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## Dicephalous in a bunaji calf

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### Abstract

The present study depicts a rare case of a dicephalic conjoined anomaly in a bunaji calf. In this case report, we describe a dicephalic female twin calf from a pregnant bunaji cow (*Bos indicus*) during the post-mortem examination. Detailed external anatomical characteristics were assessed through a detailed macroscopic examination. The two heads were joined at the level of the ramus of the mandible, extending from the ramus of the mandible to the point of the mandibular condyles. The external features comprised of a single thorax, two heads, with the right head slightly bigger than the left head, four eyes, two ears, four nostrils, two forelimbs and two hindlimbs. There was a duplication of the tongue with a common base. A foramen magnum was present at the cervical region for the passage of the spinal cord. In conclusion, the case report describes a unique case of female dicephalic conjoined twinning congenital abnormally.

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### Introduction

Congenital abnormalities have been documented in all species of domestic animals and are believed to arise when there is a disturbance during early embryonic development (Sharma *et al.*, 2013). These disturbances may be genetic or environmental in nature. When disturbances occur during duplication in a twinning embryo, they can give rise to congenital faetal abnormalities with partial duplication of body structures. A congenital anomaly where there is

incomplete separation of the skull in twinning animals may result in duplication of the facial structures (diprosopus) or the entire cranium (dicephalous), depending on the extent of separation (Salami *et al.*, 2011). Dicephalic monsters are the most common form of body duplication reported in domestic species (Roberts, 2002). These abnormalities were previously assumed to be very rare in ruminants (Leipold *et al.*, 1972) but are

becoming more common, especially in cattle, than other domestic animals (Ahmed *et al.*, 2015). In Nigeria, only a few cases of dicephalous in cattle appear to have been documented (Ate *et al.*, 2011; Salami *et al.*, 2011; Ajayi *et al.*, 2012). This may be because they were initially misinterpreted as bad omens by livestock farmers (Gyang *et al.*, 1984). However, with increasing awareness, more of these cases may be documented. This report presents a case of dicephalus parapagus in a Bunaji calf encountered at post mortem inspection in the Wurukum abattoir, Makurdi, Benue State.

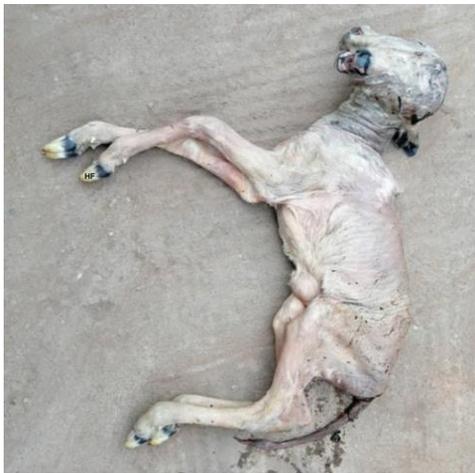
**Case Presentation**

A 4-year-old pregnant bunaji cow was presented for slaughter in the Makurdi Abattoir, Benue State, due

to unresolved dystocia. After slaughter, a double-headed calf was seen by the butchers, and subsequently, the attention of the veterinarian was drawn. Upon physical examination, a fully developed apparently healthy female foetus weighing 12.5 kg with two separate heads was noticed. The monster calf had a single thorax and four legs with well-developed hoofs (Plate I).

**Physical and Post mortem examination**

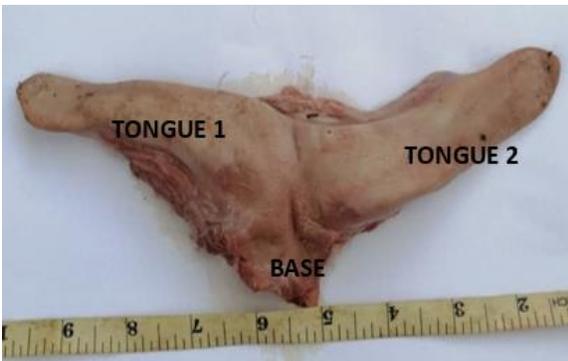
From the macroscopic examination, it was observed that the calf had two heads, and each of the heads had one mouth (oral cavity), two nostrils, one ear (the left ear for one head and the right ear for the other head (Plate II), and two eyes. The dicephalic



**Plate I:** Dicephalic calf showing faulty developed hoof (HF)



**Plate II:** The dorsal view of the heads showing the left ear (E1) on the left head and the right ear (E2) on the right head



**Plate III:** Photograph of the tongue of the dicephalic calf showing a duplicated tongue with a common base



**Plate IV:** The ventral view of dicephalic heads showing the points of fusion (PF), where the right mandible (RM) of calf 1 meet with the left mandible (LM) of calf 2 at the mandibular angles of both heads. The dicephalic skull had two jaws, lower jaw of calf 1 (LJ1) and lower jaw of calf 2 (LJ2) with a single trachea (TR)



