

Full Length Research Paper

Zootechnical performances of Red Maradi goats in farming systems of central region, Burkina Faso (West Africa)

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Accepted date November 10, 2012

This study aimed to improve the knowledge on the zootechnical parameters of Red Maradi goats introduced in the intervention area of PDRDP/BK in Burkina Faso. The study was based on a retrospective survey complemented with weighing sessions at specific age classes at the farms of ten multiplier smallholder farmers. Data gathered from this study revealed that the smallholder farmers investigated were equally composed of women and man (n= 5 each) with an average age of 42 ± 7.8 years. The average size of the herd was of 5.3 ± 1.6 animals, with a sex-ratio of 1:1.5. The average age to the first kidding, the kidding interval and prolificacy rate for this breed were 12.4 ± 1.9 months, 8.6 ± 2.4 months and 157% respectively. Mean weights of Red Maradi goats were 2.1 ± 0.2 kg kg at birth, 4.8 ± 0.9 kg at 30 days, 8.1 ± 2 kg at 60 days and 10.9 ± 3.1 kg at 90 days. Growth is affected by sex. All obtained performances can be improved while acting on the practices for animal rearing.

Keywords: Red Maradi goats; reproduction; growth; Burkina Faso.

INTRODUCTION

In Burkina Faso, the agricultural sector is one of the solutions to fight people poverty because of its contribution to exportation (80%) (Burkina Faso, 2004), since livestock contribute to 26 % to exportations and occupies 80% of the active population in farming area (MRA, 2004). Among the raised animal species, sheep and goats are numerically important and participate strongly in food security and incomes improvement of the farming communities (Kaboré et al., 2011). This report drove the development programs and project of country to build their actions on the improvements of the agricultural activities to the local level.

The "Projet de Développement Rural Décentralisé et Participatif dans les provinces du Bazèga et du Kadiogo" (PDRDP-B/K) is a developmental project conducted in

Burkina Faso with the global objective to contribute to the reduction of poverty in its area of intervention. To reach this objective, the project specifically aimed at reinforcing food security, increasing the agricultural and animal production and the incomes of the population that benefits of the action of the project (PDRPD-B/K, 2006). In this framework, PDRDP-B/K had undertaken many actions regarding the promotion of animal production. Among these actions, 120 Red Goats from Maradi in Niger have been introduced in the Bazega province in July 2005 in order to increase the productivity of the goats of the local breed and to improve the incomes of the smallholder farmers (Tamboura, 1999).

Following this introduction, the raising of the red goat has been well adopted by the producers in the area. It is in this context that this current study has been undertaken in order to evaluate the adaptability of the Red Maradi goats introduced through the knowledge about their zootechnical performances in the intervention

