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RESEARCH ARTICLE

MILK PRODUCTIVITY OF LOCAL BOVINE FEMALES INSEMINATED IN SOUTH TOGO

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Abstract

Cow's milk plays a key role in livestock systems and in human nutrition. The study consisted of determining the milk productivity of twenty-two (22) cows subjected to artificial insemination for the purpose of genetic improvement of milk. The methodology used is the measurement of milk per day per cow as of the second week of delivery at a frequency of ten (10) days during six (06) months. The results of this study yielded an average milk productivity of 0.7 ± 0.1 liters over the six (06) months of collection. No significant difference ($p > 0.05$) in milk productivity was observed in relation to the group of cattle studied, the site of establishment of the farms and the lactation rank. In conclusion, this research will serve as a basis for assessing the milk productivity of Métis resulting from artificial insemination.

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Introduction:-

Raw milk, an important source of animal protein, fat, minerals and vitamins, is a highly nutritious product for humans (Labioui et al., 2009). In Togo, local milk production covers only 28% of needs estimated in 2010 at approximately 9,600 tonnes (DGSCN, 2010). This production deficit is explained by the low milk production and productivity (1 to 4 liters per day) of cows of local breeds and poor fertility parameters (Kulo and Abalo, 2011). With the ever-increasing population, the demand for milk and dairy products is growing. To make up for this deficit, Togo uses imports. The total value of imports of milk and dairy products in Togo increased from 3 to 9 million dollars between 2000 and 2011 (FAO, 2012). The supply of milk and dairy products is therefore a major concern for the Togolese authorities. With a view to improving this milk production, a study on the improvement of bovine fertility by artificial insemination in southern Togo was undertaken by Seme (2017). Thus, knowledge of the milk productivity of inseminated local cows is important in assessing that of crossbreds resulting from artificial insemination.

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Material And Methods:-

Study zone:-

The study was conducted on cattle farms in the Avé and Zio prefectures of the Maritime region in southern Togo. These are farms selected for research on "improving milk production through artificial insemination in southern Togo" (Seme, 2017). The criteria that explain this selection are based on the fact that these farms: (i) are the main sources of supply of local milk and dairy products in Lomé, the capital of Togo (Kulo and Abalo, 2011); (ii) are among the prefectures with commercial or commercial dairy cattle farms in Togo (Dao, 2013).

This study area enjoys a subequatorial climate with two rainy seasons, the duration of which is very variable, ranging from March to mid-July for the main rainy season and from mid-September to November for the short rainy season. Precipitation varies from 800 to 1,600 mm of rain per year with an average temperature oscillating between 20°C and 35°C (FAO, 2013).

Biological Material:-

Twenty-two (22) cows from three (03) cattle farms were the subject of data collection on milk productivity. These three (03) farms were chosen on the basis of their ease of access and the availability of herdsmen for this collection. These are females that calved between June and October 2016 after the success of the first artificial insemination. The lactation rank of these females varies between 1 and 5 (Table 1).

These females are fed mainly on natural pasture with the addition, at times, of food supplementation consisting essentially of cooking salt (NaCl). They are subject to a prophylactic schedule, especially against trypanosomosis and gastrointestinal parasites.

Table 1:- Lactation ranks of the cows studied.

		Lactations	Groups of cattle			
		ranks	Zebus	Bullfighting	Metis	Total
Parity	Primiparous	1	2	0	7	9
	Multiparous	2	4	1	2	7
		3	1	1	1	3
		4	1	1	0	2
		5	0	0	1	1
Total		5	8	3	11	22

Milk measuring equipment:-

Graduated plastic cups with a capacity of one (01) liter with an accuracy of 0.05 liter were used to measure milk collected.

Milking practice:-

Every evening, the calves are isolated to prevent them from suckling at night. Isolation is done in a section of the closed barn that does not allow contact between the calves and their mothers or by tying them in a line on a rope outside the barn where their mothers are housed.

The suckling of the calf in a few seconds allows milk induction. This one is again isolated after this induction, either by attaching it by its neck to one of the forelegs of the mother or is maintained by an assistant. The milker places a plastic bucket between his legs. He grabs a teat and gently squeezes it with a downward motion, which squeezes the milk out of it. One hand pulls a teat while the other releases the neighbor at a fairly rapid pace. This manipulation is done on the teats of the four udders. Milking takes an average of five (05) minutes. The milking is not complete, the udders are not completely emptied. At the end, the calf is again left with its mother (restricted suckling). It is made by herdsmen or their wives.

