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Zootechnical Parameters and Zoo-Genetic Management of Goat Breeds Encountered in Benin: A Review

Oyéniran T. F. Offoumon[1], Yaya Idrissou[1*], Hilaire S. Sanni Worogo[1], Cham D. A. Alabi[1], Alassan S. Assani[1], Brice G.C. Assogba[1], Armand B. Gbangboche[2], Ibrahim T. Alkoiret[1]

[1]Laboratoire d'Ecologie, de Santé et de Production Animales (LESPA), Faculté d'Agronomie (FA), Université de Parakou (UP), 01 BP 123 Parakou, République du Benin

[2]Ecole de Gestion et d'Exploitation des Systèmes d'Elevage (EGESE), Université Nationale d'Agriculture (UNA), Porto-Novo, BP 43, Kétou, République du Benin

Review Article

***Corresponding author**
Yaya Idrissou

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Abstract: In rural areas, goats contribute to the reduction of malnutrition through their production of milk and meat. A review of the zootechnical and reproductive performance of goat breeds in Benin was made from ninety (90) articles, papers and documents related to these goat breeds. The main data concern the taxonomy of goats, their origin, the importance of goat rearing, the description and zootechnical parameters of the goat breeds encountered in Benin. The main local goat breeds encountered in Benin were the dwarf or Djallonke, the Sahelian breed and the red goat of Maradi. The exotic breeds mentionned in this paper concern the Alpine and the Saanen breeds. The zootechnical and reproductive performances varied from one goat race to another, but satisfactory overall. It is worth to focus on the breeding of these short-cycle species in order to meet the ever increasing demand for meat products. Alternatives for improving the performance of local breeds in crossing with exotic breeds constitute some ways to explore in order to boost the production of milk and meat goats in Benin.

Key words: goat breeds, zootechnical performance, breeding performance, Benin.

INTRODUCTION

In sub-Saharan Africa, livestock farming contributes around 50 to 80% of agricultural GDP and ensures food security for families, and is a tool for fighting poverty. Livestock farming is a capitalization that allows diversification of activities and represents a factor of economic and social integration [1]. It is an essential component of agricultural farming systems in sub-Saharan Africa as a means of mitigating risks in agriculture [2].

In Benin, animal and fish production is an important economic activity, contributing 6% of GDP [3]. The importance of animal production is also reflected in its contribution to the maintenance of activity in rural areas and its involvement in the quality of the environment. The multifunctionality of animal production has been widely described [4, 5]. Among all the farming systems practiced in Benin, small ruminants rearing is the most widespread and is characterized by its extensive mode and low productivity [6]. In this type of breeding, the number of animals is reduced, in Benin there are 2 to 4 heads of small ruminants per farm unit and in the North, the number varies between 8 and 15 heads of small ruminants per agricultural unit [6].

In Benin, the national herd was estimated in 2016 at 2,339,000 head of cattle, 1,836,000 head of sheep, 1,836,000 head of goat, 466,000 head of pigs and 20,002,000 head of poultry [7]. Despite this numerical importance, we are witnessing the importation of meat products. This import has increased from 109,306 tons in 2008 to 198,387 tons in 2013 [7] and this phenomenon is likely to increase in the coming decades as the population grows.

Projections of demographic change and growth in individual consumption of animal products show that, by 2020, more than 100 billion tons of meat will have to be produced in sub-Saharan African countries, assuming that they will record economic growth [1]. To achieve this goal, animal production must be increased to meet the current requirements for animal protein. Breeding short-cycle species and subjects not directly competing with humans in food seems an interesting approach.

Small ruminants could constitute good animals in breeding because they are not very demanding and

their reproductive cycle is intermediate between those of monogastric food competitors of humans and cattle with excessively long cycle. Ruminants are indeed the best processors of coarse foods (milk, meat) for humans [8, 9] believe that in order to develop animal production, small animals should be used as a source of meat. They think that raising goats and rabbits is better suited to small farmers than cattle breeding. Therefore, in the rank of ruminants, the goat is the animal species whose breeding will be the most advantageous. Its behavioral and digestive characteristics combined with its rusticity and its socioeconomic and cultural role reinforce the reasons for this choice.

Despite this importance, goat farming has long been neglected politically and scientifically [10-12] for the benefit of cattle, thought to be the only ones capable to produce large tonnages of meat [13]. Some countries even advocated its elimination, accusing it of promoting desertification [11]. Despite a renewed interest in small ruminants in general [10, 14, 15], knowledge of the zootechnical and reproductive performance of major goat breeds encountered in Benin are still fragmentary. This is why the present study proposes to make a bibliographical synthesis on the zootechnical performances and reproduction of goat breeds met in Benin.

Taxonomic hierarchy of goats

Goats are mammals belonging to the family Bovidae (order Artiodactyla), they are herbivorous ruminants, and several subfamilies have been described by the authors [16]. In general, goats can be classified as follows:

Kingdom: Animalia
Subkingdom: Bilateria
Infrakingdom: Deuterostomia
Phylum: Chordata
Subphylum: Vertebrata
I**nfraphylum**: Gnathostomata
Superclass Tetrapoda
Class: Mammalia
Order: Artiodactyla
Family: Bovidae
Subfamily: Caprinae
Genus: Capra Linnaeus
Species: *Capra hircus*

[17, 18, 19] include six species in this genus: *Capra algargus*, *Capra ibex*, *Capra caucasia*, *Capra cylindricornis*, *Capra pyrenaica* and *Capra palconeri*.

Origin and geographical distribution

Several authors such as [20-24] assure that the ancestor of the domestic goat is a "wild goat of the Near East", the goat (*Capra hircus*) is one of the first ungulates domesticated more than 10 000 years ago in the fertile crescent.

