

## **A case of porcine brucellosis at a farm in Izzi, Ebonyi State, Nigeria**

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### **Abstract**

There was a complaint from a farm in Izzi, Ebonyi State, Nigeria that eighteen pregnant sows in a flock of 100 pigs experienced abortion storms in the third trimester of pregnancy and other clinical signs such as frank blood streaming from the nostrils of some of the pigs, delivery of weak piglets and still-births. Tentative clinical diagnoses of brucellosis, leptospirosis, listeriosis and campylobacteriosis were made. Two millilitre of blood was collected via the ear vein from 22 of the pigs; this was allowed to clot and serum was extracted from the clotted blood. The serum samples were stored at -20°C until needed for Brucella antibody detection. Sterile swab sticks were used to collect vaginal swab samples from 14 sows for bacteriological examination. The serum samples and vaginal swabs were submitted to the Bacteriology Unit of the Central Diagnostic Laboratory of the National Veterinary Research Institute Vom, Plateau State, Nigeria for further laboratory evaluation. Complement fixation test was carried out while MacConkey agar was used as both selective and differential media for bacterial culture. Results of the complement fixation test showed that six out of the 22 serum samples were positive for *Brucella* organism. *Escherichia coli* and *Staphylococcus aureus* were also isolated from the samples, although these organisms have not been previously known to be associated with abortion in pigs. A definitive diagnosis of porcine brucellosis was reached based on the clinical signs manifested by the affected animals and the laboratory results. The *Brucella* positive pigs were culled and the affected farm was advised to depopulate, disinfect and re-stock with animals known to be free from the disease.

**Keywords:** Brucellosis; Swine; Complement fixation test; Piggery, Izzi Ebonyi State; Nigeria.

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## Introduction

Porcine brucellosis, caused by *Brucella suis*, is a major reproductive disease of pigs, which is associated with abortion in sows, poor litter size and infertility (Swai and Schoonman, 2012). The disease is a notable occupational hazard particularly to abattoir workers, farmers, and veterinarians (Swai and Schoonman, 2012; Erume et al., 2016). Pig production is seriously affected worldwide by *Brucella* infection, as it leads to abortion, birth of weak piglets, infertility and orchitis in boars, and these reproductive disorders result in significant economic losses to farmers (Megid et al., 2010). Porcine brucellosis has been previously reported in some parts of Nigeria (Onunkwo et al. 2011; Ngbede et al., 2013).

Transmission of *Brucella* in swine occurs via coitus or by consumption of feed contaminated with birth/or abortion products, uterine discharges or such products (Kebede et al., 2008; EFSA, 2009). In pigs, the pathogenesis starts with an initial bacteraemia. *Brucella suis* colonizes cells of the reproductive tract of either sex. In females, placentas and fetuses are invaded, while in males, the invasion may involve the testis, prostate, epididymis, seminal vesicles, and/or the bulbo-urethral glands (OIE, 2009). Clinical signs in both sexes include swollen joints and tendon sheaths, lameness and, occasionally, posterior paralysis (OIE, 2009). The Rose Bengal Plate test (RBPT), complement fixation test (CFT) and the fluorescence polarization assay (FPA) are the prescribed diagnostic screening tests for *Brucella* infections in herds, flocks and for international trade (OIE, 2009).

## Case History

On the 26<sup>th</sup> of April 2013, one of the 10 pig pens at a farm in Izzi, Ebonyi State, Nigeria (name of farm withheld) experienced abortion storms among 18 of its pregnant sows. There were clinical signs such as frank blood streams

from the nostrils, delivery of weak piglets and or still births (Figure 1). The flock size was 100 but there were previous losses due to sudden death in the herd (Figure 2). In some other instances, there were abortions during the third trimester of pregnancy (Figure 3) and reddening of the scrotum of the boars (Figure 4).



Figure 1. Still-birthed piglets in the farm with brucellosis.



Figure 2. Dead sow in the farm with brucellosis.



Figure 3. Abortus fetuses in the farm with brucellosis.



Figure 4. Reddening of the scrotum of a boar in the farm with brucellosis.

Blood and vaginal swab samples were collected from the pigs and submitted to the Central Diagnostic Laboratory of the National Veterinary Research Institute, Vom, Plateau State, Nigeria for diagnostic screening for the possible cause(s) of the condition.

The pigs in the affected pen included gilts, sows and boars. The breeds involved were Yorkshire, Landrace and Hampshire and their vital physiological parameters are shown in Table 1.

**Study area:** Izzi is a Local Government Area in Ebonyi State, Nigeria, with coordinates – Latitude: 6.4845, and Longitude 8.2947. Ebonyi State is in the South-east geopolitical zone of Nigeria, bordered to the north and north-east by Benue State, with Enugu State to the west, Cross River State to the east and south-east, and Abia State to the south-

west. The state lies between latitude 6.2649° N and longitude 8.0137° E. The southeast geopolitical zone is characterized by warm climatic conditions for most of the year. The wet season extends from April to October with annual rainfall ranging from 168 mm to 1700 mm while the dry season spans from November to March.