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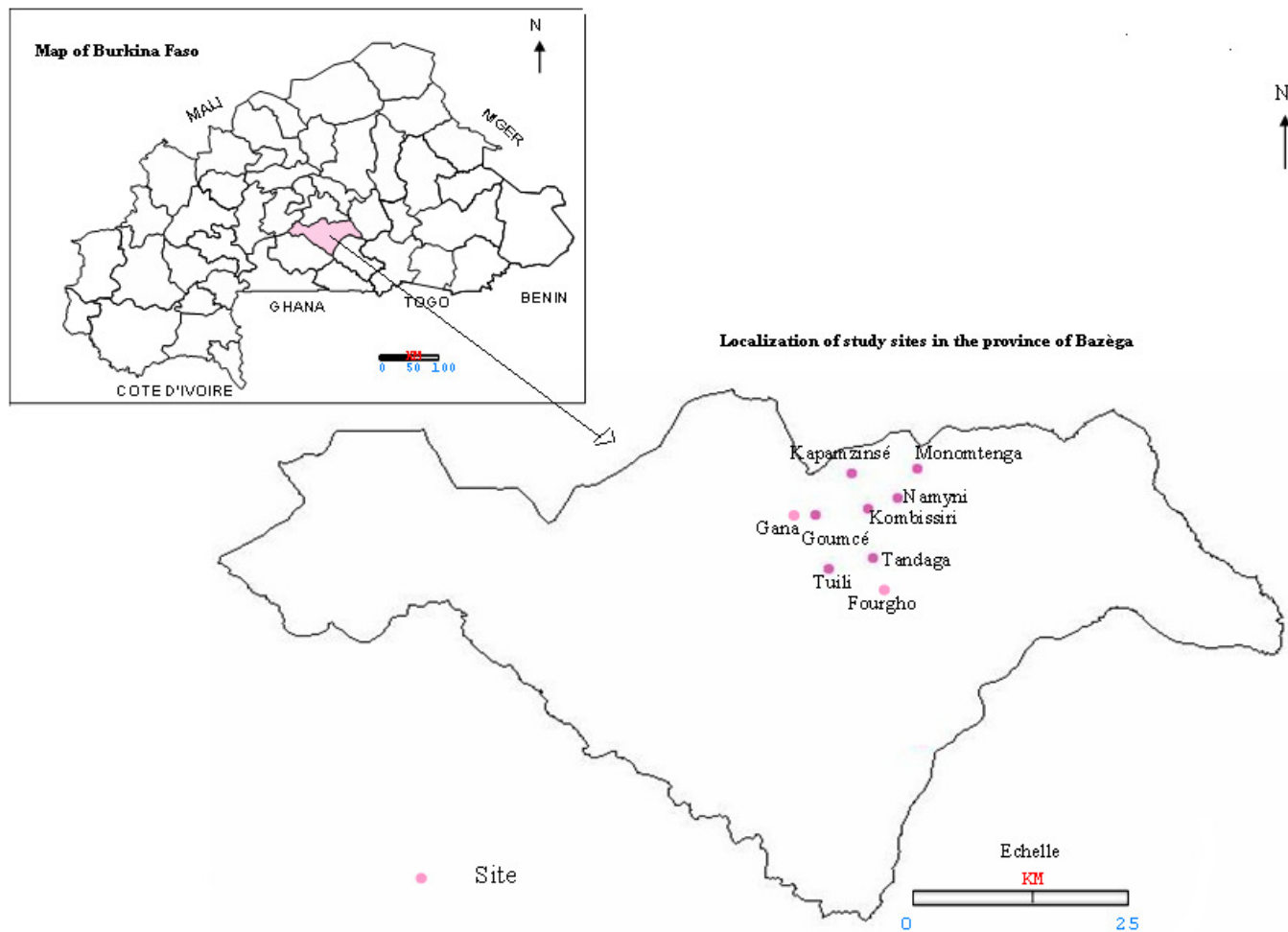


Figure 1. Intervention areas of study

areas of the project.

MATERIAL AND METHODS

Region of study

The study has been conducted from August 2006 to March 2007 in the area of Kombissiri and its surroundings on a ray of 15 km (figure 1), after the introduction of this goat breed in the region. This area is located in the North Sudanese area of Burkina Faso where the climate is characterized by the alternating of a short rainy season (June-October) with a long dry season (November-May). The annual rainfall varies between 600 and 900 mm. The annual temperatures display extended variations with mean averages from 15 to 30°C during the cold season and 30 to 45°C during the dry season. The vegetation is composed mainly of shrub savanna and clear forests materialized by a tree stratum (*Butyrospermum parkii*, *Parkia biglobosa*, *Lannea acida*, *Adansonia digitata*, *Tamarindus indica* and *Faidherbia*

albida) and a herbaceous stratum (*Loudetia togoensis*, *Pennisetum pedicellatum*, *Andropogon gayanus* and *Andropogon pseudapricus*) (Kagoné, 2000),

Experimental animals and breeding type

The study was carried out with ten multiplier smallholder farmers of Red Maradi goats monitored by the project in Burkina Faso. These smallholder farmers were scattered for eight villages and two sectors of the urban areas of Kombissiri (Figure 1) at the rate of one herd by sector.

Red Maradi goats of multiplier smallholder farmers were raised according to the traditional sedentary system in the area of Bazèga province where the number of goats was estimated to 204 646 in 2006 (MRA, 2006). In general, the animal management was homogeneous between the herds. The animals had a makeshift habitat equipped with water troughs and mangers. The reproduction is made naturally with a male goat in total freedom within the herd.

The feeding of the animals is essentially based on the

exploitation of the natural pastures constituted of ligneous and herbaceous. Meanwhile, two distinct practices are observed in relation to the season. In dry season, they are left to wander and they generally graze from 8 h AM to 4 h PM everyday. When back from the pastures, they receive a dietary supplement based on cotton cakes and salt and mineral stones in relation to the financial capacities of the smallholder farmers. In the rainy season and at the end of the harvests (from June to November), the animals are supervised by a herder/shepherd who is generally a member of the family, or they are permanently kept to pegs. Water is given at least once a day. Sometimes, the health cares are provided, including the vaccination against pasteurellosis, internal and external deworming and treatment of the diseased animals.

