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Assessment of Fetal Wastage and its Economic Implication among Ruminant Animals Slaughtered at Kano Main Abattoir, North-Western Nigeria

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ABSTRACT

The study was conducted to ascertain the impact of fetal wastage from the slaughter of pregnant ruminant animals at the Kano main abattoir, north-western Nigeria. The economic implications were also estimated. The study was carried out from May, 2023 to April, 2024. A total of 237,200 ruminant animals (cattle, sheep and goats) were slaughtered within the study period out of which 119,771(50.5%) were males while 117,429(49.5%) were females. 17,506 fetal wastages were recorded from the slaughter of 117,429 female ruminant animals. There was an overall prevalence of 15.0 % with goats having the highest specie-specific prevalence of 25.0% (n=10571) followed by sheep 14.5% (n=1808) and cattle with the lowest 8.2% (n=5217). There was no statistically significant association between the occurrence of fetal wastages and the number of females animals slaughtered (p>0.05). There was a huge income loss of about ₦3.360 billion ($2.293 million) made up of ₦2.435 billion ($1.662 million), ₦171.7 million ($117,242) and ₦753.2 million ($514,118) for cattle, sheep and goat respectively that could have been saved if the fetuses were not wasted and were raised and allowed to reach market age. It is therefore necessary to bring all hands-on deck in order to find a lasting solution to this serious menace of slaughtering pregnant food animals generally through concerted efforts by governments and professionals aimed at educating and sensitizing livestock farmers, butchers, abattoir workers and livestock dealers on the dangers of this negative practice in order to protect and salvage the livestock industry and ensure sustainable food security.

Keywords: *Abattoir, Economic Losses, Fetal Wastage, Kano State, Northwestern Nigeria, Pregnancy, Ruminant Animals*

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INTRODUCTION

The ruminant animals play a significant role in the social and economic wellbeing of Nigerians in various ways. They serve as source of income earning to major ruminant dealers, sellers of live animals and butchers/meat sellers. They generate employment and create markets for larger number of people who explore the animal products and by-products for economic gain (Lawal-Adebowale, 2012). Cattle in particular contribute to food security and nutrition through the provision of beef and milk to the population. Animal protein requirement in developing countries has become critical due to a disproportionate growth in human population relative to livestock production (Ani *et al.*, 2018). Although, the Food and Agriculture Organization (FAO) in 2013 recommended an annual intake of 41.9 kg animal protein per person, in Nigeria, intake of high-quality livestock proteins by most families is below 9kg which is more than four times below the recommended amount (Jajere *et al*., 2023).

Nigeria's cattle, sheep and goats population were put at 54.81 million, 64.93 million and 138.95 million respectively (NNASC, 2022), while human population was put at 211 million (PRB, 2021). By 2050, Nigeria's population is expected to grow swiftly and extensively reaching close to 400 million and the number of people living in urban areas is expected to triple to 280 million (FAO, 2019). As a result of these changes, the demand for livestock product will rise exponentially such that beef and milk consumption will grow by 117 and 577 percent respectively (FAO-GPS, 2018). The livestock industry therefore has to radically transform to respond to the increasing demand expected. Meeting this increasing demand for animal source food will involve rapid growth in the national herd size and productivity. In spite of these glaring challenges, animal production continues to be obstructed by many obstacles among which is the slaughter of pregnant food animals, with the consequence of fetal wastages which is an unethical practice that negatively affects the growth and development of the national herd, posing a threat to meeting the animal dietary protein requirement of the country (Abraham, 2014).

Fetal wastages from slaughtered female ruminants and the associated economic losses appear to be substantial in most developing and under-developed countries including Nigeria (Alhaji *et al*., 2015). The animal products in the diet of average Nigerian have been diminishing year after year due to the low level output which results from decline in the national herd productivity (Oyenuga, 1987). Fetal wastages associated with slaughter of pregnant food animals represent a major economic loss to the livestock industry which ultimately undermine livestock production and food security and therefore threaten sustainability of the livestock sector (Riding *et al*., 2008, Ngbede *et al.*, 2012; Zulu *et al*., 2013). Slaughter of pregnant food animals not only undermines productivity, but also animal welfare (Nabasirye *et al*., 2024). Several researchers have reported on the slaughter of pregnant large and small ruminants from various abattoirs across Nigeria. Specifically, in the North Central Nigeria (Alhaji *et al.,* 2015), in Maiduguri, North East (Iliyasu *et al.*, 2015; Jajere *et al.*, 2023), in Ubakala, Abia State, South East (Ekenma *et al.*, 2019) in Mubi, Adamawa State North East (Tizhe *et al.*, 2010), in Lafenwa, Ogun State South Western Nigeria (Adebowale *et al*., 2020).

