked to three points, namely animal health, economic impact and public health [4]. The aim of this study is to determine the possible causes

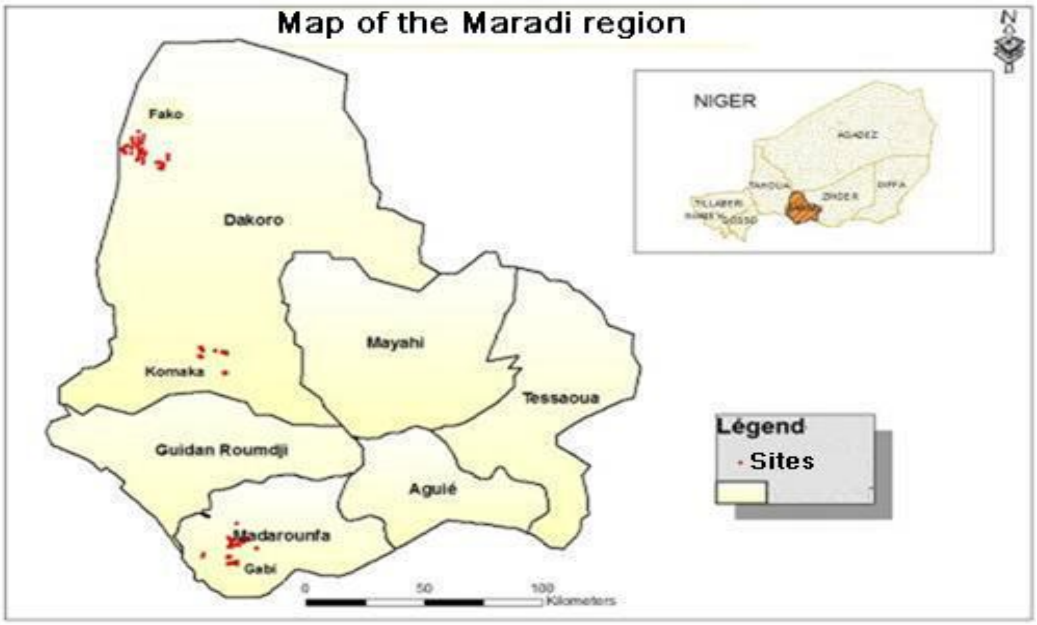
of abortions in red goats in the Maradi centres and in the two departments of Tessaoua and Madarounfa.

2-Materials and methods

Study area and breeding methods

The genetic and quantitative characteristics of the Rousse goat herd justified the choice of this region. It has a vast pastoral area (2,455,693 ha) and a livestock population estimated in 2011 at 2,065,460 LU, i.e. 17.5% of the national livestock population.

The Maradi region is located in south-central Niger. The average temperatures are particularly high (maximum monthly average in May at 32.7°C and minimum monthly average in January at 23.5°C). The average minimum temperatures are above 18°C during the coldest months (December to January). Maradi's relative humidity peaks in August, and falls to a minimum in March. The coolest period of the year lasts around 2 to 3 months from the end of November to the beginning of February, with excessive coolness accompanied by cool, wet winds. The Maradi centre is a public institution whose objectives are to select and disseminate the red goat from its authentic cradle (the Katsina-Maradi region) and to disseminate appropriate breeding techniques to breeders.



Source: Monography of the Maradi region

A survey was conducted to collect information on livestock rearing methods, the state of the animals' health and their historical abortion rates. Following the study, blood samples were collected from goats in Tessaoua, Mararounda and Maradi goat centre. A total of 452 goats were targeted: 200 in the department of Tessaoua, 200 in Madarounfa and 52 at the Maradi goat centre. The goats used were all of the Red breed. The sample size was calculated on the basis of the estimated goat population of 589,577 in Tessaoua district and 427,346 in Madarounfa district, i.e. a total of 1,016,923 goats. An expected prevalence (p) of 50% was considered, with an absolute accuracy of 5% and a confidence level of 95% (z=1.96).

$$n = \frac{1{,}96^2 * p(1-p)}{Pa^2}$$

P= 0.5; Pa=0.05; then n=385 or about 400

For N equal to 632,312, the number of samples is 400 goats, or 200 per department.

Blood samples were collected only from females aged 1-3 years who had aborted at least once during the year, and from those who had recently given birth. Sera were collected from the blood samples and stored at -70°C until serological analysis at the central breeding laboratory in Niamey (LABOCEL).