Frequency of data collection:-

The milking of females began two (02) weeks after calving. It is manual and takes place once a day between 5:30 a.m. and 8:00 a.m. Frequency of data collection.

The milking of females began two (02) weeks after calving. It is manual and takes place once a day between 5:30 a.m. and 8:00 a.m.

The individual milk productivity of each cow is collected every ten (10) days for a period of six (06) months.

Parameter studied:-

Milk productivity or the amount of milk milked per day per cow is the main parameter measured. Due to a lack of reliable data, the quantity of milk consumed by the calf could not be determined.

Data analysis:-

The data collected was entered with the Excel spreadsheet before being analyzed. The results were expressed as mean $\pm$ standard deviation and the differences were considered significant at the 5% probability threshold. In addition, the effects of the location of the farm, the lactation rank and the group of cattle considered on milk production were assessed using the ANOVA program. The computer software used is EpiData and SPSS 20.

The individual milk productivity of each cow is collected every ten (10) days for a period of six (06) months.

Results:-

Milk productivity:-

The average milk productivity was 0.7 ± 0.1 liter between 0.3 and 2.5 liters over the six (06) months of data collection (Figure 1).

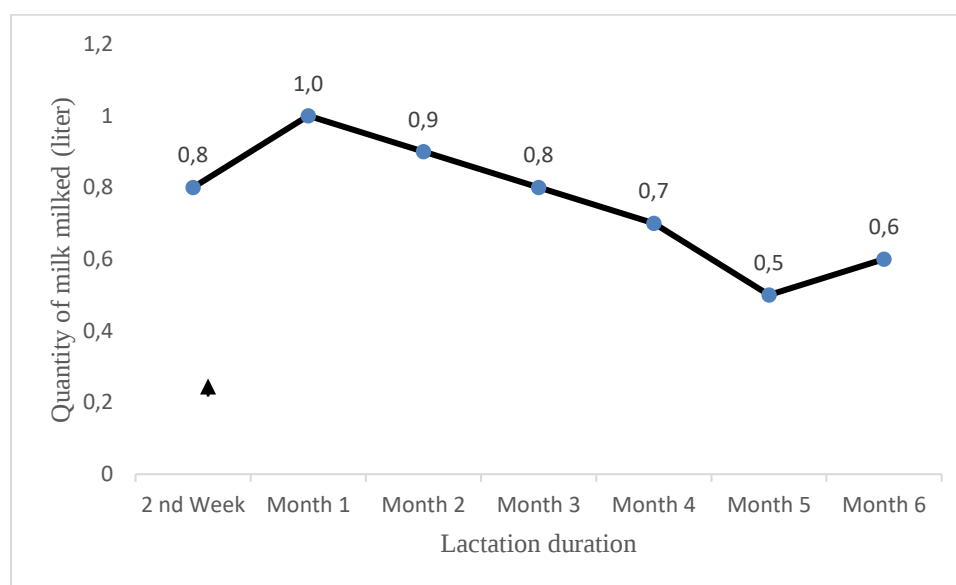


Figure 1:- Lactation curve of the bovine females in the study.

Influence of cattle group on milk productivity

No significant difference ($p > 0.05$) in milk productivity was observed between these three groups of cattle in the Fisher F test (Table 2)

Table2 :- Milk productivity of cows according to the groups of cattle considered.

group of cattle	Number of females	Average quantity of milk per cow/day (liter)
Zebus	8	0.7 ± 0.4^a
Bullfighting	3	0.7 ± 0.2^a
Metis	11	0.7 ± 0.2^a
Total/average	22	0.7 ± 0.1

Influence of the location of breeding on milk productivity

The F test carried out showed that the difference observed between the average milk productivity relative to the three (03) farms was only significant ($p \leq 0.05$) at the sixth (06) month (Table 3).

Table 3:- Milk productivity of cows according to the location of the farms.

Different farms	2 nd week	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Average
Bagbé 2	0,8±0,1 ^a	1,2±0,2 ^a	1±0,1 ^a	1± 0,2 ^a	0,9±0,1 ^a	0,8±0,1 ^a	0,8±0,2 ^b	0,9± 0,2 ^a
Antoine Copé	0,9±0,3 ^a	1±0,2 ^a	0,8±0,1 ^a	0,8±0,1 ^a	0,6± 0,2 ^a	0,4±0,2 ^a	0,6± 0,1 ^a	0,7±0,2 ^a
Tonoukouti	0,8±0,1 ^a	0,9±0,1 ^a	0,8±0,1 ^a	0,6±0,1 ^a	0,6± 0,1 ^a	0,4± 0,1 ^a	0,4±0,2 ^a	0,6± 0,2 ^a
Average	0,8±0,2	1,0±0,1	0,9±0,1	0,8±0,2	0,7±0,2	0,5±0,1	0,6±0,2	0,7±0,1

NB: the averages surmounted by the letters a and b at the level of a column are statistically different

Influence of lactation rank on milk productivity

The average milk productivity of primiparous is 0.6 ± 0.2 liters against 0.7 ± 0.2 liters for multiparous; no significant difference ($p > 0.05$) was observed with respect to lactation rank (Figure 2).

