

**Zeitschrift:** Acta Tropica  
**Herausgeber:** Schweizerisches Tropeninstitut (Basel)  
**Band:** 45 (1988)  
**Heft:** 1

**Artikel:** Reproductive disorders in African trypanosomiasis : a review  
**Autor:** Ikede, B.O. / Elhassan, Elizabeth / Akpavie, S.O.  
**DOI:** <https://doi.org/10.5169/seals-314052>

### **Nutzungsbedingungen**

Die ETH-Bibliothek ist die Anbieterin der digitalisierten Zeitschriften auf E-Periodica. Sie besitzt keine Urheberrechte an den Zeitschriften und ist nicht verantwortlich für deren Inhalte. Die Rechte liegen in der Regel bei den Herausgebern beziehungsweise den externen Rechteinhabern. Das Veröffentlichen von Bildern in Print- und Online-Publikationen sowie auf Social Media-Kanälen oder Webseiten ist nur mit vorheriger Genehmigung der Rechteinhaber erlaubt. [Mehr erfahren](#)

### **Conditions d'utilisation**

L'ETH Library est le fournisseur des revues numérisées. Elle ne détient aucun droit d'auteur sur les revues et n'est pas responsable de leur contenu. En règle générale, les droits sont détenus par les éditeurs ou les détenteurs de droits externes. La reproduction d'images dans des publications imprimées ou en ligne ainsi que sur des canaux de médias sociaux ou des sites web n'est autorisée qu'avec l'accord préalable des détenteurs des droits. [En savoir plus](#)

### **Terms of use**

The ETH Library is the provider of the digitised journals. It does not own any copyrights to the journals and is not responsible for their content. The rights usually lie with the publishers or the external rights holders. Publishing images in print and online publications, as well as on social media channels or websites, is only permitted with the prior consent of the rights holders. [Find out more](#)

**Download PDF:** 12.01.2026

**ETH-Bibliothek Zürich, E-Periodica, <https://www.e-periodica.ch>**

Department of Veterinary Pathology, University of Ibadan, Ibadan, Nigeria

## **Reproductive disorders in African trypanosomiasis: a review**

B. O. IKEDE, ELIZABETH ELHASSAN, S. O. AKPAVIE

### **Summary**

Reproductive disorders are frequently seen in human beings and in animals infected with tsetse-transmitted (African) trypanosomiasis. The disorders include irregular menstrual (or oestrus) cycle, infertility, abortion and impotence. Intrauterine infections occasionally occur, resulting in still birth or neonatal mortality. The changes are essentially reversible after treatment, although recovery may take several months.

**Key words:** trypanosomiasis; reproductive disorders; pathophysiology of reproduction; infertility; abortion.

### **Introduction**

Reproductive disorders have been recognised in human and animal African trypanosomiasis since the early part of this century. However, the pathogenesis of these disorders is not well understood. We believe that this aspect deserves closer study especially in livestock where reproductive performance is the cornerstone of productivity. Both males and females are affected by the disease.

Pituitary hormones (gonadotropins) play a major role in the reproductive process. In particular, follicle stimulating hormone (FSH), interstitial cell stimulating hormone (ICSH) and growth hormone (GH) play an important part in the spermatogenic cycle in males and oestrus cycle in females. Consequently, absence of pituitary gonadotropins (e.g. following hypophysectomy) leads to a block in sperm maturation in rats (Clermont and Morgentaler, 1955) or to marked testicular degeneration and abortion in man and animals (Steinberger and Duckett, 1967; Apted, 1970; Ikede and Losos, 1975).

---

Correspondence: Prof. B. O. Ikede, Department of Veterinary Pathology, University of Ibadan, Ibadan, Nigeria

### *Pituitary damage*

Human patients with sleeping sickness due to *Trypanosoma gambiense* and *T. rhodesiense* may exhibit impotence, gynaecomastia, feminine distribution of fat and infertility or sterility (Apted, 1970). Although some of these symptoms have been attributed to hypopituitarism probably related to pituitary fibrosis described in two patients by Hawking and Greenfield (1941), no definitive tests have been carried out to confirm the role of the pituitary or to determine the exact mechanism in man.

Studies in infected domestic and laboratory animals have provided more evidence of specific damage to the pituitary gland. Extensive mononuclear inflammation of the gland has been described in cattle, sheep, goats, donkeys and dogs experimentally infected with *T. brucei* (Losos and Ikede, 1970, 1972; Ikede et al., 1977; Moulton and Sollod, 1976; Morrison et al., 1981) and in a naturally infected horse (Ikede et al., 1973). In addition, 10 out of 19 sheep experimentally infected with *T. brucei* showed extensive coagulative necrosis and fibrosis of the adenohypophysis (Ikede and Losos, 1975). These lesions were in most cases associated with extravascular localization of trypanosomes in the gland. However, pituitary function is yet to be correlated with these lesions through sequential hormonal assays.