The history of domestication was tackled by the comparative analysis of the genetic diversity of domestic goats and that of its wild ancestor (*Capra aegagrus*), the joint study of the diversity of goats and their wild ancestors (the aegagres) provided information to reconstruct the history of domestication in a large area including eastern Anatolia, Zagros, Turkey, Central Iranian Plateau and northeastern Iran, [25]. The Fertile Crescent (Iran, Iraq, Turkey, and Palatine) is the center of domestication of goats because it is the origin of the agricultural civilization of Western Europe [26, 27].

Description of the species

The caprines have a robust body, stocky and provided with hairs, short and solid limbs, the neck is big, the head is relatively small, seldom pasted, has a variable profile according to the breeds, provided with a small goatee, a pointed snout and a narrow curved forehead, the triangular tail is devoid of hair on its ventral (below) and almost always straight, the feet are stronger than in the ovine, which, with a particular barrel bone Robust makes life easier on rough terrain. (Figure 1). The eyes are large and shiny, with a yellow or light brown iris, with transverse pupils, as in the ovines, but they do not have a teardrop, the ears often straight pointed, are very mobile, their ports are generally in relation with their size; Long and drooping ears, small erect ears, medium and horizontal ears, horns present in both sexes and may have different shapes. The horns of males are much more developed than that of females [16, 28, 29].

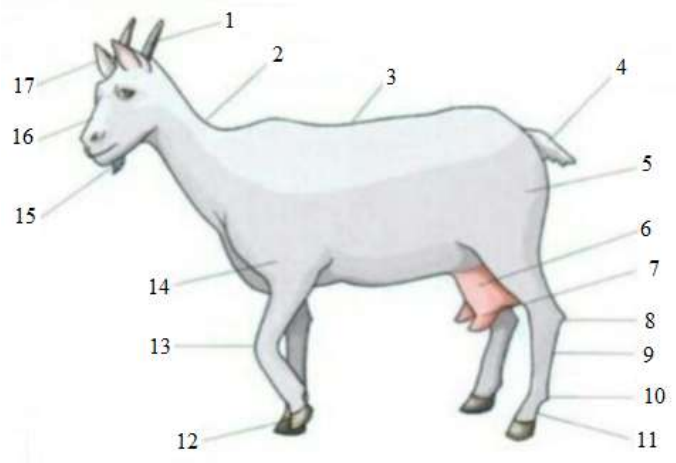

Fig-1: anatomy of the goat [16]

1 = Horn; 2 = neck; 3 = back; 4 = tail; 5 = flank; 6 = mamila; 7 = dug; 8 = ham; 9 = cannon; 10 = drag; 11 = pastern; 12 = clog; 13 = knee; 14 = elbow; 15 = goatee; 16 = muzzle; 17 = ear

Importance of goat farming

Economic importance

Goats play an important role in the peasant economy and strongly contribute to family self-consumption [30]. Raised for their milk, leather, hair and meat, goats are considered as the "cow of the poor" [31]. They are self-consumed or sold to meet the daily needs of the family [32]. Goats also play a fundamental role in supplying urban markets with meat products, especially at the end of the dry season when meat of other species is scarce [33]. In rural areas, they contribute to the reduction of malnutrition through their milk production which can reach about three (03) liters of milk per day in certain populations [34]. Milk is mostly consumed in the dry season, when the other species are all dry. The goat is used for multiple purposes, the most important of which is the sale on foot [35]. It plays a leading role in the consolidation of livestock farmers' savings allowing them to access other types of animals such as cattle [36]. Through barter, they serve to reconstitute a herd of cattle at the rate of 7 goats for a heifer [35]. This economic importance of the goat is coupled with a socio-cultural importance that varies from one locality to another.

Socio-cultural importance

The social and cultural dimension of goats is closely linked to that of our cultures, our way of life, our know-how and our landscapes. In pastoral communities, the slaughter of animals that customarily punctuate the visits of foreigners to families, include goats [35]. Goats are able to thrive in difficult places, from the confines of the Sahara to the glacial mountain ranges of Asia, and are satisfied with bitter plants disdained by other species [37] cited by [38]. They have allowed the human race to live virtually everywhere. Such mobility has facilitated contacts and dialogue between populations [39]. In most countries, goat by-products are used to make things such as: leather goods, musical instruments using the skin, brushes from their hairs. The examples in this section show that goats still play an important role in social cohesion in traditional West African societies [40]. In addition to this socio-cultural importance, the goat also plays a significant nutritional role in most families in West Africa.

Nutritional importance

The nutritional importance of the goat is linked to the quality of its meat and milk. Indeed, with a higher nutritional value than that of cow's milk, goat's milk is richer in vitamin A and is much more easily digested because of its high content of fatty acids [41]. Although cheese consumption is still very low, yogurt made from goat's milk is, on the other hand, increasingly popular and is beginning to spread in cities [42].

In countries of the Sahelian zone where protein-energy malnutrition is one of the main causes of mortality and morbidity, especially among young people, milk and goat meat often prove to be the only or one of the few sources of quality protein available [42]. Beside their socio-economic and nutritional role, goats also have considerable zootechnical importance.

Zootechnical importance

The goat is experiencing a revival of undoubted zootechnical interest. Indeed, the goat is a short-cycle species that can live in the rather difficult conditions of the Sahelian zone where the forage available rarely exceeds eight months in the year [39]. Goats are well adapted to the dry areas they have conquered thanks to their good resistance to rinderpest and heat stress [43]. In marginal areas where pastures and water sources are uncertain, their rearing is often the only way to promote the land [44]. The goat can feed all year round in woods, fields, fallow land and fallow land. Moreover, their short cycle of reproduction enables them to contribute effectively to the survival and restart of many pastoral populations [43]. Also, in relation to monogastric farming, goat farming is often

preferred because of the high cost of production in this sector [35].