Data collection

In ten multiplier smallholder farms, a retrospective survey coupled with weighing sessions based on classes of age has been carried out to collect zootechnical parameters for Red Maradi goats.

During the survey, the breeder was required to reconstitute some events through completing a questionnaire. The questionnaire included of the exploitation, part regarding the herd monitoring and also a part for the individual monitoring sheet for the kids.

An initial count of the animals was performed at the beginning of August 2006. That consisted in the individual identification of the animals with ear tags, in determining the sex and the age of each individual and also the descendants for each female and to record the date for specific events experienced by each subject such as birth, disease, treatments, etc..

The demographic monitoring of the herd was done at week intervals to register the entries (births) and the outgoing (sale, mortalities, home consumption, exchange) at the farms of ten multiplier smallholder farmers in the study. For every birth, the date, the sex, the mode of birth and the information related to the dam (identification and number of gestations) were collected and notified on the registers.

The information obtained by the survey and the regular visits to the farmers was completed to the weight assessment at fixed age classes at birth, 30 days, 60 days and 90 days

Statistical analysis

Data collected was organised in Excel datasheet and used to calculate the percentage for demographic and reproduction parameters and the means (\pm standard deviation) for animal weights. Data weights were classified by sex before submitted to ANOVA one way analysis and test of Student at 5%. All statistical analysis

was performed with Statview for Windows, version 4.57.

RESULTS

Characteristics of the farmers

The smallholder farmers used in this study were composed of five men and five women with an average age of 42.7 ± 7.8 years (ranging from 30 to 60 years-old). Only 20% of them were illiterate; the others were alphabetized with a level varying between secondary to university and 60% of them were capable to record reliable data on their animals.

Most smallholder farmers (90%) arrange a sheepfold realized according to a model proposed by livestock technical Service of the region and equipped by PDRDP/BK. However, cleaning is irregular in 70% of these local.

Herd size and structure

Information collected on the herd of smallholder farmers are presented in figure 2. The average flock size by herd was 5.3 ± 1.6 animals constituted of more females (60.4%) than males (39.6%) with a sex ratio of 1:1.5. The flock was composed for a higher number of mature animal ($n = 30$) than for young animals from 3 to 12 months ($n = 23$), that were very exploited (Figure 2) because on the 22 Red Maradi goats sold by farmers, 21 goats belong to this age classes.

All Red Maradi goats are raised with other local breed of small ruminants and according to the traditional system based exploiting natural pastures in all seasons

Health management

All multiplier smallholder farmers developed health management practices on the herd, through the vaccination of Red Maradi goats against pasteurellosis and the treatment for internal and external parasitism. However, the veterinary intervention was not systematic, being covered either by veterinary public service (70%) or private veterinary service (30%). Traditional veterinary therapy was not applied to the Red Maradi goats during the study period. The main diseases or symptoms reported by breeders are listed in figure 3. The respiratory diseases represent the more frequently reported disease (90% of respondents) followed by diarrhea (60%), abortions and conjunctivitis (50%), and by dermatitis of parasitic origin (40%).

Reproduction performance

In the herds of Red Maradi goats, males and females are separated only when they are tied up to the pegs (a way