MATERIAL AND METHODS

Study Area

The Kano Main Abattoir is situated within the ancient city gate of Mazugal (Kofar Mazugal) in the Fagge Local Government Area (LGA) of Kano State. Its GPS coordinates are 12.018^{0}N and 08.521^{0}E. This abattoir is renowned for its large-scale slaughtering of camels, cattle, sheep, and goats, primarily sourced from both within and outside Nigeria (Garba *et al*., 2022).

Kano State is located in the North-West geopolitical zone of Nigeria. The state was established on May 27, 1967, from the defunct Northern Region. Historically, Kano dates back to the 7th century AD, when migrants arrived in search of iron ore to manufacture farming tools (Figure 1). Kano State comprises 44 local governments and spans a land area of 20,131 km², with an estimated population of 11,056,300 according to the 2011 census. The State with the capital city as Kano, borders Katsina State to the northwest, Jigawa State to the northeast, Bauchi State to the southeast, and Kaduna State to the southwest. Originally, Jigawa State was part of Kano, until it became a separate state in 1991. The predominant indigenous ethnic group is Hausa, although other groups such as Yoruba and Fulani are also present (NPC, 2006).

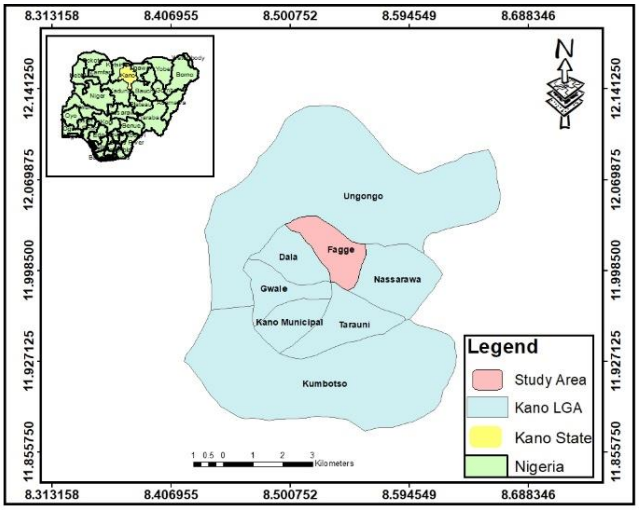

Figure 1: Map of Kano State Showing the Study Area: Source: Garba *et al*., 2022

Study design

Data was collected through daily visits to the abattoir between 6:00 am and 10:00 am. Slaughtered pregnant ruminant animals (cattle, sheep and goats) were considered for the study. After slaughtering the animals, the uteri of the pregnant ones were examined and the fetuses were equally examined and recorded. Results were presented employing simple descriptive statistics tools using percentages and tabulations. The data were subjected to further statistical analysis using IBM - SPSS statistics version 20. Chi square (χ^2) test was used to determine the statistical association between the variables and a *p*–value of less than 0.05 was considered statistically significant. The monthly prevalence rates of the fetal wastages for the different species of the ruminant animals were calculated as the total number of fetuses recovered for each specie divided by the total number of female slaughtered animal for that specie for that month expressed in percentages as described by Stella *et al.* (2024). Overall prevalence was computed as the total number of fetuses recovered from all the ruminant animals slaughtered within the study period divided by the total number all the female ruminant animals slaughtered within the study period (expressed in %). The economic losses arising from fetal wastages as a result of slaughtering pregnant ruminant animals were estimated in monetary terms as monies to be generated from the sale of ruminant animals at maturity, assuming that the fetuses would be born alive and raised to maturity with 5% pre maturity mortality as described elsewhere (Ndi *et al*., 1993; Casey *et al.*, 2003; Jajere *et al.,* 2023). The monetary values were estimated based on the Naira values (the Nigeria's official currency) and then converted to US Dollar ($) based on the Nigeria's official (Central Bank of Nigeria) foreign exchange rate of ₦1465 to a Dollar as at 2024 (CBN NFEM, 2024). The revenue losses associated with the fetal wastages were determined based on the minimum market prices of ₦500,000:00, ₦100,000:00 and ₦75,000:00 for matured cattle, sheep and goats respectively.

