
Occurrence of and economic losses associated with foetal wastage in cattle, sheep and goats slaughtered at Wurukum abattoir, Makurdi, Benue State, Nigeria

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Abstract

The slaughter of pregnant livestock is a growing national concern, which poses significant threats to food security, economic development and the long term viability of the livestock industry in Nigeria. The present study surveyed the occurrence and economic losses associated with foetal wastage among cattle, sheep and goats slaughtered at Wurukum abattoir, Makurdi, Benue State, Nigeria, from August to October 2023. A total of 4776 animals that were slaughtered at the abattoir were surveyed, comprising 2011 cattle, 1416 sheep and 1349 goats. Pregnancy status was confirmed through visual examination, palpation and uterine dissection post-slaughter, while foetal age was estimated using crown-rump length formulae specific to each species. The overall foetal wastage rate was 10.71%, with species-specific occurrences of 6.97% in cattle, 13.52% in sheep and 13.12% in goats. Most foetal losses were second trimester fetuses across all species. The estimated annual economic loss from these wasted fetuses was ₦162.24 million. These findings highlight the huge economic losses associated with foetal wastage and the concomitant neglect for animal welfare standards. It also underscores the urgent need for interventions that will prevent such wastages. Key recommended steps include enhanced veterinary presence at abattoirs, mandatory ante-mortem pregnancy testing and strict enforcement of meat inspection regulations. It was posited that addressing foetal wastage will go a long way to safeguard Nigeria's livestock industry and ensure long term food security.

Keywords: Foetal wastage; Cattle, Sheep and Goats; Economic loss; Welfare concerns; Wurukum abattoir, Makurdi, Benue State, Nigeria.

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Introduction

A major worry for Nigeria's livestock sector is foetal wastage resulting from the slaughter of pregnant female animals, which leads to significant financial losses, reduced natural herd replacement and worsening of the country's animal protein deficit (Awoyomi *et al.*, 2013; Adeyemi *et al.*, 2016). Already under pressure to meet national protein needs, the livestock sector struggles to close the gap between protein demand and available supply; the needless destruction of viable fetuses further widens this gap (Chaudhari and Bokko, 2000; Taiwo *et al.*, 2006). The ever increasing human population exacerbates this imbalance.

Although the Nigerian Meat Edict of 1968 legally forbids the slaughter of pregnant livestock except for medical reasons, the practice of slaughtering pregnant livestock remains widespread in the country due to poor law enforcement, inadequate ante-mortem inspection and rising economic pressures that push farmers and butchers to prioritize immediate sales over long-term productivity (Oduguwa *et al.*, 2013; Alhaji and Odetokun, 2013). Lack of awareness among stakeholders regarding the ethical and economic implications of slaughtering pregnant animals is another major factor that might have helped to preserve this practice (Cadmus, 2009; Adama *et al.*, 2011; EHORECON, 2005).

Depending on the area, season and species investigated, studies done in several Nigerian abattoirs have reported alarming foetal wastage rates ranging from 2% to over 50% (Abdulkadir *et al.*, 2008; Garba *et al.*, 2010; Bokko, 2011; Abonyi, 2014; Nonga, 2015; Adeyemi *et al.*, 2016; Adebawale *et al.*, 2020; Ahmad, 2024). From moral and animal welfare perspectives to economic impact and food security, this practice has far reaching consequences (Abonyi, 2014; Oyekunle *et al.*, 1992; Jajere *et al.*, 2023) as it threatens the

sustainability and efficiency of Nigeria's livestock industry by reducing the number of replacement stock and total herd productivity (Njoga *et al.*, 2019; Ngbede *et al.*, 2017; Dauda *et al.*, 2025). Beyond the ethical concerns, the economic repercussions of foetal wastage are substantial. It is estimated that foetal wastage costs the Nigerian economy approximately ₦8.6 billion annually (Eze *et al.*, 2023). These losses represent massive missed opportunities for protein supply and economic growth, as well as increased costs associated with breeding replacement stock (Mengistie *et al.*, 2023; Ahmad, 2024).