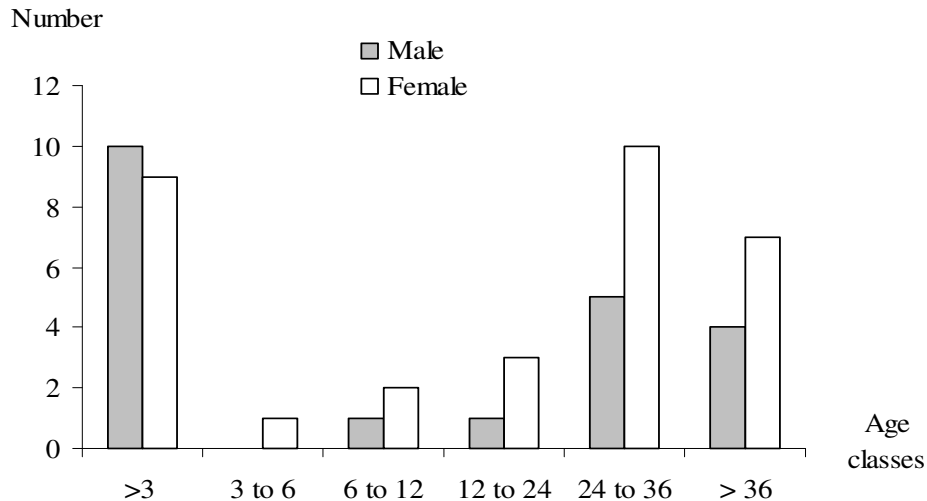


Figure 2. Age structure of Red Maradi goat's population raised in the study area

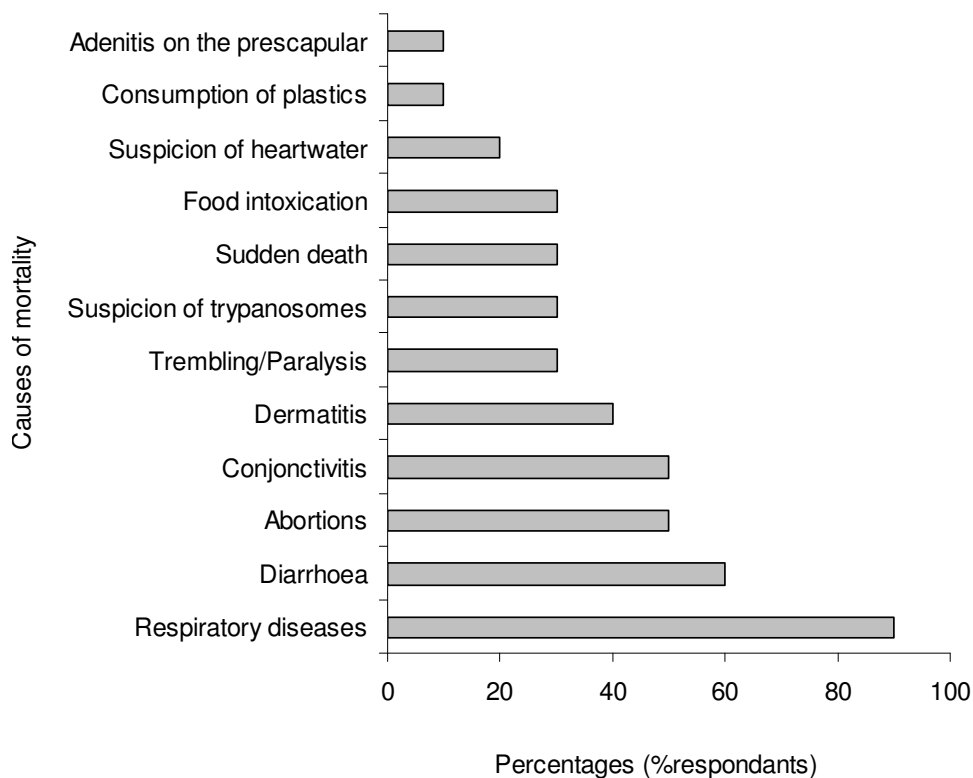


Figure 3. Main causes of mortality/morbidity observed by smallholder farmers in the study (a multiplier smallholder farmer can cite several symptoms)

of keeping animals during the rainy season for the two sexes and only at day time to avoid the disappearance of the male).

The breeding system is performed in natural mating through the whole year. The animals used in the analysis of the reproductive parameters were grouped in two classes: the primiparous (first kidding), and the goats of more than two kidding (for the interval between the

kidding and the prolificacy rate). The collected information concerned the reproductive events from their introduction up to 2007.

The age of first kidding for Red Maradi goats in this region was 12.4 ± 1.9 months and the average kidding interval has been estimated was 8.6 ± 2.4 months, ranging from 6 to 13 months. The mean of prolificacy rate was estimated to 157%. The survey showed that 42.86%

Table 1. Body weight of the kids (Mean± standard deviation) at age classes according to the sex.

Age types	Body weight (kg)	
	Male (n)	Female (n)
Birth	2.2 ± 0.2 ^b (8)	2.0 ± 0.1 ^b (6)
30 days	4.9 ± 0.8 ^a (8)	4.7 ± 1.0 ^a (5)
60 days	8.3 ± 2.3 ^a (8)	7.7 ± 1.6 ^a (5)
90 days	12.3 ± 3.5 ^a (3)	9.5 ± 2.6 ^a (3)

(^{ab}): The means with different letters on the same line are significantly different at 5%.

Data between parenthesis represent the number of animal

Table 2. Daily gain (g/day) (mean ± standard deviation) of the Red Maradi goats by sex in the study

Periods	Daily weight gain (g/day)	
	Male	Female
0-30 days	83.8 ± 29	111.1 ± 25.4
30-60 days	112.5 ± 52.6	100 ± 42.4
60-90 days	118.8 ± 75.3	83.3 ± 43.3

of the females (n = 10) had one kid while 57.14% (n = 16) had two kids.