RESULTS

During the period of study, a total number of 237,200 ruminant animals were slaughtered at the Kano main abattoir comprising of 98,665 (41.6%) cattle, 23,161(9.8%) sheep and 115,374 (48.6%) goats. This showed that more goats were slaughtered at the facility within the study period followed by cattle and sheep (Table 1). The month of April recorded the highest monthly total slaughter figure for all the ruminant animals slaughtered (29,135) while the lowest monthly total slaughter figure (11,604) was recorded in August (Table 1). The study also indicated that out of the total slaughter figure of 237,200 for all the three species, 119,771 (50.5%) were males while 117, 429 (49.5%) were females (Table 2). Accordingly, the results also showed more females were slaughtered than males for cattle and sheep while the reverse was the case for the goats where more males were slaughtered than the females within the study period (Table 2). Table 3 revealed the monthly distribution of slaughtered female animals and fetal wastages recovered for cattle, sheep and goats. The results showed that the slaughter figures for the female cattle were decreasing from the months of May to August with a concurrent decrease in the number of fetal waste recovered. However, while the female slaughter figures were increasing from the months of October to December, the number of fetal wastages recovered were decreasing from October up to the month of March even though there was a decrease in the slaughter figure from January to March (Table 3). For the goats, the pattern of slaughter figures kept decreasing intermittently with the figures of fetal wastages also decreasing. However, for the sheep there were no regular pattern between the female slaughter figures and the fetal wastage recovered. Table 4 showed the cumulative monthly prevalence of fetal wastages across the different species of the ruminant animals slaughtered within the study period, where cattle and sheep had the highest monthly prevalence of fetal wastage (39.9%) in August and (29.8%) in September, respectively. However the goats recorded much higher monthly prevalence of fetal wastage (62.1%) in July (Table 4, Figure 2). The result of the study indicated that 117,429 female ruminant animals were slaughtered within the period under study (May 2023 –April, 2024). The overall prevalence of 15% was documented (Table 5). Goats recorded the highest prevalence of 25% while cattle had the lowest 8.2% (Table5). Evaluation of the economic loss showed that from the total fetal wastages of 17,506 recovered over the study period, the estimated gross income of ₦3.360 billion ($2.293 million) made up of ₦2. 435 billion ($1.662 million), ₦171.7 million ($117,242) and ₦753.2 million ($514,118) based on conservative estimation of the minimum market price of the average matured cattle, sheep and goat respectively, were lost as a result of the practice of slaughtering pregnant ruminant animals with the consequence of avoidable fetal wastages during the twelve-month study period.

DISCUSSION

The present study revealed a high total number of slaughter figure for the three species of ruminant animals during the study period out of which the goats had the highest figure than the cattle and sheep slaughtered at Kano main abattoir. This aligned with observations in other studies (Alhaji *et al*., 2015; Khan and Khan, 1989, Dandago *et al*., 2009, Alhassan and Kwame, 2022), where they reported the slaughter of more goats than other food animals in various abattoirs in Minna, Faisalabad, Kaase and Kano. This could be due to taste preference, rate of

Table 1: Slaughter Figures for Ruminant Animals (Cattle, Sheep and Goats) at Kano Main Abattoir, North Western Nigeria (May 2023- April 2024).

Months	Cattle	Sheep	Goat	Total
May	11430	1631	15890	28951
June	6660	1444	10027	18131
July	4970	694	6511	12175
August	3218	1879	6507	11604
September	8706	1904	5496	16106
October	9130	2073	9158	20361
November	8887	1916	7817	18620
December	10891	2231	10205	23327
January	9931	1365	10667	21963
February	8245	3362	8789	20396
March	6555	1847	8029	16431
April	10042	2815	16272	29135
Total	98,665	23,161	115,374	23,720

Table 2: Monthly Distribution of Figures By Sex For Ruminant Animals (Cattle, Sheep And Goats) Slaughtered at Kano Main Abattoir, North Western Nigeria (May 2023- April 2024)