In the Sahelian environment, goat milking is required when the dairy production of the cattle herd no longer ensures the coverage of family needs [45].

Numerical importance of goat herds in Benin

In Benin, the national herd of small ruminants was estimated in 2015 at 896,000 sheeps and 1,795,000 goat heads [7]. The goat population has grown annually over the last 16 years by 2.43%, compared to 1.94% for sheep (Figure 2). The goat / sheep ratio is a criterion used by some authors to assess the relative importance of the two small ruminant species [46]. In Benin, it was in 2015 of 2.

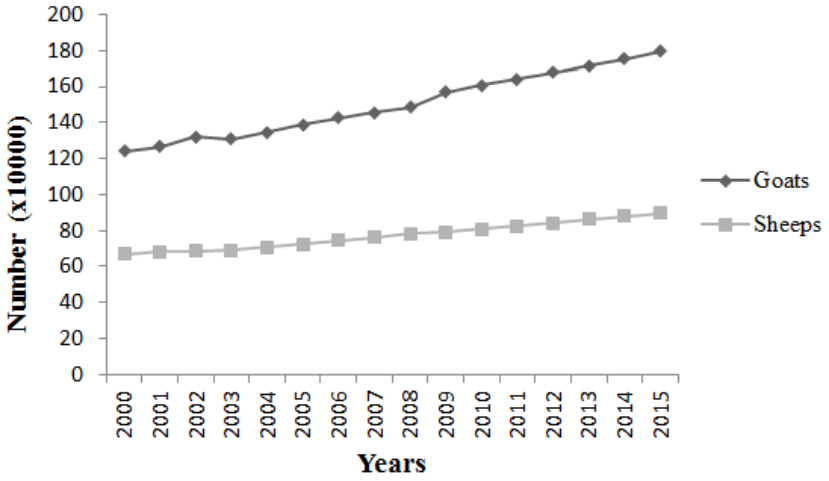

Fig-2: Evolution of goats and sheep in Benin [7].

Description and zootechnical parameters of goat breeds encountered in Benin

Goats of local breeds

Dwarf goat or Djallonke

Description

The description of the dwarf goat, southern goat (African dwarf variety), also called goat "kirdi" or "kirdimi" in Chad corresponds to that given by [47] for the Guinean goat or Fouta-Djalon goat. It is a straight (rectilinear) or concave animal with short, horizontal ears (Figure 3). The dress with short or short hairs is very varied. As in other countries [48] there are fawn, gray, black or mixed-colored individuals. They are stocky and small animals. Males weigh on average 20-25 kg and have a height at the withers of 53.25 ± 4.5 cm. Females reach an average of 15 to 25 kg and measure 49.25 ± 3.09 cm at the withers. As you go down to the far south of the country, even smaller varieties are encountered. Their size is smaller than that of the Maradi red goat (55 vs 65 cm), but of the same size as those found in other Central African countries [48].

Fig-3: Dwarf goats or Djallonke

Zootechnical performances

The dwarf goat is bad dairy. Average production is around 35 kg, which is 4 to 5 times less than the Maradi red goat, for a period of 2 to 4 months [49].

Despite its low weight, the dwarf goat has interesting beefing abilities [49, 50]. The birth weight is 1.2 to 1.5 kg, and the adult weight (3-4 years), 15 to 30 kg, but the carcass yields are high and oscillate between 48 and 50% for the females, and 50 to 60% among young castrates [49]. The meat is tasty and tender, and much appreciated by consumers. However, uncastrated old goats have an unpleasant smell that is often repugnant to consumers.

Reproductive parameters

Fecundity, prolificity

Dwarf goats are precocious [51], with goats usually reaching sexual maturity at 6 to 7 months of age. The first parturition occurs at 11-13 months in traditional breeding [52, 53]. The average fertility rates are 164% [52]. With the food available, this breed can be fertilized more than once in the year. This fertility is well above that of the Maradi red goat (145%) and other dwarf goats in Central and Eastern Africa (124% to 155%).

All authors agree that these goats are the most prolific of all domestic ruminants in tropical and subtropical conditions [51-53]. Double spans are standard, triple spans are common, and quads are often observed [50]. The average prolificacy rate, from 165 to 175%, is similar to that of the Maradi red goat [50, 53]. It is higher than that reported in Nigeria (149%), but similar in Ivory Coast (162%), by [51].

Dwarf goats are able to reproduce throughout the year [51,54]. The highest percentage of kidding is in autumn (October-mid-December), which indicates intense breeding activity from mid-April to June. This period coincides with a certain food availability, but which is not yet optimal in the southern part of Chad. On the other hand, it coincides with the period of a growing photoperiod, even if the amplitude is not high, on average from 30 minutes to 1 hour 30 minutes [55]. This finding suggests that in addition to the usual environmental factors (diet, temperature, high humidity) that affect the breeding season of African dwarf goats [51,56], photoperiod must certainly play a role whose importance remains to be assessed.

Gestation period

In goats, gestation lasts an average of 5 months. Accurate data on the dwarf goat in Benin are scarce. However, generally in Central and West Africa, the 149-day gestation period is normal in goats (144 and 150.8 days). The weight of the kids, the type of birth (single or twin) and the diet have an effect on the duration of gestation [51, 56, 57].

Age at first kidding

The average age at first kidding for the dwarf goat is 426.7 ± 13 days [58]. Already in 1967, Robinet, quoted by [59] in station observed an interval of 10 - 14 months.

Average Kidding interval

It is less than one year 283 ± 59 days for this breed in West Africa [53]. Three farrowings in two years are often observed, which reduces for these females this interval to not more than 8 months (240 days). An average interval of 227.6 days was reported for the same breed in Côte d'Ivoire [51].

