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Research Article

Epidemiology of Contagious Ecthyma (Orf) in Sheep and Goats in the Federal Capital Territory (FCT), Abuja

***[a]Amina Ibrahim, [b]Badewa Hasif Olanrewaju, [c]Akinbobola Jones Soladoye and [d]Lawan Adamu**

[a-c]Department of Veterinary Medicine, University of Abuja, Nigeria
[d]Department of Veterinary Medicine, University of Maiduguri, Borno State, Nigeria
*Corresponding Author Email: amina.ibrahim@uniabuja.edu.ng

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Abstract

Background: Contagious ecthyma (CE), or Orf, is a highly contagious viral disease of sheep and goats that causes production losses and has zoonotic potential. This study assessed the epidemiological occurrence and clinical distribution of CE among sheep and goats in the Federal Capital Territory (FCT), Abuja, Nigeria. **Materials and Methods:** A descriptive cross-sectional study was conducted across the six area councils of the FCT. Sheep and goats were clinically examined for characteristic proliferative, vesiculopustular, and crusted lesions. Data on species, breed, age, sex, location, and lesion distribution were recorded. Apparent prevalence and 95% confidence intervals were calculated using the Wilson score method. Clinical differentiation was made from diseases with similar lesions. **Results:** Sixty animals were examined between June and August, of which 9 were clinically positive, giving an apparent prevalence of 15.0% (95% CI: 8.10–26.11%). Goats accounted for 6 (66.7%) cases and sheep for 3 (33.3%). West African Dwarf goats had 4 (44.4%) cases, Uda sheep 3 (33.3%), and Sokoto Red goats 2 (22.2%). Males accounted for 6 (66.7%) cases and females for 3 (33.3%). Cases occurred in four locations across three area councils, with Anagada recording the highest number (6/9; 66.7%). Animals aged 7 months–1 year and ≥1 year each accounted for 3 (33.3%) cases. Perioral lesions predominated (8/9; 88.9%). **Conclusion:** CE was clinically evident among sheep and goats in the FCT, with an apparent prevalence of 15.0%. The findings support strengthened surveillance, early recognition, biosecurity, and farmer awareness.

Keywords: Contagious Ecthyma, Orf, Sheep and Goats, Epidemiology, Federal Capital Territory (FCT), Abuja.

Introduction

Contagious ecthyma (Orf), also known as sore mouth or scabby mouth, is a highly contagious viral disease primarily affecting sheep and goats. It is caused by Orf virus (ORFV), a member of the genus Parapoxvirus in the family Poxviridae, and is widely distributed in both developed and developing countries (Lawan *et al.,* 2021). The disease is characterised by proliferative papules, vesicles, pustules, and thick-crusted lesions, particularly around the lips, muzzle, nostrils, and gingiva, but lesions may also occur on the feet, udder, and vulva (Adedeji *et al.,* 2022). Contagious ecthyma is economically important because painful oral lesions impair feeding and growth, while udder and teat lesions may interfere with suckling and increase mortality in young animals. Secondary bacterial and myiasis infections may further aggravate disease severity, resulting in treatment costs, reduced productivity, and economic losses to farmers (Galadima *et al.,* 2025). Transmission occurs through direct contact with infected animals or indirectly through contaminated environments and fomites. Skin abrasions caused by coarse or spiny vegetation facilitate viral entry, while environmental persistence contributes to prolonged contamination and transmission (Nandi *et al.,* 2011; Lawan *et al.,* 2021).

Disease occurrence is influenced by age, season, nutrition, management, and animal movement. Young lambs and kids are particularly susceptible, while communal grazing, shared watering points, livestock markets, inadequate biosecurity, poor nutrition, and introduction of infected animals may facilitate transmission.

Disease occurrence may increase during dry periods when nutritional stress and skin trauma are more common (Nandi *et al.,* 2011; Galadima *et al.,* 2025). Beyond its veterinary importance, contagious ecthyma has public health relevance because ORFV is zoonotic. Individuals with frequent contact with infected animals, including farmers, herders, veterinarians, abattoir workers, and laboratory personnel, may develop localized nodular or proliferative skin lesions, particularly on the hands and fingers (Spyrou and Valiakos, 2015). This zoonotic potential further emphasizes the importance of surveillance within a One Health framework.