	Male				Female			
Months	Cattle	Sheep	Goat	Total	Cattle	Sheep	Goat	Total
May	3819	978	10970	15767	7611	653	4920	13184
June	2616	823	7340	10779	4044	621	2687	7352
July	1675	335	4279	6289	3295	359	2232	5886
August	1188	690	2947	4825	2030	1189	3560	6779
September	3038	1176	3255	7469	5668	728	2241	8637
October	3581	1249	5634	10464	5549	824	3524	9897
November	3219	728	5591	9538	5668	1188	2226	9082
December	3753	904	4237	8894	7138	1327	5968	14433
January	4299	516	7079	11894	5632	849	3588	10069
February	2779	1434	5581	9794	5466	1928	3208	10602
March	2288	734	5378	8400	4267	1113	2651	8031
April	3679	1161	10818	15658	6363	1654	5460	13477
Total	35934	10728	73109	119771(50.5%)	62731	12433	42265	117429(49.5%)

Table 3: Monthly Distribution of Slaughtered Female Ruminant Animals (Cattle, Sheep And Goats) and Fetal Wastages Documented at Kano Main Abattoir, North Western Nigeria (May 2023- April 2024)'.

	Cattle		Sheep		Goats	
	FSF	FW	FSF	FW	FSF	FW
May	7611	929	653	75	4920	172
June	4044	863	621	36	2687	1526
July	3295	841	359	58	2232	1386
August	2030	810	1189	125	3560	1551
September	5668	224	728	217	2241	1349
October	5549	384	824	225	3524	985
November	5668	204	1188	96	2226	396
December	7138	195	1327	71	5968	325
January	5632	176	849	171	3588	289
February	5466	160	1928	162	3208	310
March	4267	143	1113	177	2651	273
April	6363	198	1654	395	5460	461
Total	**62731**	**5127**	**12433**	**1808**	**42265**	**10571**

FSF= Female Slaughter Figures *FW = Fetal Wastage*

multiplication, availability and their relatively small size. Moreover, live goats are much more easily purchased by individuals in relation to cattle and sheep owing to market differentials between small and large ruminants.

Table 4: Cumulative Monthly Prevalence of Fetal Wastage among Ruminant Animals (Cattle, Sheep and Goats) Slaughtered at Kano Main Abattoir, North Western Nigeria (May 2023- April 2024)

	Months												
Species	**May**	**June**	**July**	**Aug.**	**Sept.**	**Oct.**	**Nov.**	**Dec.**	**Jan.**	**Feb.**	**March**	**April**	**Cumulative prevalence %**
Cattle	12.2	21.3	25.5	39.9	3.9	10.9	6.9	2.7	3.1	2.9	3.3	3.1	11.3
Sheep	11.5	5.8	16.2	10.5	29.8	27.3	8.1	5.3	20.1	8.4	15.9	23.8	15.2
Goats	34.9	56.8	62.1	43.5	60.2	27.9	17.7	5.4	8.0	9.6	10.3	8.4	28.7

Table 5: Prevalence of Fetal Wastage Among Ruminant Animals (Cattle, Sheep and Goats) Slaughtered at Kano Main Abattoir, North Western Nigeria (May 2023- April 2024)

Species	**Females Slaughtered**	**Fetal Wastage**	**Prevalence %**	**X^2**	***p-value***
Cattle	62731	5127	8.2	6.000	0.199
Sheep	12433	1808	14.5		
Goats	42265	10571	25.0		
Total	117429	17506	15.0		

Figure 2: Fetal waste and a gravid uterus from slaughtered pregnant cows at Kano Main Abattoir (Source: Personal camera)

In addition, sheep are mostly utilized during religious festivities and their data are hardly available as they are usually slaughtered outside the abattoirs during such festivities. This culture does not allow for access to records of production, slaughter and diseases which is antithetical to efficient and sustainable livestock production and husbandry. The findings in this study revealed the slaughter of 117,429 female ruminant animals within 12 months study period (May 2023-April 2024) which was in all likelihood responsible for the 17, 506 fetal wastages. This agrees with findings from other studies (Jajere *et al.*, 2023; Tizhe *et al*., 2010; Nabasirye *et al*., 2024) which link the persistent recovery of fetal losses to uncontrolled and negative practice of slaughter of high proportion of female food producing animals without recourse to pregnancy diagnosis prior to slaughter. The implication of this is the tremendous loss of potential ruminant animals' offspring that would contribute to the national livestock population growth and meat supply profile of the country.