Sahelian Goat

Description

The phaneroptic characteristics of the Sahel goat have been reported by several authors [47, 53, 60]. It is a rectilinear and hypermetric animal, with longiline format and having a big size (80 to 85 cm at the withers in the males and 70 to 75 cm in the females) and weighs between 25 and 35 kg. It has a thin, triangular head with a straight profile and a slightly flat forehead, with thin lips, a shallow nose and a straight bevel (Figure 4). The neck is thin and long. The horns almost present in both sexes are fine in the female and strong in the male. In the male, the horns are annealed and spiraled when fully developed and are carried essentially straight and deviated slightly above. The ears are more or less long (11 to 21cm), broad and pendulous or semi pendulous [61]. The presence of appendages is frequent: the pendants exist in some males and females while the goats are encountered on three quarters of cases [62]. The neckline is always straight with a prominent spine. The rump is short and marked by a steep slope with a short, raised tail. The chest is down, narrow and long. The limbs are long and slender, suitable for walking. The udder is well developed, down to thick skin with two long teats well divided into bottle form.

The robe of the sahel goat is very variable [63], characterized by a single color coat, composed or conjugate: ranging from white or black uniform (very rare) to spotted black and white, passing through the uniform fawn with dorsal or spotted skate. The hairs are short and thin. The dominant dress is the white spotted with black or red. The mane exists in three quarters of the goats, but it is practically absent in the female goat.

Fig-4: Sahelian Goat [64]

Zootechnical performances

Weight of kids at birth

The birth weight of goats varies from 1.7 to 2.5 kg in Sahelian goats. Individual differences can be considerable given the fact that several factors may be involved [53]. Several studies show that males are always heavier than females [65]. There may be considerable differences between products of the same scope. Products from simple litters are always heavier than those from multiple litters [66].

Dairy production

The Sahel goat is particularly adapted to the environment, but the daily quantities of milk produced. are quite low in comparison with the specialized breeds. The quantity of milk produced averages 70 kg per lactation, which lasts 120 days or even 180 days. Milk production is higher during the rainy season and during the first six weeks of lactation, and increases with the age of the goat. With a good combination of local food resources; the dairy production of the Sahelian goat can be significantly improved. This improvement becomes significant if there is an association of a mineral supplementation. The poor beef and dairy performance of Sahelian goats is due to constraints related to rearing conditions and climate [67].

Table-1: Reproductive Parameters of the Sahelian Goat

Parameters	References
Age at puberty 8 -14 months	[67].
Duration of the estrous and heat cycle Heat : 24- 48 h Cycle : 20-22 days	[63, 67] [67]
Age at first kidding 16.5 to 17.2 months 354 days	[63] [68]
Gestation 148 days 150 days	[63] [67].
Kidding Interval 354 days	[62]
Fecundity 171% 79.1% 103%	 [53] [61] [62, 68]
Prolificity 112% 124%	[61] [62]
Fertility Real Fertility : 70,3% Apparent fertility: 83%	[61] [62]
Abortion rate 18.9%	[61]

Reproductive parameters

The reproductive parameters of the Sahelian goat have been reported by several authors. These parameters are summarized in Table 1

Maradi red goat

Description

According to [69], the Maradi goat is incorrectly described as red (Figure 5). The coat is uniform light brown in color with narrow hairs, shiny with mahogany reflection [53]. It is this phenotype that has been selected by the goat breeding center of Maradi as part of its selection and distribution. In the Sokoto region, the coat is usually deep red [70] with an upper line of the body from head to tail marked by a black stripe. The forehead, the tail, the extremities of the limbs is also dark. Opinions remain divided on the causes of these shades of the dress. Some advance genes in pigment synthesis. Others see it as the result of the interaction of genera and environment [71].

In a dry environment, the hair lengthens, takes on a faded clear hue. In a humid environment, the dress tends to become darker. As an anecdote, in 1938, Roth gave the red goat of the time a pictorial description, in these terms: balance, finesse, harmony of form and color. It is medioline, eumetric and is of medium or small size (0.55-0.65 m); the head is fine, the forehead is prominent with a rather short profile and straight, slightly concave. The mucous membranes are black. With the crossbreeding, changes were observed at the level of the dress. But at the goat center of Maradi, the dress does not seem to have changed [72].

The neckline is short, slender and mobile. The chest is ample, the ribs and the rump are round. The back is straight, the shoulder and limbs are muscular. The udder is well developed which is an obstacle to long walks and makes the red goat a rather sedentary animal [69]. The horns are heavier in the male, who usually wears a longer, bushy and darker beard than the female. The adult goat carries a mane that extends to the shoulders. The look is imposing, almost threatening. The smell is strong and typical [69].

Fig-5: Maradi red goat [73]

Zootechnical performance

The dairy abilities of the Maradi red goat are well known to farmers and in the village where the cow is lacking, the red goat Maradi takes over. The duration of lactation is 3 to 4 months after kidding according to the conditions of breeding and the annual milk production is 150 kg in 200 days corresponding to two lactations [74].

The slaughter yield (carcass weight in kg on live weight) varies from 50 to 55% for the castrated subject reported by [50]. Goat meat, in particular that of the Maradi red goat, is the basis of food for the populations of the region of Maradi and its surroundings.

Reproductive parameters

In the Maradi red goat, twin births start from the 2nd row of lactation and continue until the age of 5 to 6 years. Triplets and quadruplets are not exceptional [69, 75]. There would be scope possibility of up to six [72]. Table 2 presents some zootechnical and reproductive parameters in the Maradi red goat.