In the study two main kidding periods were recorded since animal introduction in the region. The first kidding period extended from November 2005 to August 2006 and was dominated by the kidding of primiparous, uniparous doe (n = 11). The second period of the kidding has been recorded for September and October 2006, with 60.7% (n = 17) of multiparous pregnancies.

Growth performances

The mean weights of Red Maradi goats at different days after kidding are presented in table 1 according to the sex. Mean weight of Red Maradi goat varied from 2.1±0.2 kg at birth to 4.8±0.9kg at one month, 8.1±2 kg at two months to 10.9±3.1 kg at three months unrespectful of the sex. Only the birth weight of male kid was significantly high (P<0.05) compared to the female. No significant difference (P>0.05) between the two sexes was observed at days 30, 60 and 90.

Average daily gain from the birth to 90 days according to the sex of studied Red Maradi goats are presented in table 2. They are 83.8 g, 112.5 g, and 118.8 g for the males and 111.1g, 100 g and 83.3 g for the females respectively from birth to 30 days, from 30 to 60 days and from 60 to 90 days. None meaningful difference (P>0.05) was noted between the sex weight gain for the age classes studied. In addition, we notice that the growth of the male progresses with the age contrarily to the female.

DISCUSSION

The relative advanced age of the multiplier smallholder farmers in the area of study is due at the same time to the lack of financial means and of goat barns belonging to the young people. The equality of opportunities observed between women and men in the practice of this activity denotes, may be the little effect of the customs to impose upon the women for a given breeding. Elsewhere the self promotion of the women seems to be well perceived in the area of the study where they benefit more easily of financings and are supported by their husbands in the execution of the activities. This is probably an effect of the PDRDP-B/K through the actions of sensitization carried out in favour of gender promotion.

According to the survey that was achieved, 90% of the smallholder multipliers have the means to monitor well the received animals and also have children to herd them. In addition, the survey revealed that 60% of them have been able to register reliable data on the animals. Probably, because of the trainings they received on the technical themes in animal breeding and in literacy by the PDRDP-B/K. Moreover, we have been noticed that the breeders were receptive to the innovations that are likely to improve the productivity of their animals.

During the survey, 80% of multipliers have another herd composed of sheep and goats of local breed. The others sided for raising only the red goats after selling their local breeds.

The result of the sex ratio of Red Maradi goats in our study is different from the one returned by Wilson (1987)

and Peacock (1983) at which the sex ratio is 1:3. According to Tamboura and Berthé (1996), that might be due to the intensity of the exploitation of the males while females are kept to improve the numerical productivity of the herd in traditional system. This assessment is reinforced by the results of our retrospective survey that revealed animals of age from 3 to 24 months are the most sales and namely the males. That could explain equally that the size and structure of the herds of the survey did not seem to vary perceptibly versus the initial herd at the level of each owner. Indeed, the young animals were so quickly exploited: the couple aged from 3 to 4 months is sold 37 000 F CFA (1\$ US=500 F CFA) in the study area.

Demographic growth and extension of agricultural areas in the environment of the study entailed the reduction of the natural grazing and therefore many conflicts arise between producers. The wandering during the dry season and the fixing to pegs during the agricultural season are the modes of animal management the most spread and constitute the general tendency.

The survey revealed that the difficulties met by the multipliers of the Red Maradi goats to feed the animals appropriately are situated at two distinct periods. The first period goes from April to May and corresponds to the crucial period of bridging the gap during which all the food stocks are exhausted, the inexistent hay (Kagone, 2000) and the forestry agents are more heedful against the pruning for feeding the animals. The second period is situated from October to November and is characterized by the feeding alongside the pegs on the plots of the restricted pastures and devoid of good quality fodder.

The health problems noticed during the study are linked to the climate vagaries (rains and wind) responsible of reported cases of pneumonia, to the lack of hygiene of the local and the weak care provided to the animals. The reported abortions are the consequences of premature coverings of the young females worsened by the nutritional stress. Among some multipliers, the strokes of horns are incriminated. As for the observed conjunctivitis to the arrival of the animals, they may be caused by the conditions of transportation (wind strokes, litter remnants received into the eyes).

In our survey, the average age to the first birth of the Red Maradi goats was more precocious than the age mentioned by Marichatou et al. (2002) in the Red Maradi goats raised by smallholder farmers in Niger (13,57 ± 2,5).