Overall prevalence of fetal wastage from the slaughter of pregnant ruminant animals in this study is 15.0%. This is, however, in contrast with the findings of other studies (Ndi *et al*., 1993; Ataja *et al*., 1997; Dunka *et al*., 2017 Nabasirye *et al*., 2024) who reported an overall prevalence of 22.4%, 22.1%, 24.1% and 21.9% respectively. The variation could be as a result of the differences in the total number of animals' slaughtered, geographical location, demography, preferences of sources of animal protein, social seasons and associated demand for meat (Nabsirye *et al.*, 2024). The cattle had its highest monthly prevalence of fetal wastage in the month of August. The small ruminants (sheep and goats) had their highest prevalence of monthly fetal wastage in the months of September and July respectively. This is in agreement with the findings of Cadmus and Adesokan (2010) who similarly reported higher prevalence during the rainy season in south western Nigeria slaughter houses. The period between July and September falls within the peak rainy season of the year in the study area. This is coinciding with the period most livestock owners who are also subsistent farmers are desirous of extra financial resources to purchase inputs and pay for labor for wet season agricultural activities. Consequently, animals are taken to the market and sold for slaughter irrespective of their sex and pregnancy status.

The financial implication of high number of fetal wastages as a result of the indiscriminate slaughter of pregnant ruminant animals as revealed by this study is huge, and likely to continue unabated leading to serious deficit in the national livestock production efforts. The estimated losses amounting to billions of naira (millions of dollars) were incurred in just twelve months of this study in one abattoir alone out of several other abattoirs and slaughter houses spread across the country. This trend is worrisome and a direct threat to the livestock sector and the nation's desire for the attainment of a sustainable food security. If the livestock sector develops sustainably, consumers will be better nourished and food becomes secure because of the increased availability of affordably –priced animal source foods especially meat in the market (FAO, 2019).The growing demand for animal food and the transformation of the livestock sector represent major developmental opportunities for the country as livestock farmers, input suppliers, animal health service providers, processors, wholesalers, retailers and stakeholders could significantly expand their businesses. However, these opportunities come coupled with some major challenges among which fetal wastage is key, which if not properly addressed, risk jeopardizing the development of the livestock sector and have broader negative impacts on public health and livelihoods.

Conclusion

This study established the slaughter of pregnant ruminant animals and the discovery of attendant fetal wastages between May 2023 and April 2024 at the Kano main abattoir in the north western Nigeria. About one in every seven (15.0%) female ruminant animals slaughtered at Kano main abattoir was pregnant leading to the loss of 17506 fetuses with specie–specific prevalence of 25.0%, 14.5% and 8.2% for goats, sheep and cattle respectively. An estimated sum of ₦3.360 billion ($2.293 million), made up of ₦2.435 billion ($1.662 million), ₦171.7 million ($117,242) and ₦753.2 million ($514,118) for cattle, sheep and goat respectively would have been saved if their fetuses were saved, protected and raised to maturity.

Recommendations

In order to achieve a sustainable development of the livestock sector and mitigate the recurrent negative practice of slaughter of pregnant food animals in our abattoirs, there will be urgent need for the enforcement of all relevant government policies aimed at eliminating or minimizing the occurrence of fetal wastage across various abattoirs and slaughter slabs in the country. The government at various levels should strive to organize result-oriented sensitization campaign and mass education programs targeting livestock farmers, butchers, abattoir workers livestock dealers and even consumers on the effects of abattoir fetal wastage on livestock production and public health, and the attendant socio-economic consequences. Similarly, in order to support the conduct of pregnancy status assessments within the livestock production value chain, there is the need for the supply of standard, user-friendly and affordable pregnancy test kits at farm level, livestock markets and abattoirs so as to be able to mitigate the practice of slaughtering pregnant food animals. In view of the persistence of this negative practice as reported by various researchers, it becomes imperative

to deepen further studies with a view to identifying additional factors that continue to sustain this unhealthy practice in order to find a lasting solution that would go a long way in preserving and improving our national livestock development and growth.

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REFERENCES

Abassa, K.P. (1995). 'Prenatal wastage', in K.P. Abassa (ed.), Reproductive losses in small ruminants in sub-Saharan Africa: A review, working document, International Livestock Centre for Africa (ILCA), Addis Ababa. Viewed 3/8/2025 from <http://www.ilri.org/InfoServ/Webpub/fulldocs/X5460E/x5460e03.htm #chapter iii.prenatal> wastage

Abraham, J. (2014).Milking Nigeria's Soy Cow. In the Punch- Nigeria. http://www.punchng.com

Addass, P.A., Midau, A.,Milka, M. and Tizhe, M.A. (2010) Assessment of Abattoir Fetal Wastage of Cattle, Sheep and Goats in Mubi Main Abattoir, Adamawa State, Nigeria. World J. Agric. Sci. 6(2): 132-137.