Exotic breeds of Goat

Several successful breeds have been introduced in Africa for adaptation trials or for improvement of local populations by crossing. In Benin, the main goats of exotic breeds encountered are: Alpine goat and Saanen goat

Alpine goat

Description

The Alpine goat (figure 6), is a strong dairy, native to the Alps and France. She is of medium size and size and short hair, all colors of dress: black, white, exist in this breed. Among the most common are: the color "burnt bread" or "chamoisée" with black legs and dorsal line and a polychrome with white spots in a black

or brown dress. The head, horned or not, with or without tassels, with or without a goatee, is of medium length with broad forehead and muzzle. His profile is concave; the ears are raised erect in a fairly closed horn, the udder is voluminous, well fastened forward and backward, retracting well after milking, with thin and supple skin [78, 79, 80, 81, 82].

Table-2: Some zootechnical and reproductive parameters in Maradi red goat

Zootechnical and reproductive parameters				
Birth weight (kg)	2			
Age at puberty (month)	5 to 6			
Age at first kidding (month)		14.2	12.9	12.1
Gestation length (days)	145 to 155			
Single span (%)	60			
Double span (%)	36			
Triple span (%)	4			
Quadruple span(%)	Possibility			
Fertility rate (%)	95.5 to 98.7			
Fecundity rate (%)	122.2			
Prolificity		1.47	1.36	1.24
Interval kidding (days)		332.4	467.1	410.4
References	[75]	[76]	[77]	

Alpine goat is raised in Benin on a private farm in the plateau region in order to diversify milk production still exclusively bovine. They have been raised on this farm since 2005.

Fig-6: Alpine Goat [73]

Zootechnical performances

The average weight of goats is 80 to 100 kg, and 50 to 90 kg for females [73]. The dairy qualities are an average milk production per lactation of 842 kg in 290 days, with a protein content of 31.5 g / kg and a high rate of 35.3 g / kg [83].

The average dairy production of this breed in Benin is 1.28 ± 0.03 kg, with a peak of 1.49 ± 0.39 at 41 ± 16 days of lactation (Vissoh et *al.*, 2015).

Saanen Goat

Description

Native from the Saanen Valley in Switzerland (Figure 7), it is an animal of strong development, deep, thick, having a good bone structure, the coat and the hair are uniformly white, the hair is short, the head, with or without horns, with or without tassels, with or without a goatee, has a broad and flat forehead. The ears are worn at least horizontally, the chest deep, wide and long, the udder is globular, very broad at its upper part which gives it a stronger development in width than depth. The Saanen is a better producer of milk in the world, and gives especially excellent kids whose meat is very appreciable [78, 80, 81, 82, 84].

In Benin, thanks to the friendly relationship with the Belgians, the "Fermier sans Frontière" farm bought Saanen dairy goats imported from Belgium in September 2012.

Fig-7: Saanen goats

Zootechnical performances

The average weight of male goats is 80 to 120 kg, and 50 to 90 kg for females [73]. The dairy qualities are an average milk production per lactation of 800 kg in 270 days, with a TP of 31.3 g / kg and a TB of 35.3 g / kg [83].

In Benin, weights at specific ages for kids were estimated at 3.58kg; 11.97kg; 21.83 kg and 31.84 kg respectively at 0; 1; 3 and 6 months age [85].

Zoo-genetic management of goats

Genetic improvement trials have been conducted in West Africa, but most have failed [14]. But, some hopes are reborn, especially in dairy production given the genetic potential of the Sahelian breeds for this trait [86]. The quantities of milk can vary according to the breed and the period of lactation, but they can reach one liter per day. In addition, it is a milk of high technological quality because of the strong presence in local breeds of strong variants of the gene responsible for the synthesis of αs1 casein. The heritability coefficients reported in European [87] and African [88] breeds are quite high, suggesting that genetic progress is even more important in goats generation is short and the selection intensity applicable is high [86]. The top down approach that has led to the implementation of breeding programs in West Africa and Benin with the mixed results that we know must be avoided [86]. Like in Mexico and Brazil, it will be necessary to implement breeding programs using basic community management with, on the one hand, selection objectives articulated around the real needs of pastoralists and opportunities and on the other hand, selection schemes adapted to the resources and capacities of livestock farmers [89].

In areas where rearing and market conditions are suitable, crossing may be considered. Candidate breeds are the South African Boer breed for beef, and the Alpine or Saanen breeds for milk production [86]. Sahel x Alpine or Sahel x Saaanen goat crossbred goats have a weight at two months higher than local goat kids [67, 85]. For [90], Alpine goat can produce 267.7 kg of milk in 300 days of lactation and is an interesting candidate breed for milk production in Benin.

CONCLUSION

Demand for meat products in Benin is worrisome because of the increase in the human population and the low productivity of our local breeds. To fill the protein demand gap, raising short-cycle species seems a better alternative and betters an improvement of their productivity through crosses with more productive exotic breeds. So, knowledge of the zootechnical performance of local and exotic breeds in Benin and their reproductive parameters are particularly important. Several short-cycle species exist in Benin, but the goat species has been the subject of this review because of several reasons. First of all, it is one of the species whose breeding has been neglected, but it is a very prolific species, very rustic and has an important socio-economic and cultural function. Regarding these reasons, it will be necessary to bet more on its breeding and better improve its productivity through crossbreeding with exotic breeds.