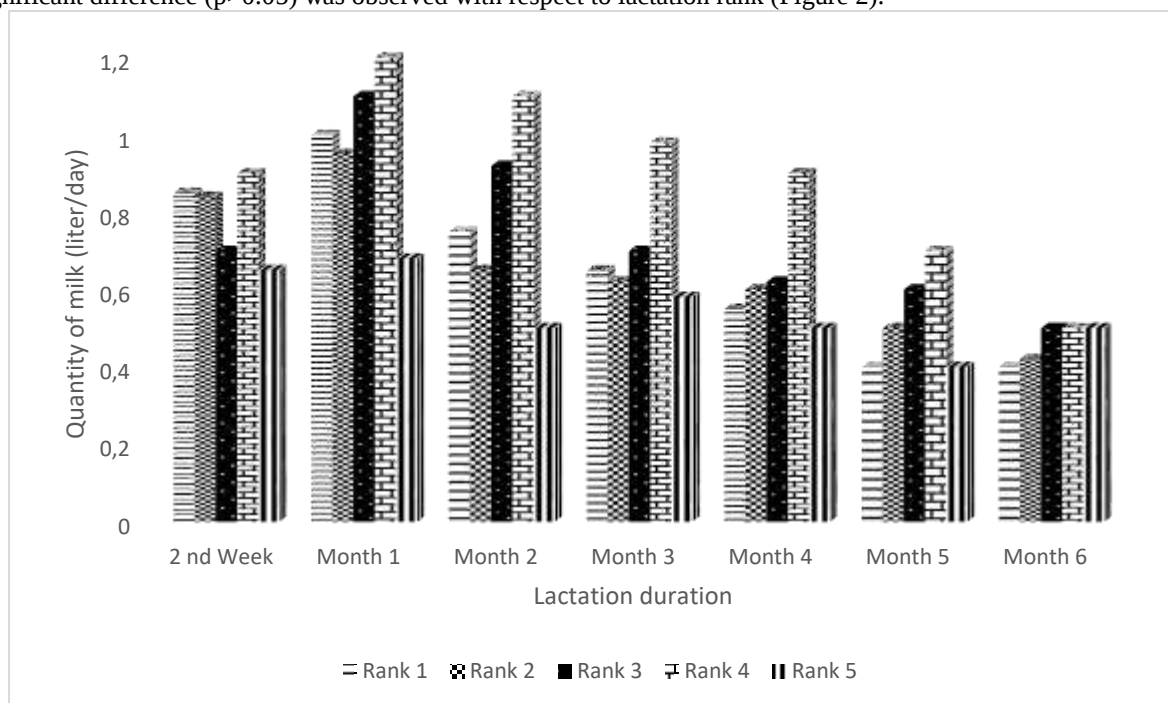


Figure 2:- Histogram showing the effect of lactation rank on milk production.

Discussion:-

The average milk productivity of cows is 0.7 ± 0.1 liters with extreme values from 0.3 to 2.5 liters. It is consistent with the values found by Adanléhoussi and Adomefa (2004) during research on improving the dairy chain in Togo. On the other hand, it is much lower than that found by Seme et al. (2016) (2.28 ± 0.86 liters) in the Maritime region. This could be explained by the fact that the period of this study experienced a severe drought that led to insufficient grazing. Because, milk productivity varies greatly depending on the food ration (Pitala et al., 2012 ; Lamboni, 2008). In addition to this lack of grazing, a low use of food supplementation has been observed, adding to the low dairy performance of these local breeds. The study conducted by Adanléhoussi et al. (2005) on the Somba breed in the peri-urban areas of Lomé and Sokodé is proof of this low dairy performance of local breeds in Togo. These authors found an average production per day of 0.63 liters of milk per cow for an average lactation duration of 241 days. In addition, health interventions for the benefit of all cattle are at a very low level in almost all farms in the country (Dao, 2013). Indeed, the hierarchy of the frequencies of pathologies encountered in dairy farms and which are at the origin of the significant drop in production, are clinical mastitis (31.7% of lactations affected), foot pathology (25.6 %), digestive disorders (12.3%) and retained placenta (9.6%) (Faye et al., 1994). The latter report that health problems tend to increase with the rank of lactation (with the notable exception of calving difficulties), the beginning of lactation being the period of greatest sensitivity. Roux confirms that herd milk production is one of the