Adebowale, O.O.,Ekundayo,o and Awoseyi,A.A.(2020). Female cattle slaughter and fetal wastage: A case study of the Lafenwa abattoir, Ogun State, Nigeria. *Cogent Food Agric,* 6:1, 1809308 https://doi.org/10.1080/23311932.2020.1809308

Alhaji, N.B.(2011). Prevalence and economic implications of calf fetal wastage in an abattoir in North Central Nigeria. *Tropical Animal Health and Production.* 43(3), 587-590. PMID: 21080227, http://dx.doi.org/10.1007/s11259-010-9735-7

Alhaji, N.B., Odetokun, I.A., Shittu, A., Onyango, J., Fasina, F.O. and Lee, H.S. (2015). Time –series analysis of ruminant fetal wastage at a slaughterhouse in North Central Nigeria between 2001 and 2012. *Onderstepoort J.Vet. Res*., 82(1): 1-13 PMiD: 26842363 DOI:10.4102/ojvr.v82i1.1010

Alhassan, M. and Kwame, N. (2022). Prevalence and Economic inference of small ruminant fetal wastage at Kusami abattoir Ltd. Kaase. Asia Pacific Journal of Sustainable Agriculture, Food and Energy. 10(1): 28-33.

Ani, A.O., Iyida, D.U., Ogwuegbu, M.C., Osita, C.O. and Edeh H.O. (2018). Growth performance of broiler birds fed varying dietary levels of Artemisia annua (sweet wormwood).Nig. J. Anim. Prod. 45(5): 122-128.

Ataja, A. M., Uko, O. J. and Tambuwal, F. M. (1997). Pregnancy in slaughtered cows at Sokoto abattoir, Nigeria. *Nigerian J Basic and Applied Sciences*, 7, 1–4.

Bakari, N.A. (2016). Fetal Wastages and Detection of Leptospira Species in Wasted Fetuses from Cows in Old Kano abattoir, Kano State, Nigeria. (MSc Dissertation, Ahmadu Bello University, Zaria, Nigeria).

Cadmus, S.I.B. and Adesokan, H.K.(2010). Bovine fetal wastage in Southwestern Nigeria: A survey of some abattoirs. *Tropical Animal Health and Production*. 42(4): 617-621. PMID: 19821049, http://dx.doi: 10.1007/s11250-009-9465-x

Casey,N.H., Niekerk, W.A. and Webb, E.C.(2003). Goat meat, (Caballero B. Ed.) Encyclopedia of Food Sciences and Nutrition, 2nd Ed, Academic Press, Pp 2937-44.

Central Bank of Nigeria Foreing Exchange Market (2024). www.cbn.gov.ng NFEM 2024 Accessed August 2025.

Dandago, M.A., Farouk, S.U. and Igwe, C.C. (2009). Evaluation of Slaughter Practices in Kano Abattoir. Techno Science Africana Journal. 3(1):28-31.

Dunka, H. I., Buba, D. M. , Gurumyen, Y. G. , Oragwa, A. O. , Oziegbe, S. D. and Patrobas, M. N. (2017). Economic losses associated with slaughter of pregnant animals in Jos Abbatoir. *International Journal of Advanced Research*, 5(7), 1047–1052. 10.21474/IJAR01/4813

Ekenma, K., Zephaniah, N.C., Uchechukwu,N.V., Odirichukwu, E.O. and Ukweni P.C. (2019). Bovine Fetal Waste in Ubakala Abattoir: Public health and Economic Implications. Am-Euras.J. Sci. Res. 14(3): 47-52. DOI: 10.5829/idosi.aejsr.2019.47.52.

Food and Agriculture Organization (2013). Current worldwide annual meat consumption per capita. Livestock and Fish Primary Equivalent. Available online: http://www.fao.org/faostat/en/#data/CL (Accessed 10/08/2025)

Food and Agriculture Organization (2016).AQUASTAT.FaO's Information System on Water and Agriculture. Available at htpp://www.fao.org/nr/water/aquastat/countries/regions/profile segments/ETH WU eng.stm

Food and Agriculture Organization (FAO) Global Perspective Studies (2018). Aligning FAO Global Livestock Environmental Assessment Model (GLEAM) and FAOSTAT balance sheet for animal feed. Viewed from https://www.fao.org.global-perspective studies.