REFERENCES

1. Faye, B., Alary, V., David, J., Grongnet, J., Dourmad, J., Etienne, M., & Noblet, J. (2001). Les enjeux des productions animales dans les pays du Sud. *Europe*, *52*(059), 579.
2. Zoundi, J. S., Sawadogo, L., & Nianogo, A. J. (2003). Pratiques et stratégies paysannes en matière de complémentation des ruminants au sein des systèmes d'exploitation mixte agriculture-élevage du plateau central et du Nord du Burkina Faso. *Tropicultura*, *21*(3), 122-128.
3. MAEP. (2010). Annuaire Statistique Agricole du Ministère de l'Agriculture, de l'Elevage et de la Pèche, 2008-2009 bénin.
4. Ashley, S., Holden, S., & Bazeley, P. (1999). *Livestock in poverty-focused*

development (pp. 1-95). Crewkerne, UK: Livestock in Development.
5. Faye, B., & Lhoste, P. (1999). Le conseil en élevage en milieu tropical. *Renc. Rech. Ruminants.* 6: 63 - 67.
6. Medenou, C., & Soule, M. (1988). Notes techniques sur l'élevage en R.P.B. N° 411Cotonou, 53 p.
7. Faostat. (2018). Statistical database. www.fao.org
8. Devendra, C. (1971). comparative efficiency of feed utilization of ruminants in the tropics. *Tropical science*.
9. Okello, K. L., & Obwolo, M. J. (1985). Ouganda: possibilités d'élevage caprin. *Revue mondiale de zootechnie*, *53*, 27-32.
10. Barry, M. B. (1985). Le rôle des petits ruminants dans la stratégie d'intensification des systèmes de production en Côte d'Ivoire. *Les petits ruminants dans l'agriculture africaine. Addis Abeba, Ethiopie, Cipea*, 199-206.
11. Amegee, Y. (1986). Feedlot performance and carcass quality of West African Dwarf goat. *Revue d'Elevage et de Medecine Veterinaire des Pays Tropicaux (France)*.
12. Lebbie, S. H. B. (2004). Goats under household conditions. *Small ruminant research*, *51*(2), 131-136.
13. Charray, J., Coulomb, J., Haumesser, J. B., Planchenault, D., & Pugliese, P. L. (1980). *Les petits ruminants d'Afrique centrale et d'Afrique de l'Ouest: Synthèse des connaissances actuelles*. GERDAT-IEMVT.
14. Ademosun, A. A. (1994). Constraints and prospects for small ruminant research and development in Africa. In *Small Ruminant Research and Development in Africa. Proceedings of the 2 nd Biennial Conference SRNET, AICC, Arusha, Tanzania* (Vol. 7, pp. 1-6).
15. Gefu, J. O., Adu, I. F., Alawa, C. B. I., & Magaji, S. O. (1994). Characteristics of smallholder sheep and goat management practices in South-East Nigeria: observations from Anambra State. Niger. *J. Anim. Prod*., 21: 127-134
16. Fournier, A. (2006). L'élevage des chèvres. Artémis (eds). Slovaquie. p10-22. ISBN: 2844164579-9782844164576.
17. Corbet, G. B. (1978). The mammals of the Palaearctic Region. A taxonomic Review. British Museum (Natural History): London, UK.
18. Corbet, G. B., & hill, J. E. (1980). A World List of Mammalian Species. British Museum (Natural History): London, UK.
19. Denis, B. (2000). La chèvre: un animal à découvrir (1009-1011) In: 7ème conférence internationale sur les caprins: Recueil des communications Tome II. Tours et Poitiers, du 15-21 mai 2000. *Paris: INRA-IGA-Institut de l'élevage.-1049 p*.
20. Epstein, H. (1971). The origin of the domestic mammals of Africa. Africana publ. corp. (eds).Londres. Pp2-719.
21. Esperandieu, G. (1957). *De l'art animalier dans l'Afrique antique*. Impr. officielle.
22. Mason, I. L. (1984). Goat evolution of domestical animals. Ed. Longman, London. 86-93p.
23. Vigne, J. D. (1988). *Les grandes etapes de la domestication de la chevre: une proposition d'explication de son statut en Europe occidentale*. Société d'ethnozootechnie.
24. Lauvergne, J. J. (1988). Le peuplement caprin du rivage nord de la mediterranee. *Ethnozootechnie*, (41), 25-32.
25. Saeid, N. (2007). Histoire évolutive de l'Aegagre (Capra aegagrus) et de la chèvre (C. hircus) basée sur l'analyse du polymorphisme de l'ADN mitochondrial et nucléaire : Implications pour la conservation et pour l'origine de la domestication p 6.
26. Harris, D. R. (1961). The distribution and ancestry of the domestic goat. *Journal of the Linnean Society of London* 173: 79-91.
27. Higgs, G. A., Vane, J. R., Hart, R. J., Porter, C., & Wilson, R. G. (1976). Prostaglandins in the saliva of the cattle tick, Boophilus microplus (Canestrini) (Acarina, Ixodidae). *Bull. ent. Res*. 66, 665-670.
28. Benyoub, K. (2015). Caractérisation phénotypique des populations locales caprines dans le Nord-Ouest Algérien. Analyse morphométrique et qualité du lait. thèse master. Université e Tlemcen76-78.
29. Mamet, R. (1971). La connaissance du bétail. J-B Bailliére et fils (eds). Paris
30. Lhost, D., & Rousseau. (1993). Zootechnie des régions chaudes : les systèmes d'élevage
31. Konte, M. (1999). Le lait et les produits laitiers : Developpement de systèmes de producteurs intensive en Afrique de l'Ouest. Ref : ISRA/UPV-LNERV/Février 1999
32. Remond, B., Cisse, M., Ollier, A., & Chilliard, Y. (1991). Effects of slow release bovine somatotropin in dairy heifers and cow fed two levels of energy concentrate, performances and body condition. *J. Dairy Sci*., 74, 1370-1381.
33. Wilson, R. T. (1992). *Petits ruminants: production et ressources génétiques en Afrique tropicale* (No. 636.2 F31f). FAO.
34. Kane, M. (1995). Les races d'animaux élevés en Mauritanie. *Bull. d'Info. sur les Ress. Génét*., 15 : 3-25
35. Missohou, A., Ba, A. C., Dieye, P. N., Bah, H., Lo, A., & Gueyes. (2000). Ressources génétiques caprines d'Afrique de l'Ouest: systèmes de production et caractères ethniques. West African genetic resources of goat; production systems and ethnic traits. (932-935) In: 7th International Conference on goat, France, 15-21 may 2000.
36. Niaré, T. (1995). Croissance pré-sevrage des agneaux et productivité en milieu traditionnel soudano-sahélien au Mali. Revue Elev. Méd. vét. Pays trop., 48 (2) : 195-202.

