

Ph. Marchot¹P. L. Leroy²S. Janicot³B. Guillot⁴

The low tse tse challenge in the Accra Plains and consequent breeding prospects

MARCHOT (Ph.), LEROY (P. L.), JANICOT (S.), GUILLOT (B.).
Faible taux glossinaire dans les plaines d'Accra et perspectives de développement de l'élevage. *Revue Élev. Méd. vét. Pays trop.*, 1989, 42 (3) : 447-451.

Le Ranch d'Élevage d'Aveyime, situé au Ghana dans les plaines d'Accra est un centre de sélection bovine. La conformation du cheptel West African Shorthorn y est améliorée par croisement avec des zébus White Fulani. Un microclimat très sec caractérise la plaine par rapport aux régions qui se trouvent sous les mêmes latitudes. La rareté de la mouche tsé-tsé, et par suite, de la trypanosomose en sont des conséquences qui permettent une telle amélioration génétique. Celle-ci doit être poursuivie, étant donné qu'aucun facteur susceptible de modifier les conditions climatiques, donc la répartition des mouches, ne doit se manifester. *Mots clés* : Zébu - Élevage extensif - Sélection - Glossine - Trypanosomose - Ghana.

INTRODUCTION

The Accra Plains of Ghana are usually described as a triangular area (2,135 km²) situated between the Volta River and the Gulf of Guinea. The road linking Dawhenya-Afiénya-Kpong which lies on the Greenwich meridian constitutes its Western limit (Fig. 1).

The plains have a coastal savannah vegetation and thickets and shrubs are abundant.

Grazing land is mainly composed of short grasses like *Vetiveria fulvibarbis*, *Bracharia falcifera*, *Andropogon canaliculatus*. Tall grasses like *Ctenium newtonii*, *Sporobolus pyramidalis* are mainly found along the Volta flood Plains and mangrove vegetation is found in lagoon areas.

Most land is devoted to cattle rearing. The area has the largest concentration of cattle in the Southern part of the country (61,000 heads). The pastoral vocation of the Plains stems from the following physical and economical factors :

1. ACR, c/o EEC Delegation, P.O. Box 9505, Accra, Ghana.
 2. Department of Genetics, Veterinary College, University Liège, rue des Vétérinaires 45, B-1070 Brussels, Belgium.
 3. Météorologie Nationale, 2 avenue Rapp, 75340 Paris cedex 07, France.
 4. ORSTOM/CMS, B.P. 147, 22302 Lannion, France.
- Reçu le 27.02.89, accepté le 07.03.89.

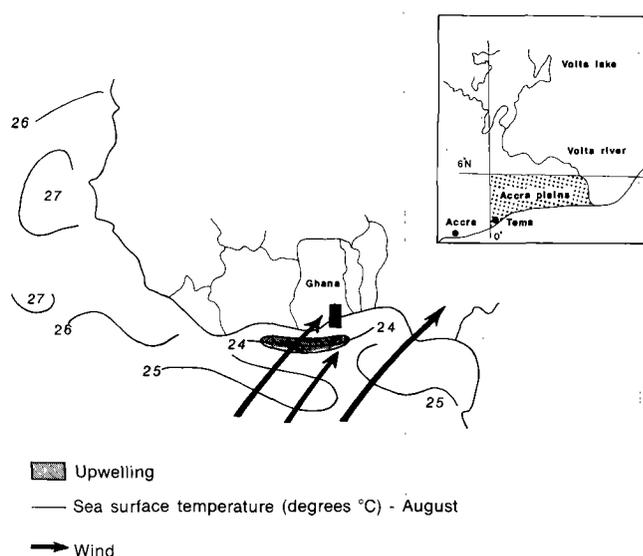


Fig. 1 : Location map (adapted from JANICOT 1985).

— poor quality of soils (shallow sandy and loamy soils deficient in organic matters and in plant nutrient). This restricts small scale farming around the villages to essentially subsistence activities. Cassava, maize, okra, sugar cane, groundnuts and beans are the principal crops cultivated in the area.

A second consequence is the low density of the human population as indicated in the 1984 census : 208,652 people.