### *Reproductive disorders in males*

Clinical orchitis has been described in human sleeping sickness (Apted, 1970). In male animals infected with the brucei group, the lesions are a combination of scrotal dermatitis, orchitis and periorchitis. Soon after infection the parasites localize in the scrotal skin and hydrocoel fluid and also invade the tunica vaginalis, testis, epididymis and spermatic cord, provoking a nonpurulent granulomatous inflammation in monkeys (Peruzzi, 1928), sheep (Ikede, 1979), rabbits (Van den Ingh and Van Dijk, 1975; Ikede and Akpavie, 1982) and mice (Anosa and Kaneko, 1984). Thrombosis of the vessels of the pampiniform plexus has also been reported in *T. brucei* infected male dogs (Morrison et al., 1981). These lesions lead to degeneration of the seminiferous tubules, aspermatogenesis and aspermia in severe cases. Other factors such as fever may also be responsible for the testicular degeneration.

*T. vivax* and *T. congolense* are also associated with infertility in animals but the mechanisms appear different. Inflammatory changes in the genital organs are usually mild or absent but there is progressive and marked testicular degeneration that can lead to atrophy and aspermia (Isoun and Anosa, 1974; Isoun et al., 1975; Anosa and Isoun, 1980; Kaaya and Oduor-Okello, 1980; Masake, 1980; Anosa, 1983). The cause of the testicular lesion is believed to be due to the effect of prolonged fever, thrombosis of spermatic blood vessels, and the general wasting of body organs (Anosa and Isoun, 1980; Anosa, 1983).

The severity of testicular and epididymal lesions is reflected in poor quality of semen and the high percentage of abnormal spermatozoa present in the

ejaculate of bulls (Isoun et al., 1975; Grundler, 1985) and rams (Isoun and Anosa, 1974; Anosa and Isoun, 1980; Akpavie et al., 1987) experimentally infected with *T. vivax*, *T. congolense* or *T. brucei*. It has also been shown in rabbits and sheep that successful treatment with trypanocides will lead gradually to normal spermatogenesis over a period of several months if the original lesions have not been complicated by secondary bacterial infections (Ikede and Akpavie, 1982; Akpavie et al., 1987).

### *Reproductive disorders in females*

Females infected with trypanosomes show irregular oestrous cycle and may be infertile or sterile. Infection during pregnancy may lead to foetal death, abortion, still birth and neonatal death. Macfie (1913) was among the earliest workers to report amenorrhoea in women suffering from Gambian sleeping sickness, while Hornby (1921) first described abortions in pregnant cattle infected with African trypanosomes.

Abortions, still birth and neonatal deaths occur sporadically in infected women. Manson-Bahr (1966) reviewed the few reports of human congenital African trypanosomiasis in the former French Congo, Cameroun and Western Germany. Later, Olowe (1975) described a case of congenital *T. gambiense* infection in a 17-day-old girl who died a few weeks later of meningoencephalitis. The organism was detected in the cerebrospinal fluid but not blood. Recently, Emeh and Nduka (1983) showed that serum gonadotropins (FSH and luteinizing hormone) were significantly depressed in a study of 11 cases of advanced Gambian sleeping sickness. A year after antitrypanosomal treatment the values returned to normal. Single, rather than sequential samples were apparently taken before and after treatment. Further studies are required for a clearer picture of the role of gonadotropins.

Although abortions are often reported in clinical cases of African animal trypanosomiasis (Leefflang, 1975), organisms are rarely detected in the foetus or newborn (Woo and Limebeer, 1971). Some of the reports of intrauterine infections in animals include those on *T. vivax* in the blood of a newborn lamb (Ikede and Losos, 1972) and a calf (Ogwu et al., 1985), and *T. congolense* in mice (Griffin, 1983).

Vohradsky (1971) reported the presence of cystic ovaries and endometritis in cattle infected with *T. vivax*. Isoun and Anosa (1974) also observed numerous ovarian cysts containing trypanosomes in two sheep experimentally infected with *T. vivax*. One of the sheep also had trypanosomes in the amniotic fluid. Apparently neither the cysts nor the parasites in the amniotic fluid adversely affected pregnancy in the ewes.