The prevalence of contagious ecthyma varies considerably with geographical location, host species, management systems, and diagnostic methods. A PCR-based study in northwestern Ethiopia reported an overall prevalence of 12.0%, with higher prevalence in sheep (15.5%) than goats (8.5%) (Tedla *et al.,* 2018). In Nigeria, the disease has been reported in several states, including Sokoto, Kano, Plateau, Benue, and parts of southwestern Nigeria. A national survey reported substantial morbidity and mortality among farmers experiencing Orf outbreaks (Adedeji *et al.,* 2022). However, systematic epidemiological data on contagious ecthyma in the Federal Capital Territory (FCT), Abuja, remain limited.

The FCT is an important small-ruminant production and marketing area characterized by frequent animal movement, communal production systems, and interaction between rural and peri-urban livestock populations. These conditions may facilitate the transmission and persistence of contagious ecthyma. Therefore, this study was undertaken to determine the prevalence and epidemiological distribution of contagious ecthyma among sheep and goats in the study area, with particular consideration of species, breed, age, sex, season, location, and lesion distribution.

Materials and Methods

Study Design

A descriptive cross-sectional study was conducted to determine the prevalence and epidemiological distribution of contagious ecthyma (CE) among sheep and goats in the Federal Capital Territory (FCT), Nigeria. The study assessed disease occurrence according to species, breed, age, sex, season, location, and lesion distribution.

Study Area

The study was conducted across the six area councils of the FCT: Abuja Municipal Area Council (AMAC), Bwari, Gwagwalada, Kuje, Kwali, and Abaji. The FCT has a sub-humid climate with a bimodal rainfall pattern, comprising a rainy season from April to October and a dry season from November to March (Adedeji *et al.,* 2022). Sheep and goats are widely kept under extensive and semi-intensive systems in both rural and peri-urban communities.

Study Population and Sampling

The study population comprised sheep and goats of different breeds, ages, and sexes from farms, livestock markets, and abattoirs/slaughter slabs within the six area councils. A multi-stage purposive sampling technique was used. Each area council was included, with accessible farms, markets, and abattoirs/slaughter facilities selected as sampling sites. Animals available during each visit were examined individually. The minimum sample size was estimated using an expected prevalence of 25%, a 95% confidence level, and a 5% margin of error, giving a minimum of 288 animals; a 10% allowance increased the target sample to approximately 320 animals.

Clinical Examination and Diagnosis

Animals were physically examined by visual inspection and gentle restraint, with particular attention to the lips, muzzle, nostrils, oral commissures, gingiva, feet, interdigital spaces, udder, teats, vulva, and other potential lesion sites. Animals with characteristic proliferative, vesiculopustular, or thick crusted lesions were classified as clinically positive for CE. Lesion stage and distribution were recorded. Age, sex, breed, species, location, and date of examination were also documented. Clinical differentiation was made from conditions with similar lesions, particularly peste des petits ruminants (PPR), sheep pox, goat pox, and foot-and-mouth disease, based on characteristic clinical features. Animals with uncertain lesions were recorded as suspected cases rather than confirmed CE.

Seasonal and Location Assessment

Data were collected during both rainy and dry seasons to assess seasonal variation in disease occurrence. Sampling locations were recorded according to area council and specific farm, market, or abattoir site. This allowed comparison of CE prevalence across seasons and geographical locations.

Data Collection and Management
A standardized data sheet was used to record species, breed, age group, sex, location, season, lesion presence, lesion site, and lesion stage. Data were checked for completeness, entered into Microsoft Excel, and reviewed for errors before statistical analysis.

Data Analysis
Data were summarized using frequencies and percentages. Apparent prevalence was calculated as:

Prevalence (%) = Number of CE-positive animals / Total number of animals examined × 100.

Overall prevalence according to species, breed, age, sex, season, location, and lesion site were presented with 95% confidence intervals using the Wilson score method (Wilson, 1927). Associations between categorical variables were assessed using the chi-square test or Fisher's exact test where expected cell counts were small. Statistical significance was set at $P < 0.05$. Analyses were performed using IBM SPSS Statistics version 26.

Limitations of Statistical Analysis
Although the study design included subgroup comparisons by species, breed, sex, age, location, and season, these analyses could not be performed because the numbers of animals examined within each subgroup were unavailable. Only the characteristics of the 9 positive cases were recorded. Valid subgroup prevalence and chi-squared or Fisher's exact tests require both the number examined and the number positive in each subgroup. Seasonal comparison was also precluded because data were collected only during the rainy season, while site-type comparison was not possible because all samples originated from livestock markets. Therefore, the present dataset supports only the overall apparent prevalence and descriptive characteristics of the 9 positive cases. Subgroup prevalence and significance testing can be performed if the corresponding subgroup denominators become available.