— low incidence of trypanosomosis due to the specific microclimate of the area.

— proximity of Accra and its harbour, Tema, which creates a large demand for meat products.

The distribution of the low precipitation follows a bimodal pattern (May to August and October to December). Cattle herds are kept grazing all around the year on natural pastures which cover about 75 p. 100 of the Plains. Supplementation with concentrates is rare.

Aveyime Cattle Ranch (European Economic Community/Government of Ghana) with its 10,000 ha is a breeding station with occupies a central position in the Plains, along the Volta River, 90 km East of Accra.

Ph. Marchot, P.L. Leroy, S. Janicot, B. Guillot

As inbreeding in cattle is a major factor limiting production, the main objective of the Ranch is to provide genetically superior bulls, adapted to local conditions and to contribute to increased meat output. The demand for such bulls is very high and not easy to satisfy.

The microclimate of the Accra Plains

The Accra Plains, more especially the Western part is a relatively dry area with a mean rainfall of 935 mm (35 years average).

The microclimate has its origin in the Gulf of Guinea. North Easterly Monsoon winds have a dynamic effect on the water at the surface of the ocean which is deviated in the high sea direction.

This creates an upwelling (water flowing from the deep of the ocean) so that the temperature of the surface water is cooler (24 °C) along the Accra coast than that of other parts of the Gulf (Fig. 1).

The air masses blowing on this relatively cool water absorbs less moisture. Only stratus generating low precipitations on the continent appear and therefore, rainfall is scarce. In addition when these clouds reach the continent, they reduce the sun radiation, and consequently the temperature which reduces the evaporation (8).

The fact that the Plains are not within the privileged areas where cumulonimbus clouds frequently appear (6) is another consequence of the existence of the upwelling. Occurrence of these clouds is shown in figure 2 and the correlation between cumulonimbus clouds appearance and precipitation ($r = 0.89$) was demonstrated for West Africa by LAHUEC *et al.* (6).

Finally, this is the impact of the Intertropical Convergence Zone, North of Accra during the summer. This convergence is of low amplitude compared to other areas with similar latitudes and the precipitations on the Accra Plains are therefore scanty.

The dryness of the Plains with total rainfalls of 632.10, 712.10, 707.63 as registered in 1985, 1986, 1987 respectively is a result of a combination of these factors.