**Plate V:** Oral cavity showing fused middle incisor (MI)

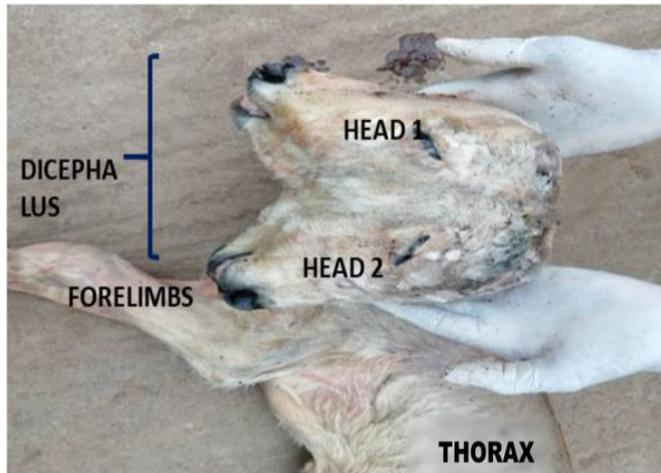
calf had a duplication of the tongue with a common base (Plate III). The left tongue was visibly bigger than the right tongue. The left tongue was about 5 inches long, and the right tongue was about 4 inches long. There was a common trachea and epiglottis (Plate IV).

The calf had abnormal dentition on both heads. The middle incisors were fused (Plate V) on both heads. The two skulls were joined at the mandibular angles of both heads. The heads had a common neck (Plate VI and VII). The rump length of the calf from the mid head to the base of the tail was 26.5 inches in both skulls. In contrast, the length between the nostrils to the medial canthus of the eye was 4.0 inches and 4.5 inches for the left and right heads, respectively.

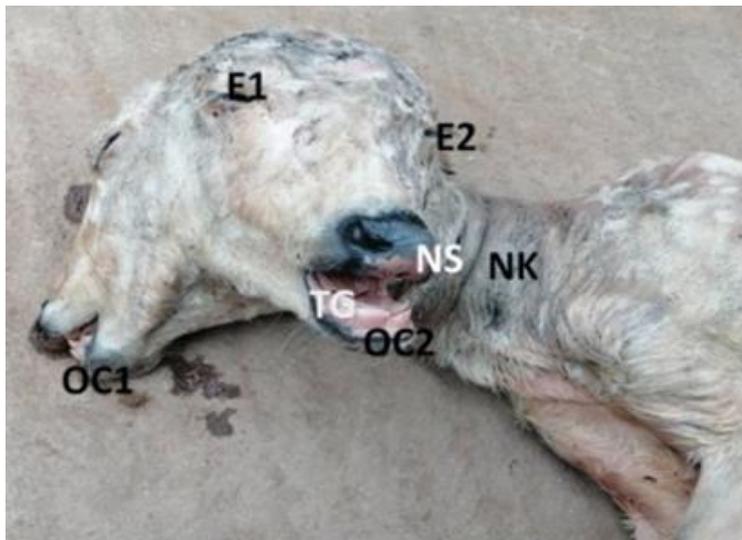
### Discussion

Dicephalus beasts have been reported in various breeds of cattle worldwide with high incidence in female as also seen in this case. The gross anatomical observations reported in this case are similar to those reported by Ate *et al.* (2011). Most reported cases of dicephalus in cattle in Nigeria are associated with the Bunaji breed of cattle (Ate *et al.*, 2011; Ajayi *et al.*, 2012; Salami *et al.*, 2011). This is probably because this breed is the most common and widespread breed of cattle found in Nigeria. The true incidence of these birth defects in this breed of cattle is unknown as only cases that attracted veterinary attention were reported.

There is a lot of ongoing debate on the aetiopathogenesis of these dicephalic monsters



**Plate VI:** Dicephalic calf showing two heads with a common neck



**Plate VII:** Dicephalic calf showing two heads with two eyes, eye 1 (E1) and eye 2 (E2), two oral cavities, oral cavity 1 (OC1) and oral cavity 2 (OC2), basal septum (NS), tongue (TG) and a neck

among various scientists but the most prominent theories are those of “partial fission” and “secondary fusion” of embryos (Boer *et al.*, 2019). In this report, the cause of the anomaly could not be determined but as suggested by Ajayi *et al.* (2012), teratogenic plants might have played a significant role. This is because the Bunaji cattle are predominantly reared by Fulani herdsmen who practice nomadic farming and also ethno-veterinary practices (Leeflag, 1993) for disease management.

Leipold *et al.* (1972) reported that identical twins are rare in cattle, with conjoined twins occurring approximately once in every 100,000 births. However, Ajayi *et al.* (2012) reported two dicephalic

anomalies in one abattoir within seven months, where an average of 200 head of cattle were slaughtered per day. This suggests that with increased surveillance, more of these cases may be identified, and scientists may be able to trace their triggers.

This cow was obviously salvaged due to unresolved dystocia. Animals that are sold for salvage slaughter are disposed at ridiculous amounts in addition to loss of the calf with resultant economic impacts on the owner. However, Salami *et al.* (2011) recommended that culling of the parent stock may be the best way to avoid future occurrence of these abnormalities in a livestock farm especially if the cause is genetic.

#### **Acknowledgement**

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#### **Conflict of Interest**

The authors declare that there is no conflict of interest.

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