

A Case Report of Abortion Induced By *Aspergillus* Mycotoxicosis in Sokoto Red Goat

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ABSTRACT

Key words:

Sokoto Red Does, *Aspergillus*, *Staphylococcus aureus*, Vitamin C, Sulphadimidine

Mycotoxicosis is a major problem in animal production. We present a report of abortion induced by *Aspergillus* mycotoxicosis in Sokoto red goats. Nine pregnant Sokoto red does were reported to be fed on a special compounded feed meal after which four had still birth. Vital parameters at presentation, feed samples, blood and swabs from fetal gastric contents were taken for laboratory analyses. Samples of the feed and fetal gastric contents were tested microbiologically and found to be positive for *Aspergillus* spp. One of the four does manifested anaemia, while two others manifested neutropenia. All nine does also manifested secondary bacterial colonization and infection by *Staphylococcus aureus*. Sensitivity test was conducted. Supportive injectable vitamin C, sulphadimidine and oxytocin were administered intramuscularly. The does recovered and were subsequently productive. This gave credence to the efficacy of the therapy as drugs administered while managing this case were effective. This therapy is therefore recommended for use in future similar cases

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1. INTRODUCTION

Goats are one of the smallest and earliest domesticated ruminants. Nigeria – with an estimated 34.6 million goats (Lawal-Adebowale, 2012) – is a leading goat producer in the world. Goats are source of food and revenue generation in Africa and the rest of the world (Aina, 2012).

The potentials and usefulness of these small ruminants could be protected by preserving their health. However, goats were documented to have the highest incidence of abortion in Abeokuta, South-West Nigeria (Oloye et al., 2008) with mycotoxicosis a major cause. *Aspergillus fumigatus* is the main cause of mycotic abortion in ruminants. It is responsible for 75% of mycotic abortions cases, with *Zygomycetes* and *Candida spp* making up the remaining 25% (Jensen and Hau, 1990; Sarfati et al., 1996). Mycotic abortion occurs sporadically, but sometimes, a significant percentage of pregnant animals (10-20%) in a herd may be affected, and usually observed in the third trimester of pregnancy (Tell, 2005). Fungi can produce reproductive failure in animals, either as direct result of establishing infection in the general

system or by producing mycotoxins. *Aspergillus fumigatus*, a ubiquitous pathogen, could also be responsible for gastrointestinal, pneumonia and mammary gland infections in animals.

Mycotoxin contamination of feeds account for more than 25% of the total cereals produced in the world (Finnegan, 2010). Cereals like rice, wheat, maize, and their by-products are commonly used for production of animal feeds in Nigeria. Temperature and humidity are major factors affecting mould growth during storage. Usually at high temperature, there is a greater chance of mould formation, though such growth occurs rarely in grains containing less than 14-15 moisture. In Nigeria, animal feeds are stored in silos which are non-water proof and non-aerated. Pockets of moisture can create ideal micro-environment for fungi growth. Thus, stored grains are easily contaminated. Mycotoxins can induce several adverse biological effects as they are carcinogenic, mutagenic, teratogenic, estrogenic, hemorrhagic, immunotoxic, nephrotoxic, hepatotoxic, dermatotoxic and neurotoxic (Awad et al., 2014). Mycotoxicosis usually results in foetal abortion. It also causes mycotic mastitis in cattle

(Bakr et al., 2015). Other associated clinical signs include placentitis, rare foetal autolysis, formation of ringworm-like lesion and absence of fur on the fetal body. Despite the fact that mycotoxicosis is a major problem affecting ruminant production in the tropics, mycotoxicosis induced abortion still remain underreported. This paper reports a case of mycotoxicosis induced abortion in Sokoto Red does which were treated and after monitoring were found to retain their productivity.

2. CASE REPORT

2.1. History

A case of abortion in nine pregnant Sokoto Red does with age range 2 to 2.5 years was made to the Veterinary Teaching Hospital, Federal University of Agriculture, Abeokuta, Nigeria (FUNAAB). These does weigh 20 to 25kg and had an average body score of 3. Four of the nine Sokoto Red does had abortion. These does were managed intensively. The animals were said to be fed with concentrates (comprising maize, groundnut cake, palm kernel cake, wheat, and some powdered minerals (NaCl, potash)) and a specially prepared feed meal.

2.2. Clinical findings

Physical examination revealed that the four does that aborted were alert, with protruded and congested vulva, and with signs of impending parturition. The cervixes were patent. Classically, muscles of the rumps and pelvis diaphragm were relaxed; udders were engorged with colostrum on expression. Each pregnant doe had aborted a kid as shown below in Figure 1. The abortions occurred at the late third trimester of pregnancy. The fetuses had distended abdomen, no fur on the body and were all dead. The rectal temperatures of the does were as follows: 38.70°C, 39.2°C, 38.7°C, and 39.3°C respectively. Their respiratory rate was relatively high and ranged between 45-55 cycle/minute (polypnea).

2.3. Diagnosis

Feed samples were collected for microbial culture and blood from all pregnant does for complete blood count. These samples were analyzed at the College of Veterinary Medicine Laboratories, FUNAAB. Using standard microbiological procedures, *Aspergillus* spp., *Staphylococcus aureus*, and *Streptococcus* spp. were isolated from the feed samples. These organisms were cultured from the gastric content of the aborted fetuses which infers that the infection must have passed

transplacentally (vertically) to the fetuses from the dams. We believed the dams have consumed contaminated feed. Diagnosis of mycotic abortion is confirmed by the isolation of fungal in placental tissue, fetal internal organs or abomasal contents (Pal, 2007; Pal, 2015). Mycotic impression smears using Lactophenol cotton blue stain was used to confirm the presence of *Aspergillus* spp (Figure 2). Sensitivity test, using the disk dilution technique was also carried out and trimethoprim was found to be sensitive to isolated pathogens. Differential diagnoses included Brucellosis, Trypanosomosis, Mycotic abortion, poisoning, and Pregnancy toxemia. Tentative diagnoses were bacterial infections and pregnancy toxemia. The confirmatory diagnosis was Mycotic abortion (aflatoxicosis) *Aspergillus* spp., *Staphylococcus aureus*, and *Streptococcus* spp. co-infections. One of the does manifested slight anaemia, while the others showed a decrease in neutrophils (neutropenia). Other haematological parameters were within the normal range as shown in the Table 1.