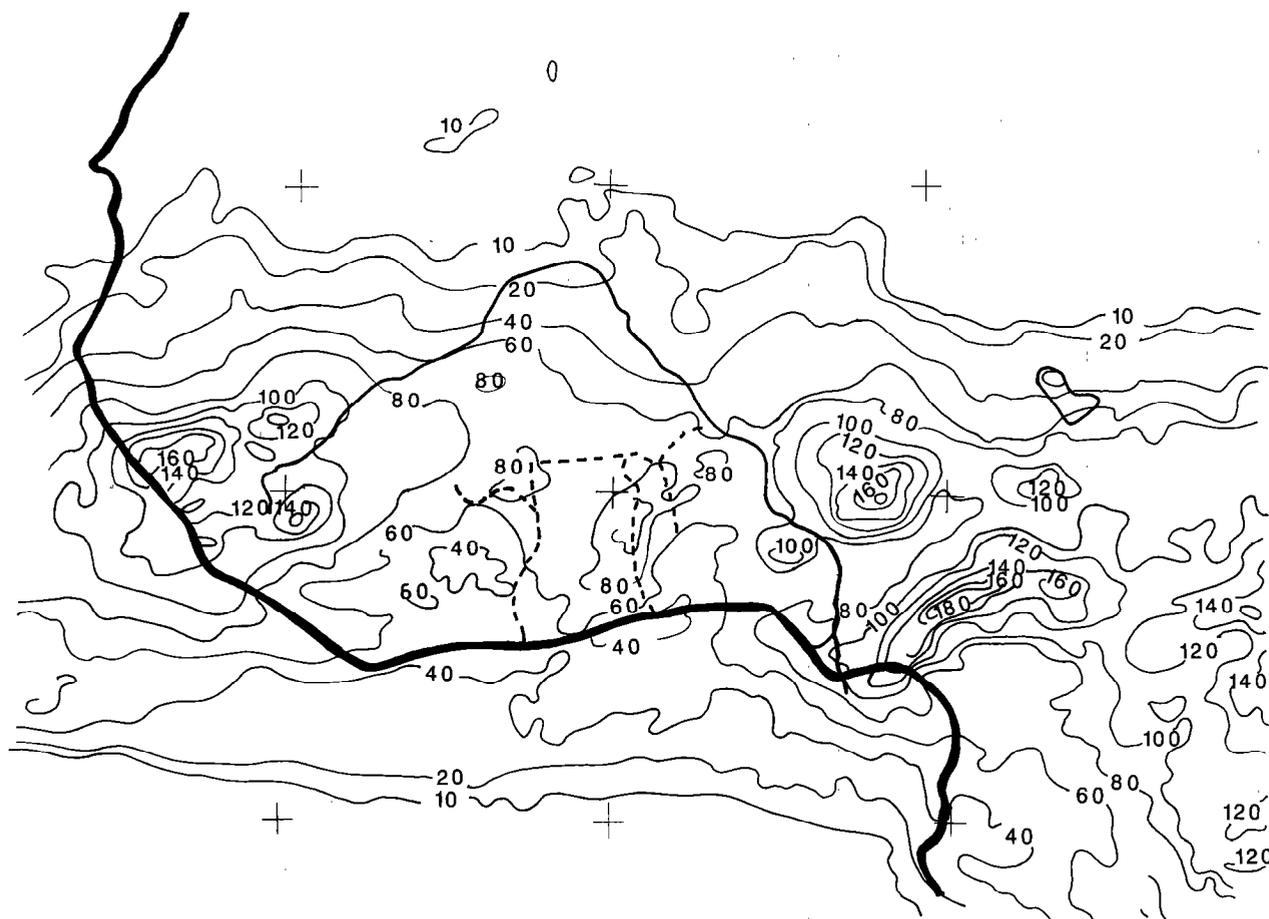


Fig. 2 : Frequency of cumulo-nimbus appearances ($n = 1,038$ pictures) ($^{\circ}/100$) from the period 01/05 to 31/10/86 (LAHUEC *et al.*, 1986).

Limited incidence of trypanosomosis

A low tse tse fly population and so low incidence of animal trypanosomosis are consequence of the noticeable dryness of the area.

From the establishment of the Ranch in 1973 to 1985, trypanosomosis has been diagnosed in cattle on 3 occasions.

In a survey carried out during the wet season in 1985, 635 heads (mainly White Fulani and Sanga) were screened using the microhaematocrit tube method; 5.8 p. 100 of the animals were infested without showing any clinical signs. From smears made from positive cases, only 30 p. 100 of the trypanosomes were from *Trypanosoma congolense* group; no *T. vivax* were observed. The rest was from the *T. brucei* group, so very lowly pathogenic for cattle (1).

The same year, an extensive survey took place on the ranch and up to 10 km outside of the boundaries of the ranch, using Challier biconal traps and hand nets. The placement of traps (20) aimed at trypanosomosis high risk spots (particularly water collecting points, dams). The traps were laid for days before being shifted to other sites and were emptied daily. No tse tse flies were either encountered or caught during the 10 days survey (2).

In 1987, 10 p. 100 of the cattle herd (200 heads) were screened by the same technique of the microhaematocrit. A single case of trypanosomosis (*T. brucei* group) was diagnosed (3).

The tse tse fly challenge is thus extremely low, due to the climatic conditions encountered whereas according to maps showing the distribution of glossina by FORD and KATONDO revised by KATONDO (5), one would expect to find, perhaps no *Glossina longipalpalis*, but certainly *G. palpalis palpalis*.

Biting flies like tabanid are responsible of the latent persistence of the trypanosomes observed in the survey we undertaken by the Tsetse fly and Trypanosomosis Control Unit of the Veterinary Department, Pong-Tamale.

Thus, trypanosomosis is sporadic on the Ranch and it can be assumed that it is equally rare in the Accra Plains under similar environmental conditions.

The affectation which is mainly transmitted by biting flies does not constitute an obstacle to the improvement of the production of the local trypanotolerant cattle, by crossbreeding with zebus.