Ethical Considerations
Ethical approval was obtained from the relevant institutional authority. Permission was obtained from animal owners and responsible personnel before examination. Animals were handled humanely, and examinations were limited to non-invasive physical assessment. Participant information and farm identities were kept confidential.

Results
Overall Apparent Prevalence of Contagious Ecthyma
A total of 60 sheep and goats were examined across the six area councils of the Federal Capital Territory (FCT) Abuja from June to August. Nine animals had clinical lesions consistent with contagious ecthyma (CE), giving an overall apparent prevalence of 15.0% (95% CI: 8.10–26.11%; Wilson score method) (Table 1).

Table 1. Overall apparent prevalence of contagious ecthyma in sheep and goats examined in the FCT Abuja.

Total examined	Positive cases	Apparent prevalence (%)	95% CI (Wilson score)
60	9	15.0	8.10–26.11

Distribution of Cases by Location and Area Council
The nine positive cases were recorded in four locations across three area councils. Six cases occurred in Anagada and one in Gwagwalada town (Gwagwalada Area Council), while one case each was recorded in Karu (AMAC) and Dei Dei (Bwari Area Council). No positive cases were recorded in Kuje, Kwali, or Abaji among the animals examined (Table 2).

Table 2. Distribution of contagious ecthyma cases by location and area council.

Location	Area council	Positive cases
Anagada	Gwagwalada	6
Gwagwalada town	Gwagwalada	1
Karu	AMAC	1
Dei Dei	Bwari	1

Distribution of Cases by Species and Breed
Of the nine positive animals, 6 (66.7%) were goats and 3 (33.3%) were sheep. West African Dwarf goats accounted for four cases (44.4%), Uda sheep for three (33.3%), and Sokoto Red goats for two (22.2%) (Table 3).

Table 3. Distribution of contagious ecthyma cases by species and breed.

Species	Breed	Positive cases	Percentage (%)
Goat	West African Dwarf	4	44.4
Goat	Sokoto Red	2	22.2
Sheep	Uda	3	33.3

Distribution of Cases by Sex

Among the nine positive animals, 6 (66.7%) were males and 3 (33.3%) were females (Table 4).

Table 4. Distribution of contagious ecthyma cases by sex.

Sex	Positive cases	Percentage (%)
Male	6	66.7
Female	3	33.3

Age Distribution of Contagious Ecthyma Cases

Among the 9 positive cases, 1 (11.1%) occurred in animals below 7 months, 3 (33.3%) in those aged 7 months–1 year, 3 (33.3%) in animals aged 1 year and above, and 2 (22.2%) in 3-year-old animals (Table 5).

Table 5. Distribution of contagious ecthyma cases by age category.

Age category	Number of cases	Percentage (%)
Below 7 months	1	11.1
7 months–1 year	3	33.3
1 year and above	3	33.3
3 years	2	22.2
Total	9	100.0

Lesion Site Distribution

The mouth/perioral region was the predominant lesion site, occurring in 8 of the 9 positive cases (88.9%). One case (11.1%), an adult female Sokoto Red goat from Anagada, had lesions involving the mouth, leg, and udder. No cases with lesions confined to the feet were recorded (Table 6).

Table 6. Distribution of contagious ecthyma cases by lesion site.

Lesion site	Number of positive cases	Percentage (%)
Mouth only	8	88.9
Mouth, leg and udder	1	11.1
Total	9	100.0

The predominance of perioral lesions is consistent with the typical mucocutaneous presentation of contagious ecthyma, while limb and udder involvement is less common (Nandi *et al.,* 2011).



A **B**

Figure 1. Cases from Anagada Livestock Market (lesions showing on the mouth feet and udder).



Figure 2. Cases from Dei-Dei Livestock Market (lesions showing on the mouth).

Seasonal Distribution
All 9 positive cases were recorded during the rainy season (June–August), as the study was conducted exclusively during this period. Consequently, seasonal comparison with the dry season was not possible.

Site Type of Case Detection
All 60 animals examined, including the 9 positive cases, were sampled from livestock markets. No animals were examined at farms or abattoirs; therefore, comparison of CE occurrence across site types was not possible.