Makurdi serves as a pivotal hub for livestock marketing and meat supply in Benue State, Nigeria. As such, understanding foetal wastage trends in its major abattoir is crucial for livestock policy and public health planning. Although prior studies done in Makurdi exist, the need for an updated evaluation is vital as existing data on foetal wastage in the area is outdated (Abdulkadir *et al.*, 2008; Odeh *et al.*, 2015; Adeyemi *et al.*, 2016) and limited in scope, focusing on single species or short time periods. Recent changes in the socioeconomic landscape, security challenges affecting livestock movement, and a decline in the enforcement of inspection protocols have likely altered the dynamics of foetal wastage (Raimi *et al.*, 2017; Ugwu *et al.*, 2023). Additionally, the increasing reports of informal animal slaughter activities in some parts of Benue State, Nigeria, further emphasize the necessity for more vigilant surveillance. Consequently, a renewed assessment at the Wurukum abattoir, Makurdi is essential to provide current evidence for regulatory bodies to improve ante-mortem inspection and develop strategies that safeguard livestock sustainability and rural livelihoods. The present study therefore surveyed the occurrence of and economic losses associated with foetal wastage in cattle, sheep and goats

slaughtered at the Wurukum abattoir, Makurdi, Benue State, Nigeria.

Materials and Methods

Study Area: The study was conducted at the Wurukum abattoir, located in Makurdi, the capital of Benue State in North-Central Nigeria. Makurdi lies between latitudes 7°40'N and 7°53'N, and longitudes 8°22'E and 8°35'E, covering approximately 804 km². The city is situated in the lower Benue Valley along the banks of the Benue River, with an elevation ranging from 73 to 167 metres above sea level.

Wurukum abattoir, situated beneath the New Benue Bridge in Makurdi metropolis, is the largest in the city. It receives most of its livestock, particularly cattle, from Lafia in Nasarawa State, Nigeria, and the abattoir supplies a significant proportion of the meat consumed in Makurdi.

Sample size and sampling: An exhaustive, comprehensive sampling method was used. All cows, ewes and does slaughtered during the daily operations of the abattoir within the 3-month study period were included in the survey. This approach was chosen to capture the maximum possible representation of foetal wastage during the study period.

Data Collection: Data collection was carried out over a three-month period from August to October 2023. Observations were made daily (excluding Sundays) between 6.00 am and 8.00 am during routine slaughter operations at the abattoir. Foetal wastes from slaughtered gravid cattle, sheep, and goats were examined under the supervision of a certified meat inspector.

During evisceration, a longitudinal incision was made into the uterine horns to confirm pregnancy and extract the foetus(es). The crown-rump length (CRL) of each fetus was measured using a flexible measuring tape (Figure 1), and gestational age was estimated

using species-specific formula as described by Richardson (1980) and Singh *et al.* (2004).

Determination of Gestational Age: For cattle, the pregnancy status of slaughtered cows was first assessed visually, followed by manual palpation of the uterus and confirmed through dissection. Gestational age was estimated using the following formula (Singh *et al.*, 2004): $X = 2.5 (Y + 21)$; where X = developmental age in days and Y = crown-rump length (cm). Based on the estimated gestational age, fetuses were categorized into trimesters as follows: First trimester: 0 – 94 days; Second trimester: 95 – 189 days; and Third trimester: 190 – 283 days.

For ewes (sheep) and does (goats), pregnancy was confirmed by visual inspection of the uterus followed by palpation and then dissection where necessary. Foetal age was determined using the CRL and the formula by Richardson (1980): $X = 2.1 (Y + 17)$; where X = developmental age in days and Y = crown-rump length (cm). Fetuses were classified into gestational stages based on CRL: First trimester (0 – 51 days): 0 – 5 cm; Second trimester (52–101 days): 6 – 21 cm; and Third trimester (102–153 days): 22 – 50 cm.