Multiplication of non trypanotolerant cattle

In the rest of Ghana and in other coastal countries from West Africa like Côte-d'Ivoire, Liberia, Togo, Benin, Sierra Leone the economic incidence of this protozoan infestation has favoured the selection of high performance and trypanotolerant West African Shorthorn bulls or the introduction of N'Dama stock.

Whereas, in the Accra Plains, the introduction of zebus like the White Fulani and the Sokoto Gudali are used for crossbreeding purpose, with the aim of producing stronger and heavier cattle called « Sanga ».

Figure 3 shows the liveweight of bulls with 50 p. 100 or more of Fulani blood sold by the Ranch in 1987.

The average liveweight of West African Shorthorn bulls, in the Plains varies from 190 to 200 kg (8). Comparing these figures to those for the crossbred cattle indicates that the latter are about 25 p. 100 superior.

TABLE I Reproductive performance of the cattle breeds kept on the Aveyime cattle Ranch.

Breed	Calving interval					
	N	Mean	Minimum value	Maximum value	Std error of mean	c.v.
West. Afr. Sh.	73	540.164	310.0	909.0	15.499	24.515
Sanga	58	508.535	300.0	1,149.0	21.837	32.703
White Fulani	59	495.152	296.0	837.0	19.036	29.531
Breed	Age at first calving					
	N	Mean	Minimum	Maximum	Std error	c.v.
West. Afr. Sh.	—	—	—	—	—	—
Sanga	17	1,406.941	1,112.0	1,850.0	56.464	16.547
White Fulani	35	1,267.171	1,032.0	1,794.0	31.071	14.506

(West. Afr. Sh. = West African Shorthorn).

Ph. Marchot, P.L. Leroy, S. Janicot, B. Guillot

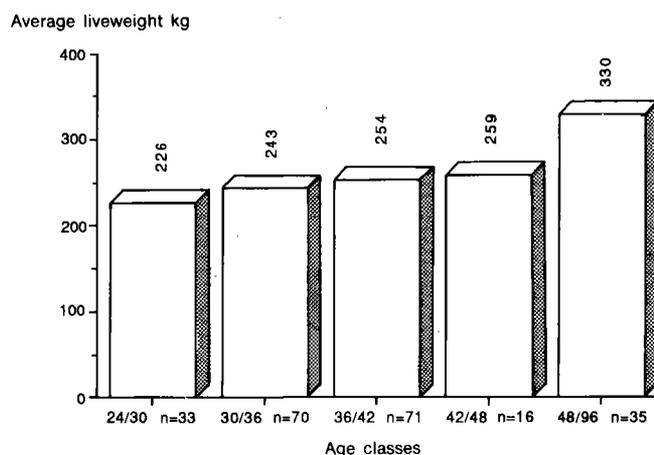


Fig. 3 : Average liveweight of bulls sold in 1987.

Only a part of this superiority is attributable to the genetic factor. Nevertheless only 11 p.100 of the cattle from the area are still pure W.A.S. All the rest of the stock has benefited from upgrading, by breeding with zebu from the Ranch or from the North.

Consequently, this crossbreeding programme has significantly increased meat production in the Plains which reached 375 tons in 1987 or 27 p.100 of the meat marketed at the Ashaiman market, the largest cattle market, in the South.

Probable evolution of the Accra Plains climate

An objective of the Ghanaian Government is to close its animal protein gap by increasing local production.

Except the Accra Plains, areas of less dense human population, with available grazing land are in tse tse infested zones. Hence, the land seems suitable for livestock production and in particular for crossbreeding. Before expanding the programme, it is important to be sure that the probability to see variation in the climatic conditions of the Plains and consequently, of its pathology, are quasi nil.

MARCHOT (Ph.), LEROY (P. L.), JANICOT (S.), GUILLOT (B.). The low tse tse challenge in the Accra Plains and consequent breeding prospects. *Revue Elev. Méd. vét. Pays trop.*, 1989, 42 (3) : 447-451.