Ige and Amodu (1975) reported reproductive disorders in N'dama cattle experimentally infected with *T. vivax*, *T. congolense* or *T. brucei* or a mixture of all three. They observed that irregular oestrus and sterility persisted for 3–16 months after self-cure or Berenil treatment. Ogwu et al. (1984) found that

infection of zebu heifers with *T. vivax* before first mating resulted in infertility. When pregnant heifers were infected, the calves born had lower birth weights than controls (Ogwu et al., 1985). They also observed that infection of pregnant heifers in the first trimester resulted in one abortion and three normal deliveries, whereas, heifers infected in the second trimester all had normal births. On the other hand, of the 4 heifers infected in the third trimester, three calved prematurely while the fourth died shortly after a full-term calf had been pulled out. Control heifers had normal gestation and parturition.

In general, the foetus or newborn from an infected dam may be anaemic, but no significant placental lesions have been described. However, many aborted foetuses do not always show evidence of intrauterine infection. Such cases may be related to maternal hormonal imbalance from pituitary damage, to the stress of infection and to the effect of hyperthermia on the conceptus.

## Conclusion

During the course of infection, trypanosomes cause specific and non-specific damage to some of the organs involved in the reproductive process as well as the foetus. The organs include the pituitary gland, testis, epididymis, ovary and uterus. Lesions in the gonads lead to infertility while those in the foetus lead to foetal death, and/or neonatal death. Superimposed on these changes is damage to the pituitary gland. The sequential pathophysiology of endocrine imbalance in trypanosomiasis is yet to be adequately studied.

- Akpavie S. O., Ikede B. O., Egbunike G. N.: Ejaculate characteristics of sheep infected with *Trypanosoma brucei* and *T. vivax*: changes caused by treatment with diminazene aceturate. *Res. Vet. Sci.* 42, 1–6 (1987).
- Anosa V. O.: Diseases produced by *Trypanosoma vivax* in ruminants, horses and rodents. *Zbl. Vet. Med. B* 30, 717–747 (1983).
- Anosa V. O., Isoun T. T.: Further observations on the testicular pathology in *Trypanosoma vivax* infection of sheep and goats. *Res. Vet. Sci.* 28, 151–160 (1980).
- Anosa V. O., Kaneko J. J.: Pathogenesis of *Trypanosoma brucei* infection in Deer mice (*Peromyscus maniculatus*). Light and electron microscopic study of testicular lesions. *Vet. Path.* 21, 233–246 (1984).
- Apted P. I. C.: Clinical manifestation and diagnosis of sleeping sickness. In: *The African trypanosomiasis*, ed. by H. W. Mulligan and W. H. Potts, p. 681–683. Allen and Unwin, London 1970.
- Clermont Y., Morgentaler H.: Quantitative study of spermatogenesis in the hypophysectomized rat. *Endocrinology* 57, 369–382 (1955).
- Emeh J. K., Nduka E. U.: Circulating serum levels of gonadotropins in Gambian sleeping sickness. *IRCS Medical* 11, 411 (1983).
- Griffin L.: Congenital transmission of *T. congolense* in mice. *J. comp. Path.* 93, 489–492 (1983).
- Grundler G.: The influence of trypanosomiasis on sperm quality. Proceedings of the 18th meeting of the OAU/ISCTR, Harare, Zimbabwe, March 1985.
- Hawking F., Greenfield J. G.: Two autopsies on Rhodesian sleeping sickness, visceral lesions and significance of changes in the CSF. *Trans. roy. Soc. trop. Med. Hyg.* 35, 155–164 (1941).
- Hornby H. E.: Trypanosomes and trypanosomiasis of cattle. *J. comp. Path.* 34, 211–240 (1921).