The average interval during the calvings of the goats of our study is inferior to that reported by Faugère et al. (1989) in local goat of Louga region but is superior to that reported by the same authors for Kolda region of Senegal (Faugère et al., 1988).

The result of prolificacy rate in the study is superior to that reported by Marichatou et al. (2002) (136 %) carried out on the same specie goat in traditional breeding. The body weight (all sex considered) for different classes

of age in the present study is superior to those mentioned by Tamboura and Berthé (1996) carried out on Mossi goat breed in Burkina Faso and by Marichatou et al. (2002) in Niger. In addition, the males of Red Maradi goat were slightly heavier than the females in our study. This observation was similar to that made by Marichatou et al., (2002) and contrary to that of Tamboura and Berthé (1996). However, growth evolution (average daily gain) in the current study is contrary to the observation made by Tamboura and Berthé (1996) on Mossi goat breed in Burkina at which the average daily gain decreases with age in male as in female.

CONCLUSION

The results of our survey show that the relative low performances of Red Maradi goats might be explained by the weak level of technicality of the producers and the difficult raising conditions of the study area. However, the observed growth performances reveal the possibility to improve the intrinsic potential qualities of the Red Maradi goats introduced by PDRDP-B/K project. Thus, the formation of the producers on the good practices of goat rearing could be considered through simplified modules that are easily applicable in the farming area.

ACKNOWLEDGEMENTS

The authors of this work thank the smallholder farmers who participated in the study and the project PDRDP/BK.

REFERENCES

- Burkina Faso (2004). Document de Stratégie de Développement Rural à l'horizon 2015. Version finale, Burkina Faso, Ouagadougou, 143 p.
- Faugère O, Faugère B., Merlin P, Dockes C, et Perrot C. (1988).. L'élevage traditionnel des petits ruminants dans la zone de Kolda (Haute Casamance). Référentiel technico-économique (données recueillies dans 20 villages de 1984 à 1987). Réf.n° 018/VIRO, LNERV, DAKAR, 187p.
- Faugère O, Faugère B., Merlin P., Dockes C, et Perrot C. (1989). L'élevage traditionnel des petits ruminants dans la zone de Louga. Référentiel technico-économique (données recueillies dans 15 villages de 1984 à 1988). Réf.n° 26/VIRO, LNERV, DAKAR, 139p.
- Kaboré A, Traoré A, Gnanda BI, Nignan M, Tamboura HH, Bélem AMG (2011). Constraints of small ruminant production among farming systems in periurban area of Ouagadougou, Burkina Faso (West Africa). *Adv. Appl. Sci. Res.*, 2 (6):588-594.
- Kagoné H (2000). Gestion durable des écosystèmes pâturés en zone nord-soudanienne du Burkina Faso. *Thèse de doctorat*, Faculté Universitaire des Sciences Agronomiques de Gembloux (Belgique), 236 p + annexes.
- Marichatou H, Mamane L, Banoin M, Baril G (2002). Performances zootechniques des caprins au Niger : Etude comparative de la chèvre rousse de Maradi et de la chèvre à robe noire dans la zone de Maradi. *Revue Elev. Méd. Vét. Pays trop.*, 55 (1) : 79– 84.
- Ministère des Ressources Animales (MRA) (2004). Deuxième enquête nationale sur les effectifs de cheptel. tome II, 86 p.
- Ministère des Ressources Animales (MRA) (2004). Les statistiques du secteur de l'élevage au Burkina Faso. DEP/SSA 54 p.

- Peacock CP (1983). Phase exploratoire d'une étude des systèmes de production animale dans le Gourma malien : données de base sur le cheptel ovin et caprin. (Doc. Prog. AZ. 92C) ILCA-Bamako, Mali. -
- Tamboura H, Berté D (1996). Système traditionnel d'élevage caprin sur le plateau central du Burkina Faso. In : small Ruminant Research and développement of the Africa ; *Proceedings of the third biennial Conférence of African Small ruminant research network workshop* U.S décembre 1994, ILRI, Nairobi (Kenya) p. 93 – 97.
- Tamboura HH (1999). Les ressources génétiques locales d'ovins et de caprins du Burkina Faso : situation actuelle et perspectives d'amélioration. In : *Les enjeux de l'amélioration génétique sur la santé animale en Afrique subsaharienne*. Eds Boly H. et Leroy P..CUIF/UO/SPA, Ouagadougou, 103-113.
- Wilson RT (1987). Livestock production of traditionally small ruminant in an agro-pastoral system in northern Burkina Faso. *Trop. Agric.*, 64,163-169.