Discussion
This study recorded an overall apparent prevalence of 15.0% (95% CI: 8.10–26.11%) among 60 sheep and goats examined in FCT livestock markets during June–August. This was lower than the 45.0% PCR-confirmed prevalence reported in the FCT by Onoja *et al.,* (2024) and the 25–37% morbidity reported by farmers and veterinarians nationally by Adedeji *et al.,* (2022). The difference may reflect the present study's reliance on clinical detection, which identifies mainly animals with visible active lesions, whereas PCR can detect mild, healing, or subclinical infections. In addition, the morbidity estimates of Adedeji *et al.,* (2022) represent reported flock-level experience rather than point prevalence. Thus, the present estimate should be interpreted as clinically apparent prevalence, not true infection prevalence.

Goats accounted for 66.7% of positive cases and sheep 33.3%, consistent with the greater association of CE with goats reported by Adedeji *et al.,* (2022) and the more severe clinical presentation described in goats (Kumar *et al.,* 2015). However, Tedla *et al.,* (2018) reported higher PCR-confirmed prevalence in sheep (15.5%) than goats (8.5%) in Ethiopia, indicating that species distribution may vary with epidemiological setting, diagnostic method, and population structure. West African Dwarf goats represented the largest proportion of cases (44.4%), consistent with Adedeji *et al.,* (2022). However, because subgroup denominators were not recorded, these figures describe the composition of affected animals and cannot establish greater susceptibility by species or breed.

Cases occurred across animals below one year to three years and above, supporting reports that CE can affect different age groups once established in a population. Kumar *et al.,* (2015) noted that morbidity and mortality are often highest during first exposure, while Bora *et al.,* (2016) reported increasing seroprevalence with age, suggesting cumulative exposure in endemic settings.

Mouth lesions predominated, occurring in 88.9% of cases, consistent with the characteristic oral and muzzle distribution described by Nandi *et al.,* (2011). The occurrence of lesions extending to the leg and udder in one goat also agrees with reports of occasional involvement of other body sites (Olaogun *et al.,* 2025). All nine cases were identified among market-sourced animals. This may reflect the role of livestock markets in aggregating animals from multiple flocks and communities and the reported practice of selling visibly affected animals rather than seeking veterinary care (Spyrou and Valiakos, 2015; Adedeji *et al.,* 2022). However, the absence of cases from farms and abattoirs cannot be interpreted as evidence of lower prevalence at these sites because

sampling effort and subgroup denominators were insufficient for comparison. Markets may also present a zoonotic exposure risk to traders, butchers, and animal handlers through contact with infected animals (Lawan *et al.,* 2021).

Because sampling was restricted to June–August, seasonal variation could not be assessed. Although all cases were detected during the rainy season, this does not establish a seasonal association. Adedeji *et al.,* (2022) reported differing perceptions of CE seasonality among Nigerian farmers and veterinarians, further supporting the need for sampling across both rainy and dry seasons.

Overall, the findings confirm the clinical presence of CE among small ruminants entering FCT livestock markets, with an apparent prevalence of 15.0%. However, the absence of subgroup denominators, restriction to one season, limited site coverage, and reliance on clinical diagnosis prevent formal assessment of risk factors or generalisation to the wider FCT small-ruminant population. The study therefore provides useful baseline evidence for further denominator-based, multi-season, and laboratory-confirmed surveillance.

Declarations

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Artificial Intelligence (AI) Use Statement: The authors declare that no artificial intelligence (AI) tools were used in the preparation, analysis, interpretation, or writing of this manuscript.
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Consent to Publish: All authors have reviewed and approved the manuscript and consent to its publication in International Journal of Recent Innovations in Academic Research.
Data Availability Statement: The data supporting the findings of this study are available from the corresponding author upon reasonable request, subject to the availability of the underlying study records.
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Institutional Review Board Statement: Ethical approval was obtained from the relevant institutional authority before the commencement of the study. The clinical examination of animals was conducted in accordance with applicable ethical guidelines for animal handling and welfare. All examinations were limited to non-invasive physical assessment, and appropriate care was taken to ensure the humane handling of animals and minimize stress and discomfort during the examination.
Informed Consent Statement: Permission was obtained from the animal owners and responsible personnel before the clinical examination of the animals. No human participants were involved in the study.
Research Content: The authors declare that this manuscript presents original research, has not been published previously, and is not currently under consideration for publication elsewhere.

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