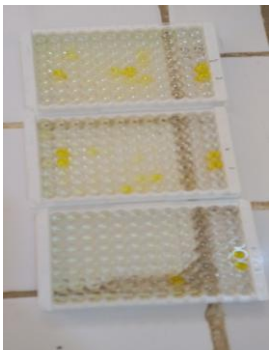
Serological tests

The antibodies against the three targeted abortifacient diseases were determined by indirect ELISA (Enzyme Linked Immunosorbent Assay) for chlamydia, toxoplasmosis and brucellosis. These tests were carried out at the Central Livestock Laboratory in Niamey, according to the principles described by ID vêt.

Plates were read at 450 nm using a plate reader (Titreteck Multiscan Plus). In this way, recent and past infections were detected by IgM and IgG. Test results were interpreted according to the manufacturer's recommendations.

Reagent kits for ELISA

Stop phase (Acid solution)



ELISA test reaction

RESULTS

1- Livestock farming characteristics

In this survey, we observed that the animals' feeding is largely characterized by pastoral resources, grazing in the same environments and in the company of other animal species, particularly sheep, particularly in the departments of Tessaoua and Madarounfa. Complementary feed (beans, orobes, etc.) is restricted to fattening males and lactating females.

In all study sites, goat housing hygiene is extremely limited. Abortions occur at any time of the year, with the majority at the end of gestation (4 to 5 months), and a relative number at the beginning of gestation (1 to 2 months).

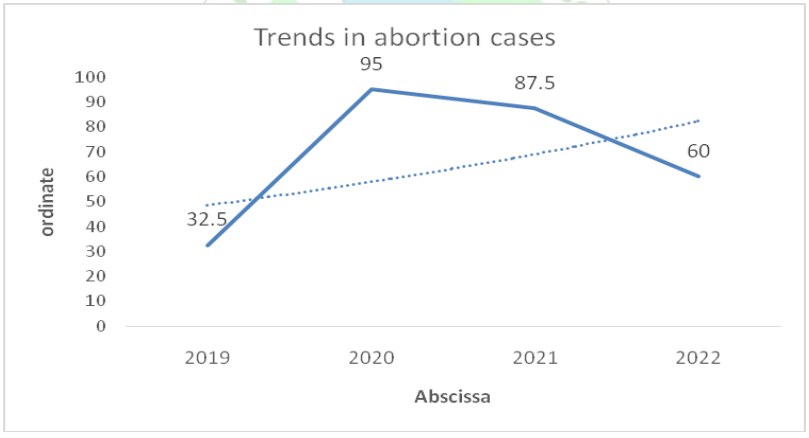


Figure 1: Trends in abortions by year (2019-2022)

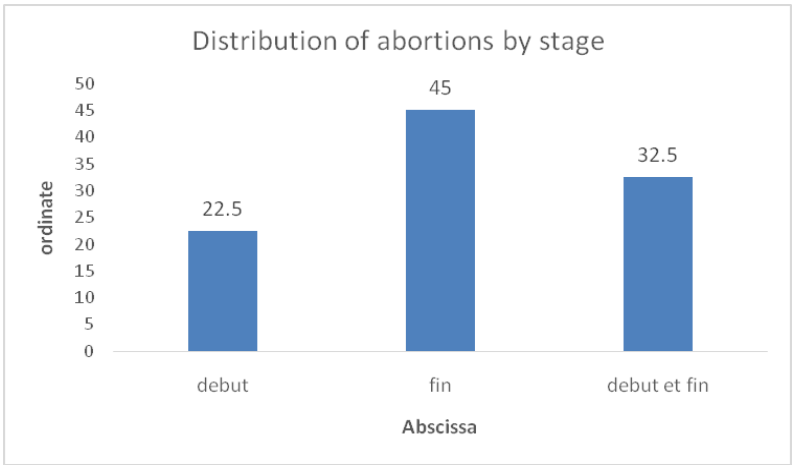


Figure 2: Distribution of abortions by stage.

1- Serology

Serological testing for brucellosis

The analysis of 452 sera obtained by indirect ELISA from the three (3) study sites revealed the absence of any positive reaction for brucellosis.