Figure 1. Crown-rump measurement of caprine foetus.

Data Analysis: All data were recorded and entered into Microsoft Excel 2013. Descriptive statistics used to summarize the data included

frequencies and percentages of pregnant animals, distribution by species, sex and trimester of pregnancy. Results were presented in percentages and monetary values (₦).

Results

A total of 4,776 ruminants were slaughtered at the Wurukum abattoir during the three-month study period (August – October 2023), comprising 2011 cattle, 1416 sheep and 1349 goats (Table 1). Of the total sampled population, 3,026 (63.36%) were females and 1,750 (36.64%) were males (Table 1). Among the 2,011 cattle slaughtered, 1,248 (62.06%) were females and 763 (37.94%) were males, while in sheep, there were 932 (65.82%) females and 484 (34.18%) males. For goats, the females were 846 (62.71%) and males were 503 (37.29%) [Table 1] The sex distribution remained relatively consistent across all three species, with females consistently outnumbering males in the

slaughter records, however, the occurrence of pregnancy and resulting foetal wastage varied by species (Table 1).

Among the 1248 cows slaughtered, 87 were confirmed pregnant, giving a pregnancy occurrence of 6.97% (Table 1). Each gravid cow carried a single foetus (Figure 2 and 3), resulting in 87 bovine foetuses recovered during the study period, corresponding to 6.97% foetal wastage.

In the sheep, a total of 932 ewes were slaughtered and 86 were found pregnant, representing a pregnancy occurrence of 9.22% (Table 1). Due to multiple pregnancies in some ewes (Figure 4 and 5), a total of 126 ovine foetuses were recovered, corresponding to 13.52% foetal wastage.

For goats, 846 does were slaughtered and 75 were confirmed pregnant, giving a pregnancy occurrence of 8.87% among females (Table 1). A total of 111 caprine fetuses were recovered (Figure 6), representing 13.12% foetal wastage (Table 1).

Table 1. Distribution of ruminants slaughtered at Wurukum abattoir, Makurdi Benue State, Nigeria from August to October 2023, based on sex, species and pregnancy status.

Specie	No. of Males (with % in bracket)	No. of Females (with % in brackets)	Total	No. of females pregnant (with % in brackets)	No. of Foetuses	% Foetal wastage
Bovine	763 (37.94%)	1248 (62.06%)	2011	87 (6.97%)	87	6.97%
Ovine	484 (34.18%)	932 (65.82%)	1416	86 (9.23%)	126	13.52%
Caprine	503 (37.29%)	846 (62.71%)	1349	75 (8.87%)	111	13.12%
Total	1750	3026	4776	248 (8.20%)	324	10.71%

Table 2. Wasted foetuses of cattle, sheep and goats at different stages of gestation at Wurukum abattoir, Makurdi, Benue State Nigeria, from August to October 2023

Stage of gestation	Bovine (n = 87)	Ovine (n = 126)	Caprine (n = 111)
1st trimester	17 (19.54%)	10 (7.94%)	12 (10.81%)
2nd trimester	54 (62.07%)	109 (86.51%)	95 (85.59%)
3rd trimester	16 (18.39%)	7 (5.56%)	4 (3.60%)
Total	87	126	111

Overall, 248 pregnant animals were slaughtered across the three species, which yielded 324 fetuses (Table 1). This represents an overall pregnancy occurrence of 8.20% among females slaughtered during the study period, and a corresponding foetal wastage of 10.71% (Table 1).

Gestational age estimation based on crown–rump length (CRL) measurements showed that foetal wastage occurred predominantly during the second trimester across all species (Table 2). In cattle, 17 (19.54%) were in the first trimester, 54 (62.07%) in the second trimester, and 16 (18.39%) were in the third trimester (Table 2). In sheep, 10 (7.94%) were in the first trimester, 109 (86.51%) were in the second trimester, and 7 (5.56%) were in the third trimester (Table 2). In goats, 12 (10.81%) were in the first trimester, 95 (85.59%) were in the second trimester, and 4 (3.60%) were in the third trimester (Table 2). Across all species, second-trimester pregnancies accounted for the majority of foetal wastage. Figures 2 to 6 shows pictures of wasted fetuses across the 3 species at varying stages of gestation.