Aveyime Cattle Ranch is a breeding station located in the Accra Plains of Ghana. Conformation of West African Shorthorn is improved by crossbreeding with White Fulani Zebu. The Plains benefit from a very dry microclimate, compared to neighbouring areas under similar latitudes. Consequently, tse tse challenge is so low and the incidence of trypanosomosis so reduced that such genetic upgrading becomes realistic. The programme has to be pursued, as no major modification of the climatic conditions and consequently, of the tse tse repartition should appear. *Key words* : Zebu - Ranching - Selection - Glossina - Trypanosomosis - Ghana.

The temperature of the ocean is one of the main factors which limit the precipitations in the Plains.

So, the continuation of the crossbreeding programme is realistic and not hazardous at all.

Presently, it is impossible to forecast the evolution of the climate in this region or anywhere in the world. But an analysis of the climatic fluctuations in this region since the beginning of the century indicates that the relative dryness of the Accra Plains is a constant factor of this region.

CONCLUSION

A large part of the Accra Plains is devoted to ruminants due to the poor value of its soil and the lack of water for cultivation.

A consequence of the dryness of the Plains is a very low tse tse fly challenge and hence, scarcity of animal trypanosomosis.

An additional factor in favour of cattle production in the area is the presence of a substantial meat demand due to the proximity of urban centers like Accra and Tema.

So, there is no doubt that the pastoral vocation of the Plains and the pursuit of the crossbreeding programme which is actually carried out is realistic and not hazardous at all.

ACKNOWLEDGEMENT

The authors wish to express their thanks to Mr HEADEY from the EEC Commission for permission to publish this paper and drawn the attention on the fact that any conclusions are not necessarily endorsed by the EEC-DG VIII.

MARCHOT (Ph.), LEROY (P. L.), JANICOT (S.), GUILLOT (B.). Leve tasa de glosinas en la planicie de Accra y perspectiva de desarrollo de la cría de ganado. *Revue Elev. Méd. vét. Pays trop.*, 1989, 42 (3) : 447-451.

El rancho de ganadería de Aveyime es una hacienda de cría de ganado situada en la planicie de Accra en Ghana. Se mejora la raza haciendo cruce de los Cebus West African Shorthorn con los Cebus White Fulani. La planicie es favorecida por un micro-clima muy seco en comparación con el de las áreas vecinas situadas bajo la misma latitud. Por eso se encuentran tan pocas moscas tse-tsé y no se teme la tripanosomosis ; por tal motivo el cruce genético se hace realista. Se debe proseguir el programa ya que no hay que temer muchos cambios importantes de las condiciones climáticas ni, por consecuencia, de la repartición de las moscas tse-tsé. *Palabras claves* : Cebú - Rancho - Selección - Glosina - Tripanosomosis - Ghana.

REFERENCES

1. DOKU (C. K.). Incidence of trypanosomiasis on the ACR. Ghana, ACR, 1985. (Technical Report).
2. DOKU (C. K.). Tse tse flies, trypanosomiasis situation and related problems. Ghana, ACR, 1986. (Technical Report).
3. DOKU (C. K.). Tse tse and Trypanosomiasis Control Unit, Pong-Tamale. Ghana, ACR, 1987. (Annual Report).
4. JANICOT (S.). Analyse spatio-temporelle des précipitations annuelles sur l'Afrique de l'Ouest et l'Afrique Centrale. *Veille climatique satellitaire*, 1985, **10** : 32-45.
5. KATONDO (K. M.). Revision of second edition of tse-tse distribution maps. *Insect Sci. Appl.*, 1984, **5** (5) : 381-388.
6. LAHUEC (J. P.), CARN (M.), GUILLOT (B.). Convection et pluviométrie en Afrique de l'Ouest. *Veille climatique satellitaire*, 1986, **15** : 19-25.
7. MALLEY (J.). *In* : COETZEE (J. A.), ed. Paleocology of Africa and the surrounding islands. Vol. 18. 1987. Pp. 307-334.
8. USAID. Ghana Livestock Development Handbook. Accra, USAID, 1967. 127 p.
9. VALENZA (G.) *et al.* Accra Plains Livestock Development Project. Final Report. Vol. 1. Accra, ACR, 1986. 201 p.