**Sample collection and Laboratory analysis:**

Two millilitre of blood was collected through the ear vein from 22 of the pigs in the pen. The collected blood samples were dispensed into labelled plain test tubes and allowed to clot. Serum was extracted afterwards and then stored at -20°C until its use for antibody detection. For vaginal samples, sterile swab sticks were used to collect the samples from 14 sows, using sterile gloves. The serum samples and vaginal swabs were submitted to the Bacteriology Unit of the Central Diagnostic Laboratory of the National Veterinary Research Institute Vom, Plateau State, Nigeria. Complement fixation test (CFT) was carried out as described by OIE (2009).

MacConkey Agar (MCA) was used as both a selective and differential medium to isolate and differentiate non-fastidious gram-negative rods. Blood agar (AB, trypticase soy agar) was used as an enriched (trypticase soy agar), bacterial growth medium.

**Table 1.** Vital parameters of the pigs examined at the farm with brucellosis in Izzi, Ebonyi State, Nigeria

Vital Physiological Parameters	Values obtained (min. and max.)	Reference (Normal) values*
Temperature (°C)	41 – 43	38.5 – 40.0
Pulse rate (beats/min)	112 – 115	90 – 110
Respiration rate (breaths/min)	20 – 30	10 – 20

\* Source of Reference (Normal values): Zimmerman *et al.*, 2012.

## Results

Six serum samples (Serial Nos. 3, 8, 12, 13, 19, and 20) out of the 22 submitted were positive for *Brucella* antibodies (27.3%) on complement fixation test (CFT). All the serum samples were negative for African swine fever (ASF) virus.

The bacterial culture on MCA and blood agar after 24 hours incubation at 37°C yielded growth of *Escherichia coli* and few growth of *Staphylococcus aureus*. When subjected to *Listeria* special medium, there was no observed growth. *Campylobacter* screening was also made but there was no observed growth. An impression smear was made and stained with silver stain for *Leptospira* but there was no observed growth. The isolated organisms (*E. coli* and *S. aureus*) were sensitive to Gentamycin and doxycycline 3+, Ciprofloxacin 2+, enrofloxacin 2+ and Anicillin 2+ but resistant to Tylosin.

On the basis of the clinical signs manifested by the affected animals and the laboratory results, a final/definitive diagnosis of porcine brucellosis was arrived at.

## Discussion

The clinical signs of abortions, lameness, delivery of weak piglets and still births observed in this farm were similar to those previously reported elsewhere for brucellosis (Megid *et al.*, 2010; Onunkwo *et al.*, 2011; Praud *et al.*, 2012). It had been reported that *Brucella* infected pigs remain carriers for life and continue to shed the organisms in the environment (Gonzalez-Espinoza *et al.*, 2012). Therefore, it is likely that the positive reactors to *Brucella* agglutinins may still be infected and shedding the organism and contaminating the environment. Thus, they may serve as a potential source of infection for other pigs, livestock and humans (Ngbede *et al.*, 2013).

There had been increasing reports, from swine farmers in Nigeria, of economic losses due to

abortions and infertility among their herds (Onunkwo *et al.*, 2011). In a study involving 351 swine serum samples, 2 (0.6%) were reported to be positive for *Brucella* antibodies (Onunkwo *et al.*, 2011), while a prevalence of 30.60% was reported among pigs slaughtered in Makurdi (Wurukum) abattoir, Benue State, Nigeria (Ngbede *et al.*, 2013). In spite of several diagnostic test methods available for brucellosis, however, no single serological test fits an individual animal species and all epidemiological situation, and some of these tests had been reported as not satisfactory in diagnosing brucellosis in pigs. Reactivity of samples that are positive in screening test should therefore be determined using established confirmatory methods (OIE, 2009).

The *E. coli* and *S. aureus* isolated from the pigs in the farm is not considered to be of relevance to the disease outbreak, because *E. coli* is an enteric bacterium typically found in humans and animals' gastrointestinal tracts, with a lifestyle ranging from commensal to obligate pathogen. As a pathogen, *E. coli* is associated with bacteremia, wound infections, urinary and gastrointestinal tract infections (Abdalla *et al.*, 2021). *Staphylococcus aureus* in the same vein is a commensal microorganism that is always present on the body and in farms, colonizing different ecological niches of the human body and farm environment, and its infection has been associated with various clinical signs which does not include abortion in sows (Haag *et al.*, 2019).

The present case report suggests that cases of porcine brucellosis occur among swine populations in Izzi, Ebonyi State of Nigeria, and highlights the need for public awareness of the possibilities of human infections with this zoonotic organism in the area.

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#### Conflict of Interest

The authors declare no conflict of interest.

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