37. Winrock. (1976). The Role of Sheep and Goats in Agricultural Development Morrilton, Arkansas: Winrock International.
38. Rege, J. E. O. (1994). Indigenous African small ruminants: a case of characterisation and improvement In: Small ruminant Research and Development. Proc 2nd Bi-annual Conference of the Small Ruminant Network. AICC, Arusha, Tanzania, 7-11 dec. 1992
39. Fernandez, H. (2006). Proceedings of the National Academy of Sciences of the United States of America.
40. Poutya, M. R. (2008). Analyse du polymorphisme des microsatellites : Application à la caractérisation des chèvres naines et du sahel d'Afrique de l'Ouest ; Thèse de Med Vét, Ecole Inter-Etats des Sciences et Médecine Vétérinaires (E.I.S.M.V.) ; Université Cheikh Anta Diop de Dakar, 94p
41. FAO. (2001). Annuaire de la production. Rome, 53: 199-251
42. Tamboura, H., & Berte, D. (1996). Système traditionnel d'élevage caprin sur le plateau central du Burkina Faso. In: Proc. 3rd Biennal conference of the African small ruminant reproduction; Niamey, Niger. Nairobi, Kenya, ILRI; 285-289
43. IEMVT. (1989). Elevage du mouton en zone tropicale humide d'Afrique; 207 INRA (Institut National de Recherche Agronomique). 21p.
44. Masson, I. L. (1988). A world dictionary of livestock breeds, types and varieties UK: 3è Edit. CAB. International.348p.
45. Tourrand, J. F., & Landais, E. (1996). Productivité des caprins dans les systèmes de production agricole du Delta du fleuve Sénégal. *Revue Elev. vét. Pays trop.* 49 (2) : 168-173.
46. Wilson, R.T., & Light, D. (1986). Livestock production in central Mali: economic characters and productivity indices in traditionally managed goats and sheep. *J. Anim. Sci*., 62 (3): 567-575
47. Doutressoule. (1947). L'élevage en Afrique occidentale française, edition Larose, Paris, 298p.
48. Bourzat. (1985). La chèvre naine de l'Afrique occidentale: monographie. Doc. Groupe N° SRC 4. ILCA, Addis-Abeba, Ethiopie.
49. Pagot, J. (1985). L'élevage en pays tropicaux, ministère de la coopération. Édition GP Maisonneuve et Larose, Mémento de l'agronome, 451p.
50. Naba. (2001). Contribution à l'évaluation technique du projet d'appui à la selection, la promotion et la diffusion de la chèvre rousse de Maradi, Niger. Thèse. Med. Vét., Dakar. 83 p.
51. Chukukwa, Opara, Herbert, Ogbuewu, & Ekenyem B.U. (2010). Reproductive Potentials of West African Dwarf Sheep and Goat: A Review. *Res. J. Vet. Sci*., 3: 86-100. URL: http://scialert.net/abstract/?doi=rjvs.2010.86.100.
52. Dumas.(1977). Etude sur l'élevage des petits ruminants du Tchad. Analyse des caractéristiques de la reproduction. *Maisons-Alfort, France, Iemvt*, 32 p. (Fiche de synthèse n° 5)
53. Charray, Coulomb, Haussemer, & Planchenault. (1980). Les petits ruminants d'Afrique Centrale et de l'Ouest. Synthèse des connaissances actuelles. Maisons-Alfort : I EMVT, 295 p.
54. Delgadillo, J. A., Malpaux, B., & Chemineau, P. (1997). La reproduction des caprins dans les zones tropicales et subtropicales. *Productions Animales 1 (10), 33-41.(1997).*
55. Yenikoye, A. (1986). *Etudes de l'endocrinologie sexuelle et de la croissance folliculaire chez la brebis nigérienne de race Peulh: Influence de la saison de reproduction* (Doctoral dissertation).
56. Zahraddeen, D., Butswat, I. S. R., & Mbap, S. T. (2007). Evaluation of some factors affecting milk composition of indigenous goats in Nigeria. *Livestock Research for Rural Development* 19:166-171.http://www.lrrd.org/lrrd19/11/zahr19166.htm.
57. Lapo, Hamidou, & Assane. (2005). Caractéristiques de la reproduction chez la chèvre rousse de Maradi en élevage semi-extensif. *RASPA* 3 (1) : 2005.
58. Haumesser. (1975). Quelques aspects de la reproduction chez la chèvre rousse de Maradi - Comparaison avec d'autres races tropicales ou subtropicales. *Revue Elev. Med. Vet. Pays Trop.* 28(2): 225-234.
59. Ally. (1990). Caractéristiques de reproduction des ovins et caprins élevés en milieu traditionnel de Dahra-Djoloff, Sénégal. Thèse Méd. Vét. Dakar, 88 p.
60. Wilson, R. T. (1992). *Petits ruminants: production et ressources génétiques en Afrique tropicale* (No. 636.2 F31f). FAO.
61. Gnanda, I. B. (2008). Importance socio-économique de la chèvre du Sahel burkinabé et amélioration de sa productivité par l'alimentation. *Annales de l'Université polytechnique de Bobo-Dioulasso, Institut du développement rural. Thèse de Doctorat unique en développement rural. Systèmes de Production Animale, spécialité: Nutrition et Alimentation*.
62. Mbaïdingatoloum, F. M. (2003). Essai d'un protocole d'insémination artificielle chez les chèvres sahéliennes en milieu réel: résultats préliminaires. *Mémoire DEA: Productions animales, Dakar (EISMV), 8*.
63. Chamchadine, M. A. (1994). Comportement alimentaire et performances laitières des chèvres sahéliennes sur parcours naturels. *Th. méd. vét.: Dakar*, (1).
64. Harouna, M. S., Assane, M. M., Sawadogo, M. G. J., & Mamman, M. M. Caracteristiques du cycle œstral de deux races caprines du niger: la chevre du sahel et la chevre rousse de maradi.
65. Rwakazina, O. (2005). *Evaluation de la productivité en milieu réel et en station de la chèvre Boer au Rwanda* (Doctoral dissertation, Thèse: Méd. Vét: Dakar).