Figure 2. Foetal wastage in bovine species at third trimester of gestation.



Figure 3. Foetal wastage in bovine species at first trimester of gestation.



Figure 4. Foetal wastage in ovine species at third trimester of gestation.



Figure 5. Foetal wastage in ovine species at first trimester of gestation.



Figure 6. Foetal wastage in caprine species at various stages of gestation.

Based on prevailing market prices of adult livestock during the study period (₦300,000 per cow, ₦60,000 per sheep, and ₦40,000 per goat), the estimated weekly loss due to slaughter of pregnant animals was ₦3,120,000 (Table 3). Species-specific estimates showed the following estimated weekly losses: Cattle – ₦2,100,000; Sheep – ₦660,000; and Goats – ₦360,000 (Table 3). The monthly and annual estimates as extrapolated from these weekly estimates gave an annual economic loss attributable to foetal wastage at Wurukum abattoir as ₦162,240,000 (Table 3).

Qualitative data obtained during the study identified several reasons for the slaughter of pregnant animals. Responses obtained during the study indicated that high market demand was the most frequently cited reason for the slaughter of pregnant animals, followed by economic hardship facing the farmers and a general lack of awareness of pregnancy status prior to slaughter (Figure 7).

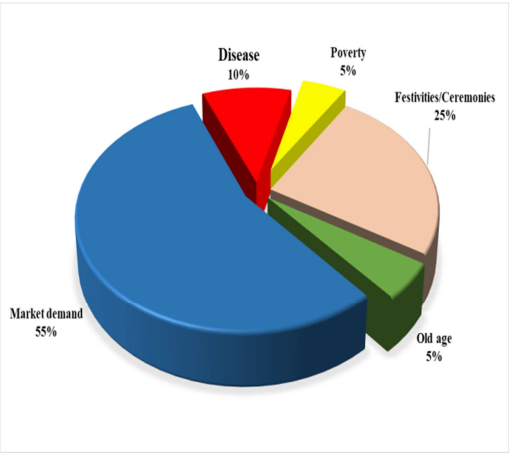


Figure 7. Reasons given by butchers for slaughter of pregnant animals at Wurukum abattoir, Makurdi, Benue State Nigeria.

Table 3. Estimated economic loss due to foetal wastage at Wurukum abattoir, Makurdi, Benue State, Nigeria, from August to October 2023.

Animals, with average prices	No. of pregnant animals slaughtered weekly	Estimated weekly loss (₦)	Estimated monthly loss (₦)	Estimated yearly loss (₦)
Cattle @ ₦300,000 per cow	7	2,100,000	8,400,000	109,200,000
Sheep @ ₦60,000 per ewe.	11	660,000	2,640,000	34,320,000
Goat @ ₦40,000 per doe.	9	360,000	1,440,000	18,720,000
Total	27	3,120,000	12,480,000	162,240,000

Discussion

The finding in this study that 8.20% of slaughtered females were pregnant is startling and worrisome. This practice of slaughter of pregnant animals threatens the herd replacement stock and results in significant economic losses for the livestock industry (Alhaji and Odetokun, 2013; Adeyemi *et al.*, 2016). The overall occurrence of pregnancy recorded for female cattle (6.97%), sheep (9.22%), and goats (8.87%) in the present study suggests a systemic failure in ante-mortem inspection procedures (Swai *et al.*, 2015; Jajere *et al.*, 2023). The continued slaughter of pregnant animals at this magnitude is unsustainable. It leads to a "double loss": the immediate loss of the potential offspring and the long-term depletion of the breeding herd (Atawalna *et al.*, 2013; Ngbede *et al.*, 2017; Bakari *et al.*, 2025).