Table 1: Serological testing for chlamydia and toxoplasmosis

Diseases	Study sites			Total Positive
	Tessaoua	Madarounfa	Maradi Center	
Chlamydia	42/200	23/200	0/52	65/452
Prevalence	21	11,5	0,00	32,5%
Toxoplasmosis	26/200	19/200	0/52	45/452
Prevalence	13	9,5	0,00	22,5%

Serological testing according to female category

Table 2: Serological testing for chlamydia

Female category	**Positive sera**	**Prevalence**
Primiparous females	**38/220**	**17,27**
Females who have recently given birth	**16/135**	**11,82**
Females with abortions	**11/97**	**11,34**

Table 3: Serological testing for Toxoplasmosis

Female category	**Positive sera**	**Prevalence**
Primiparous females	**21/220**	**9,54**
Females who have recently given birth	**10/135**	**7,40**
Females with abortions	**14/97**	**14,43**

DISCUSSIONS

Over the last 4 years, the trend in abortions among Maradi Red goat herds has shown a downward trend, with a low rate in 2019 (32.5%) and a higher rate in 2020 (95%). The sudden increase of abortion rates in 2020 could therefore be explained by the presence of chlamydiosis, which is characterized by waves of abortions in the second year of breeding. These results differ from those reported by El Idrissi AH., et al (2003) [5] who found respective rates of 52.2%, 55.3%, and 45% over a 3-year period (1997-2000). The trend in abortions is also decreasing, with a higher rate in 1998-1999 (55.3%) and a lower rate in 1999-2000 (45%). The decrease in these different curves could be due to symptomatic treatments carried out by breeders in the various herds.

The frequent occurrence of abortion cases at the end of gestation (65%) led to the suspicion of certain abortifacient diseases such as brucellosis, chlamydia and toxoplasmosis. These same symptoms were detected by Sana H. (2014) [4] on sheep in the Wilaya of Constantine, by Thomas S. (2018) [6] on sheep in Midi Pyrenees with abortion rates of 10%. This difference in results may be due to the natural resistance of sheep compared with goats, to climatic conditions (tropical-type climate compared with that of the Mediterranean, where average temperatures range from 0 to 12°C), but also to the farming systems applied in these two localities compared with those in Niger.

Among the three (3) abortive diseases detected, chlamydia was the most prevalent, followed by toxoplasmosis. No cases of brucellosis were detected in any of the individuals studied. The seroprevalence of chlamydia in red goats is 32.5%. This result is significantly lower than that reported by Sana H. (2014) [4] in the wilaya of Constantine, which is 45, 6%; it is higher than that reported by Rahal **&** al. (2011) [7] in the region of Ksar Boukhari, which is 10%. This difference in results could be attributed to the study design, the sampling method used, the sample size and the test conducted.

The seroprevalence of toxoplasmosis in Maradi red goats is 22.5%, a result approximating that observed in a study carried out by authors [8], in which toxoplasmosis was the cause of (24%) of the abortive series studied; in contrast, Gustafsson, K & Uggla, A. (1994) [9] observed a seroprevalence of (0%) in agricultural areas of Sweden. This difference in results could be due to the fact that the study carried out by the authors concerned farms where the prophylactic, sanitary, feeding and hygiene schedules were respected, hence the absence of the disease in the subjects concerned.

Serological results for brucellosis showed no infection among the study animals (0%). In contrast, Rahal et al

(2011) [7] reported a seroprevalence of 11% in the Ksar Boukhari region. This difference in results could be linked to the absence of this disease in the animals studied.

Primiparous goats accounted for 52% of those with higher seroprevalence. This is consistent with results reported in the literature, since in small ruminants infected with Chlamydia, it is mainly primiparous goats that abort. Multiparous goats, on the other hand, develop a solid, long-lasting immunity (5 to 6 years), allowing them to carry subsequent pregnancies to term, even after repeated infections [10].

CONCLUSION

The present study revealed the persistence of certain abortifacient diseases on the farms surveyed, despite the provisions made in relation to the traditional breeding method, where animals are exposed to the risk of contamination at grazing sites and common sources of watering. Further research incorporating molecular diagnosis and sampling of a large number of animals could confirm the involvement of brucellosis in cases of reproductive breakdown in the Maradi Red goat.

Among the abortifacient diseases on the farms surveyed, Chlamydia and toxoplasmosis are both diseases that have a major impact on livestock farming and constitute a public health issue. Consequently, veterinary and public health services should strengthen their collaboration and implement a program to control major zoonoses.

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