measures most obviously affected by mastitis (Roux, 1999). According to Taylor, the quantities of milk produced drop significantly (up to 15-18%) as soon as the cases of mastitis increase (Taylor, 2006). The milk productivity of the present study overlaps with that of Kouamo et al. (2009) who had found in Sub-Saharan Africa and Senegal, a production oscillating between 1 to 4 liters per day.

Dairy productivity in relation to the location of the farms:-

According to Alice (1999) and Tordina (2001), milk production varies under the influence of rearing conditions including feed level, genetic potential, health monitoring, etc. It is fairly consistent with that of Boujenane [4] who maintained that to have a high milk production, it is necessary to have an animal with a high genetic potential and to offer it adequate breeding conditions to express its potential. This work would explain the differences in production between the farms of Bagbé II (0.9 ± 0.2 litres), Antoine copé (0.7 ± 0.2 litres) and Tonoukouti (0.6 ± 0.2 litres) with respectively for average production peaks of 1.2; 1 liter and 0.9 liters of milk recorded in the first month of lactation. The environment of an animal being a combination of all factors could influence the expression of the trait governing milk production. These factors are related to livestock management and the season. To have a high milk production, it is not enough to have an animal with a high genetic potential, it must also be offered adequate breeding conditions to express its potential (Boujenane, 2003). It is concluded that the location influences milk production.

Influence of lactation rank on milk production:-

It appears from the evolution of milk production according to the lactation ranks that the cows of lactation rank 4 is higher than those of the other lactation ranks (ranks 1, 2, 3 and 5). The observation of the production of the 4th rank of lactation compared to those of ranks 1, 2 and 3 confirms that the quantity of milk produced increases with the rank of lactation except that there is overlapping of production of ranks of lactation 1, 2 and 3. On the other hand, the quantity of milk produced from the 5th lactation rank is relatively low and lower than the other lactation ranks. This production dynamic can be explained by the variability in the number of cows used according to the rank of lactation (9/22 for the 1st rank, 7/22 for the 2nd rank, 3/22 for the 3rd and 2/22 for the 5th row and 1/22 for the 4th row). However, Ouedraogo (2013) demonstrated that the quantity of milk produced by a cow generally increases with the rank of calving until the 4th or 5th lactation then decreases significantly and quite quickly from the 6th calving. The results of the study of the milk performance of Zebu Azawak, Zebu Peulh and Metis Azawak cows in Burkina Faso over the same period (6 months) indicate on the one hand the superiority of the total milk production of primiparous cows (638.5 l/cow) to that of cows of the 2nd row of calving (568.4 l/cow) and on the other hand an increase in the milk production of cows from the 3rd row of calving up to the 5th (Ouedraogo, 2013). This difference in results could be explained by the size of the samples and the rearing conditions of these two studies. Referring to the literature review, the sample size in Burkina Faso was clearly very large (130 suckler cows against 22 in our study). The farms that were the subject of this study were monitored for 12 years before the experiment. During this time, these cows received regular treatment against internal and external parasitosis (every 3 months), vaccines against CBPP, pasteurellosis and emphysematous anthrax and were tested for tuberculosis and brucellosis (zoonosis). It should be noted that age plays a major role in the development of the secretory activity of the udder. In properly exploited cows, the productive capacity rises gradually. The peak of milk production is reached at the fifth parturition, around the eighth year. It regresses during subsequent lactations (Zelter, 1953). These variations in production with lactation number are explained both by body variations, the increase in breast tissue during the first gestations and the normal aging of the tissue. There is a difference between the production of heifers depending on whether their first calving took place at 2 or 3 years of age, the production of the first lactation is lower in very young heifers than in the oldest heifers. Heifers that calve early (mated in less than a year) have a much lower production; which will affect subsequent lactations (Soltner, 1989).

Conclusion:-

This study made it possible to evaluate at 0.7 ± 0.1 liter the milk productivity of local cows in southern Togo. This low productivity denotes poor performance of local breeds bred in conditions that are not suitable for better expression of dairy genes. Thus, this inventory will allow to appreciate the gain of milk brought by the use of artificial insemination.

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