2.4. Management

The therapy instituted was as follows: prior to confirmatory diagnosis, injectable Oxytetracycline (20% solution), 20mg/kg intramuscular (IM) once to all animals; multivitamins, 5ml per doe, IM injection once. After confirmatory diagnosis, Oxytocin, 6 units per doe, IM injection once; Ascorbic acid, 250mg per doe, IM injection (5/7), sulphadimidine 150mg/kg, IM injection (5/7). After recovery of the does, a case follows up was carried out. Virginal swabs were taken for microbiological analyses with no pathogenic organisms isolated.

3. DISCUSSION

Mycotic abortion due to Aspergillosis is one of the leading causes of infectious abortion in pregnant ruminants (Pal, 2015) and this is of a high economic and public health significance. In this case, the PCV of a doe decreased (a sign of a slight anaemia). The decreased neutrophils in one of the does is an indication of the effect imposed by the mycotoxins. This would have caused a surge in the cortisol level resulting in the neutropenia and cell mediated immunocompromise. No significant changes in haemoglobin concentration, PCV, mean corpuscular haemoglobin, and red blood cell morphology (Day and Corbel, 1974) were observed in experimentally induced mycotic abortion in sheep. The effect manifested might depend on other factors such as:

health status of the animal, dose of the inoculum (fungus/mycotoxins) ingested in feed, management system, breed and nutritional status of the animal. However, there was secondary bacterial infection sensitive to few antibiotics including sulphonamide. Oxytocin – anecbolic – causes contraction, prevents bleeding and enhances involution of the uterus. Ascorbic acid is an antioxidant that helps in counteracting stress due to mycotoxicosis. It helps in mopping up oxidative radicals stimulated by the mycotoxins elaborated by *Aspergillus spp.* It enhances immunity aiding recuperation of the does.

Sulphadimidine is a sulphur based broad spectrum antibacterial agent. It can also exhibit antifungal effect and is relatively safe in ruminant. It was selected for treatment of the does based on the result of sensitivity test. It targets opportunistic and secondary bacterial that might ascend to uterus. The fungus contaminating the feed and consumed by the does could have been circulated in the body through blood and other body fluids. The fungal level becomes intolerable to the animals coupled with stress or pregnancy. This overwhelms the body’s defensive mechanism. If mycotoxin levels are elaborated beyond the

detoxification capacity, it causes stress induced by the formation of reactive radicals. Body tissues will produce necrotic factors, an array of vasoactive substances, which compromise the capillary walls in tissues of the uterus, placenta, caruncles and the fetal umbilicus. These tissues may respond by marked infiltration by mast and phagocytic cells. The amniotic and chronic fluid may harbor *Aspergillus spp.* (Abdulrazik et al., 2011). The infection may be transmitted vertically to the fetuses causing malabsorption of simpler substances and nutrients. This would further bring a distortion in hormonal surges, more importantly of progesterone, oxytocin, oestrogen, relaxin, prostaglandin and prolactin. This will have shortened the length of gestation prior to term, resulting in abortion. Mycotic abortion has been identified as a major reproductive disorder associated with *Aspergillus* infection in pregnant does and ewes (Verma et al., 1999). Similar to our findings, *Aspergillus*, especially *A. fumigatus* have been found to be commonly associated with mycotic abortions in pregnant ruminants (Jensen et al., 1996; Sarfati et al., 1996; Ali and Khan, 2006; Dehkordi et al., 2012) in previous studies.



Figure 1. Aborted fetuses from the pregnant does

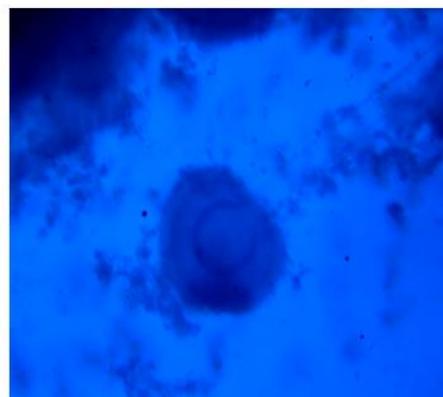


Figure 2. Mycotic smear depicting *Aspergillus spp.* using Lactophenol cotton blue stain

Table 1. Haematological result of the affected does compared with normal values

Parameter	Does				Normal
	1	2	3	4	
PCV%	20.4	23.2	23.0	25.4	22-38
WBC × 10 ⁹ L	12.0	16.3	22.0	5.7	4-13
Basophils (%)	0	0	0	0	0-1
Neutrophils (%)	32	20	12	30	30-48
Lymphocytes (%)	67	78	88	69	50-70
Eosinophils (%)	1	0	0	0	0-1
Monocytes (%)	0	2	0	0	0-4

PCV: Packed cell Volume, WBC: White Blood Cell

4. CONCLUSION

Animals in the tropics, especially those reared in sub-Saharan Africa, should be intensively managed to avoid mycotoxicosis since ruminants are indiscriminate feeders. Ruminants should be well-fed on good quality feed free from moisture. This would limit the increased incidence of mould growth and contamination of animal feeds.

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