Interestingly, while cattle had a lower percentage of pregnant females compared to small ruminants, the single-fetus nature of bovine pregnancies resulted in a 1:1 ratio of wastage per gravid cow. In contrast, sheep and goats showed higher foetal wastage rates (13.52% and 13.12%, respectively) as a result of the higher frequency of multiple gestations (twinning and triplets). This suggests that the slaughter of a single ewe or doe often results in a disproportionately higher loss of potential offspring compared to cattle.

The study found an average foetal wastage rate of 10.71% across all species indicating a significantly high prevalence. The overall 10.71% foetal wastage recorded in the present study is relatively higher than the 3.90% and 2.43% previously reported by Abdulkadir *et al.* (2008) and Adeyemi *et al.* (2016), respectively in this region/area. This relatively higher level of foetal wastage recorded in the present study relative to previous studies could be linked to seasonal influences, as the study was conducted during the peak of rainy

season in this region. This period typically corresponds with increased breeding activity and disease outbreaks, potentially prompting farmers to cull at-risk or ill animals, including pregnant ones (Muhammad *et al.*, 2008). Similar and higher foetal wastage rates have been reported in other parts of Nigeria: Ebonyi – 9.2%, (Nwakpu and Osakwe, 2007); Lagos – 10.7% (Oduguwa *et al.*, 2013); Oyo State – 10.3% (Awoyomi *et al.*, 2013); Adamawa – 14.4% (Ardo *et al.*, 2013); and Ogun State – 12.6% (Adebowale *et al.*, 2020). Comparable findings have also been documented in other parts of Africa: Kumasi, Ghana – 18.4% (Atawalna *et al.*, 2013); and Bukoba, Tanzania – 15.6% (Nonga, 2015).

In the present study, more cows (1,248) were slaughtered than bulls (763), a pattern sometimes attributed to the higher availability of females or the culling of older, less productive cows from the herd. This trend aligns with previous findings in Nigeria (Abdulkadir *et al.*, 2008; Adeyemi *et al.*, 2016; Raimi *et al.*, 2017; Onyinye *et al.*, 2018) and across many other African countries (Swai *et al.*, 2015; Tamirat *et al.*, 2015; Tasiame *et al.*, 2016). Nevertheless, other studies have reported higher slaughter rates among bulls (Bello *et al.*, 2012; Alhaji *et al.*, 2015; Baba *et al.*, 2018; Bakari *et al.*, 2025). These discrepancies may be attributed to regional differences, market demand, cultural preferences or slaughterhouse throughput.

Losses of cattle in the second trimester accounted for more than 62% of foetal wastage. The slaughter of pregnant female animals during the second and third trimesters is especially worrisome, as pregnancies at these stages can be readily identified by visual examination, implying that these animals were being slaughtered despite obvious signs of pregnancy. Although first-trimester wastage (7.94% – 19.54%) might be excused based on the challenge of detecting early pregnancy without the aid of diagnostic tools like

ultrasonography, the high rate of mid-to-late-term slaughter suggests socio-economic factors rather than a mere lack of diagnostic capability. This oversight might be explained by economic desperation and inadequate ante-mortem examination largely due to a shortage of qualified veterinary personnel in this abattoir. This finding is consistent with previous findings (Adeyemi *et al.*, 2016), but contradicts the reports of Bokko (2011), who observed higher third-trimester losses.