- Ige K., Amodu A. A.: Studies on the pathogenesis of trypanosomiasis for N'dama cattle. Proceedings of the 14th meeting of the OAU/ISCTR, Dakar, Senegal, p. 151–156 (1975).
- Ikede B. O.: Genital lesions in experimental chronic *Trypanosoma brucei* infection in rams. Res. Vet. Sci. 26, 145–151 (1979).
- Ikede B. O., Akpavie S. O.: Delay in resolution of trypanosome-induced genital lesions in male rabbits infected with *Trypanosoma brucei* and treated with diminazene aceturate. Res. Vet. Sci. 32, 374–376 (1982).
- Ikede B. O., Losos G. J.: Congenital transmission of *Trypanosoma vivax* in sheep. Brit. Vet. J. 128, i–ii (1972).
- Ikede B. O., Losos G. J.: Studies on the pathogenesis of *Trypanosoma brucei* infection in sheep. III. Hypophyseal and other endocrine lesions. J. comp. Path. 85, 37–44 (1975).
- Ikede B. O., Hill D. H., Akpokodje J. U.: Clinico-pathological changes in a horse naturally infected with *Trypanosoma brucei*. Nig. Vet. J. 2, 13–17 (1973).
- Ikede B. O., Akpokodje J. U., Hill D. H., Ajidagba P. O.: Clinical haematological and pathological studies in donkeys experimentally infected with *Trypanosoma brucei*. Trop. Anim. Hlth Prod. 9, 93–98 (1977).
- Ingh T. S. G. A. M. Van Den, Dijk J. E. Van: Pathology of chronic *Trypanosoma brucei* infection in the rabbit. Zbl. Vet. Med. B 22, 729–736 (1975).
- Isoun T. T., Anosa V. O.: Lesions in the reproductive organs of sheep and goats infected with *T. vivax*. Z. Tropenmed. Parasit. 25, 469–476 (1974).
- Isoun T. T., Akpokodje J. U., Anosa V. O.: Testicular changes in white fulani zebu (Bunaji) cattle experimentally infected with *Trypanosoma vivax*: a preliminary report. J. Nig. Vet. Med. Ass. 4, 107–108 (1975).
- Kaaya G. P., Oduor-Okelo: The effect of *Trypanosoma congolense* infection on the testis and epididymis of the goat. Bull. Anim. Hlth Prod. Afr. 28, 1–5 (1980).
- Leeflang P.: The epizootiology of trypanosomiasis in ranch cattle (Shika, Agricultural Research Station, Northern Nigeria) at some distance from known primary foci of Savannah Tsetse. Proceedings of the 14th meeting of the OAU/ISCTR, Dakar, Senegal, p. 94–100 (1975).
- Losos G. J., Ikede B. O.: Pathology of experimental trypanosomiasis in the albino rat, rabbit, goat and sheep. A preliminary report. Canad. J. comp. Med. 34, 209–212 (1970).
- Losos G. J., Ikede B. O.: Review of pathology of diseases in domestic and laboratory animals caused by *Trypanosoma congolense*, *T. vivax*, *T. brucei*, *T. rhodesiense* and *T. gambiense*. Vet. Path. (Suppl.) 9, 1–71 (1972).
- Macfie J. W. S.: Trypanosomiasis of domestic animals in Northern Nigeria. Ann. trop. Med. Parasit. 7, 1–39 (1913).
- Manson-Bahr P.: Manson's tropical diseases, 16th ed., p. 78. Bailliere Tindall and Cassell, London 1966.
- Masake R. A.: The pathogenesis of infection with *Trypanosoma vivax* in goats and cattle. Vet. Rec. 107, 551–557 (1980).
- Morrison W. I., Murray M., Sayer P. D., Preston J. M.: The pathogenesis of experimentally induced *Trypanosoma brucei* infection in the dog. I. Tissue and organ damage. Amer. J. Path. 102, 168–181 (1981).
- Moulton J. E., Sollod A. E.: Clinical, serologic and pathologic changes in calves with experimentally induced *Trypanosoma brucei* infection. Amer. J. Vet. Res. 37, 791–802 (1976).
- Ogwu O., Njoku C. O., Osori D. I. K., Ezeokoli C. O., Kumi-Diaka J.: Effects of experimental *Trypanosoma vivax* on fertility of heifers. Theriogenology 22, 625–633 (1984).
- Ogwu D., Njoku C. O., Osori D. I. K.: Effects of experimental *Trypanosoma vivax* infection in pregnancy and fertility of heifers. Proceedings of the 18th meeting of the OAU/ISCTRC, Harare, Zimbabwe, March 1985.
- Olowe S. A.: A case of congenital trypanosomiasis in Lagos. Trans. roy. Soc. trop. Med. Hyg. 69, 57–59 (1975).

- Peruzzi M.: Pathologico-anatomical and serological observations on the trypanosomiasis. Final report. League of Nations International Committee on Human Trypanosomiasis, Section 5, p. 245–328. Geneva 1928.
- Steinberger E., Duckett G. E.: Hormonal control of spermatogenesis. J. Reprod. Fertil. Suppl. 2, 75–87 (1967).
- Vohradsky F.: Clinical signs, daily rate of infection, physical changes of the blood and pathomorphological changes in cattle artificially infected by *Trypanosoma vivax*. Rev. Elev. Méd. vét. Pays trop. 24, 251–263 (1971).
- Woo P. K., Limebeer P. L.: Evidence of intra-uterine transmission of trypanosomiasis in cattle. Acta trop. (Basel) 28, 61–63 (1971).