66. Moulin, C. H. (1993). Performances animales et pratiques d'élevage en Afrique Sahélienne. In *La diversité du fonctionnement des troupeaux de petits ruminants dans la communauté rurale de Ndiagne (Sénégal)*. Thèse Doct. Ina PC Paris.
67. Djakba, A. V. (2007). *Evaluation des paramètres de reproduction chez la chèvre du Sahel inséminée artificiellement dans la région de Fatick* (Doctoral dissertation, Thèse: Méd. Vét.: Dakar).
68. CIRAD-EMVT. (1991). Fiche technique de l'élevage tropical No 4.- Maisons Alfort : CIRAD-EMVT.8 p.
69. Roth, M. (1938). La petite chèvre rousse du Niger. *Bull. SerY. Zootechn. Epizoot. Afr. Occid. Fr*, 1, 13-19.
70. Wilson, R.T. (1988). La production animale au Mali central: études à long terme sur les bovins et les petits ruminants dans le système agro-pastoral. Addis-Ababa, Ethiopia, ILCA (Research report No. 14). 1988, 115p.
71. Poudelet, E. (1976). *Contribution à l'étude de la chèvre rousse de Maradi*. Ecole nationale vétérinaire.
72. Abdou, H. (2014). *Complémentation précoce en colostrum de vache Azawak chez la chèvre rousse de Maradi au Niger: effets sur les performances de croissance et de reproduction, et sur la survie au cours de la première année de vie* (Doctoral dissertation, Université de Liège, Liège, Belgique).
73. Capgenes, page consultée le 23/06/2018, Les Races URL : www.capgenes.com/spip.php?rubrique11.
74. Oumara, A. D. (1986). Croissance et viabilité de la chèvre rousse de Maradi au centre d'élevage caprin de Maradi (Thèse de doctorat vétérinaire). École Inter-États de sciences et médecine vétérinaire de Dakar: Dakar, 122p.
75. Zakara, O. (1985). Les petits ruminants en République du Niger. In: Wilson R.T., Bourzat D. (Eds), Small ruminants in African Agriculture, Proc. Conf. at ILCA, Addis Ababa, Ethiopia. 236-242.
76. Haumesser, J. B. (1975). Some aspects of reproduction in the reddish brown goats of Maradi. Comparison with other tropical or sub-tropical breeds [in French]. *Rev. Elev. Med. Vet. Pays Trop.* 28 (2): 225-234
77. Marichatou, H., Mamane, L., Banoin, M., & Baril, G., (2002). Zootechnical performances of goats in Niger: comparative study of the Maradi Russet goat with the Black-Coat goat in Maradi area [in French]. *Rev. Elev. Med. Vet. Pays Trop.*, 55 (1): 79-84
78. Quittet, E.(1977). La chèvre, Guide de l'éleveur. La maison rustique (eds). Paris, I.S.B.N. 27066-0017-9. P18-20.
79. Charron, G. (1986). La production laitière. Volume I, les bases de la production. Lavoisier TEC et DOC., 347p.
80. Benalia, M. (1996). Contribution à la connaissance de l'élevage caprin: Synthèse bibliographique. Thèse. Ing. Agr. Tiaret, 72p.
81. Babo, D. (2000). Races ovines et caprines françaises. Edition France Agricole, 1ére édition,p :249-302.
82. Gilbert, T. (2002). L'élevage des chèvres. Editions de Vecchi S.A., Paris.159p.
83. Institut de l'élevage – Fédération du Contrôle Laitier. (2007). Résultats de contrôle laitier – Espèce caprine, FCL, 16p.
84. Holmes-Pegler, H. S. (1966). The book of goat. Ninth edition, The bazaar, Exchange and Mart, LTD, p255.
85. Offoumon, O. T. F., Bassossa, B. A. M., Idrissou, Y., Assani, A. S., Assogba, B. G. C., Alkoiret, I.T., & Gbangboché, A. B. (2018). Growth performance of Saanen, red Raradi and the crossbred Saanen versus red Maradi goats in soudanese area of Benin. International Research Journal of Natural and Applied Sciences, 5(5): 1-14.
86. Missohou, A., Nahimana, G., Ayssiwede, S. B., & Sembene, M. (2016). Elevage caprin en Afrique de l'Ouest : une synthèse. Rev. Elev. Med. Vet. Pays Trop., 69(1): 3-18.
87. Bélichon, S., Manfredi, E., Piacère, A. (1998). Genetic parameters of dairy traits in the Alpine and Saanen goat breeds. Genet. Sel. Evol., 30: 529-534.
88. Odubote, I. K. (1996). Genetic parameters for litter size at birth and kidding interval in the West African Dwarf goats. *Small Ruminant Research*, *20*(3), 261-265.
89. Iñiguez, L. (2011). The challenges of research and development of small ruminant production in dry areas. *Small Ruminant Research*, *98*(1-3), 12-20.
90. Vissoh, D., Gbangboche, A. B., & Padonou, E. (2015). The alpine goat's milk production and cheese yield in Benin. *International Journal of Current Research*, *7*, 22108-22112.