Slaughter patterns for sheep and goats mirrored those of cattle, with females making up the majority of the animals slaughtered. The lower percentage of rams slaughtered may reflect cultural practices, where rams are reserved and fattened for particular festivals, commanding greater market value. The results from the present study correspond with earlier reports in Tanzania by Swai *et al.* (2015). The incidence of foetal wastage among ewes was lower than figures (23.08%) previously reported from this location (Adeyemi *et al.*, 2016), and from other Nigerian regions: 22.78% in the Sahel (Bokko, 2011) and 29.8% in Birnin Kebbi (Garba *et al.*, 2010). The foetal wastage rate among does was slightly higher than previous reports such as 9.29% in Port Harcourt (Akpabio and Babalola, 2014). Reports of foetal wastage in goats across Nigeria have varied widely, from 10.1% to 57.9% (Mohammad *et al.*, 2007; Bokko, 2011; Sanusi *et al.*, 2006; Idahor *et al.*, 2009; Alade *et al.*, 2011).

In both sheep and goats, most foetal wastage occurred during the second trimester (85.59% and 86.51% respectively) while the third trimester wastage was lowest across both species. Early-stage pregnancies may go unnoticed due to few external signs, therefore increasing the possibility that the animals are incorrectly classified as non-pregnant and sold for slaughter. On the other hand, at the third trimester, the abdomen is conspicuously distended and the udder swollen. This leaves the farmer with the decision not to sell off

such animals in most cases. These results are consistent with those of Adeyemi *et al.* (2016), but contrasts with that of Bokko (2011).

The financial consequences of these losses are profound. In just one abattoir, the estimated annual economic loss reached a staggering ₦162.24 million (₦109.2 million for cattle, ₦34.32 million for sheep, and ₦18.72 million for goats). Considering that the country is yet to reach self-sufficiency in the production of animal protein, it is worrisome to envision the great loss of this huge amount due to foetal wastages in just one abattoir in Benue State. These figures are in line with earlier reports (Alhaji and Odetokun, 2013; Awoyomi *et al.*, 2013; Bokko, 2011; Adeyemi *et al.*, 2016). With Nigeria's human population growing at 3.5% yearly while livestock growth lags significantly behind (0.8 – 2.9%) (Chaudhari and Bokko, 2000; Taiwo *et al.*, 2006), the continuous slaughter of pregnant females will put avoidable negative pressure on the livestock industry and further weaken national efforts to meet animal protein needs (Oyekunle *et al.*, 1992).

The indiscriminate slaughter of pregnant animals is against global welfare norms and the Nigerian Meat Edict of 1968. Despite this legal framework, enforcement remains weak. Economic hardship on farmers, regulatory gaps and ignorance among stakeholders regarding the long term damage caused by this practice usually impede enforcement. According to Ugwu *et al.* (2023) ignorance of pregnancy status and economic hardship faced by farmers were identified as primary drivers. But in this study, the main reason for slaughter of pregnant female animals was market demand while economic hardship played a minor role. The unnecessary destruction of live fetuses is among the most avoidable forms of cruelty and a significant cause of reproductive losses in Nigeria. Regulatory frameworks, such as the WHO guidelines adopted in Nigeria's amended meat

inspection laws, designate veterinarians as major participants in animal welfare and meat safety. However, the continued slaughter of pregnant animals call for renewed political will and practical reforms, including intensive awareness campaigns, enhanced veterinary pre-slaughter inspection and pregnancy diagnosis at abattoirs.

Finally, the high number of cattle slaughtered during the study suggests that beef remains the most consumed meat among the local population. This tendency adds additional strain on reproductive females and emphasizes the pressing need for strategies that promote sustainable livestock management.

Conclusion and Recommendations: The findings of this study provide empirical evidence of significant (10.71%) foetal wastage among slaughtered cattle, sheep and goats at the Wurukum abattoir, Makurdi, Benue State Nigeria. This is a common and economically damaging practice, contributing to protein shortage, economic loss and reduced livestock sustainability. There is a need for prompt intervention through public awareness, stakeholder education, improved veterinary inspection and stricter enforcement of abattoir regulations. Establishing modern abattoirs with mandatory pre-slaughter examination procedures is critical to reducing this unethical practice and promoting food security in Nigeria. The sustainability of the Benue State livestock industry and the long-term availability of animal protein for the growing population depend on closing these gaps.

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Conflict of interest

The authors declare no conflict of interest.

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