Food and Agriculture Organization (2019). FAOSTAT. Available at <http://www.fao.org/faostat/en/#data/TP Accessed July,2025>

Garba, Y., Mohammed, Z. and Jinjiri, A. (2022). Assessment of facilities at kano main abattoir and livestock slaughter figures as affected by Centre for Dryland Agriculture, Bayero University, Kano Department of Animal Science.

Iliyasu, D., Ogwu, D., Yelwa, H., Yaroro, I., Ajani, J.A., Auwal, U., Bugau, J.S., Kuzayed, I.G.and Jibrin, U.R. (2015). Incidence of Bovine Pregnancy Wastage in Maiduguri Abattoir, Borno State Nigeria. *Int. J. Livest. Res*. 5(8): 59-65. DOI 10.5455/ijlr.20150817110238 ISSN 2277-1964

International Technology association ITA (2004). Nigerian Livetock. The Library of Congress Country Studies CIA World Fact book.

Jajere,S.M., Mohammed, S., Jidda, D. and Emmanuel, E.T.(2023) Fetal Wastage Among Food-Producing Animals Slaughtered at Maiduguri Abattoir: Prevalence, Causes and Economic Implications. *Sahel J.Vet Sci.* 20(3): 45-52. http://doi.org/10.54058/saheljvs.v20i3.403

Kano State Population (2021) Kano: https://kano state government population. Archived. Retrieved June 7, 2025.

Khan, M. and Khan, A. (1989).'Frequency of pregnant animals slaughtered at Faisalabad abattoir. Journal of Islamic Academy of Science. 2(1): 82.

Knarda (2001). Kano Agricultural and Rural Development Authority. Meteorological Station Reports: Temperature Record Book and Management Unit. 11:1-82.

Lawal-Adebowale, O.A. (2012). Dynamics of ruminant livestock management in the context of the Nigerian agricultural system, In K. Javed(ed.), Livestock Production In Tech, viewed 5th August 2025 from http://www.intechopen.com/books/livestock-production/dynamics-of-ruminant-livestock-management-in-the-context-of-the-nigerian-agricultural-system.

Nabasirye,S., Baluka,S.A. and Sengooba, A.(2024). Prevalence and economic losses associated with fetal wastage in abattoir. *Veterinary Medicine and Science,* 10:e 1343 http://doi.org/10.1002/vms3.1343.

National Population Commission (NPC) (2006). Population census report: Nigeria, Abuja: NPC;2006.

Ndi,C., Tambi,N.E. and Agharih, N.W. (1993). Reducing calf wastage from the slaughtering of pregnant cows in Cameroon. Available on line. https://www.fao.org/3/v1650t/v1650t0g.htm (Accessed 2/8/2025).

Ngbede, L.O., Hena, S.A.,Ogunttoye, O.O. Tarhyel, R. and Bulus, C.(2012) Bovine fetal wastage and its economic implication. A six –year (2003-2008) retrospective study in an abattoir in Northwestern Nigeria. *Scientific Journal of Veterinary Advances* 1(2), 42-46.

Nigerian National –Agricultural Sample Census (NNASC) (2022). Viewed from https://microdata.nigerianstat.gov.ng Accessed 13th August 2025.

National Population Commission (NPC). Population census report: Nigeria. Abuja: NPC; 2006.

Obudu, C.A., Ubah, S.A., Erondu,V.C. and Columbus, P.K. (2018). Fetal Wastages Among Ruminants Slaughtered at the Abattoir in Gwagwalada, FCT, and Nigeria. Abuja Journal of Veterinary and Biomedical Sciences, 1:53-64.

Obudu, C.A., Ubah, S.A., Erondu,V.C. and Columbus, P.K. (2018). Fetal

Wastages Among Ruminants Slaughtered at the Abattoir in Gwagwalada, FCT, and Nigeria. Abuja Journal of Veterinary and Biomedical Sciences1:53-64.

Oyenuga, V.A. (1987) Fundamental strategies for livestock production in Nigeria. A mud pillar supporting a weak structure: *Nigerian J. Animal Production*. 14: 5-11.

Population Reference Bureau (2021). World Population Data Sheet from http:www.prb.org/pdf13/2021-population data sheet_eng.pdf

Riding, G.A., Lehnert, S.A., French, A.J. and Hill, J.R. (2008). Conceptus-related measurements during first trimester of bovine pregnancy. *The Veterinary Journal,* 175: 266-272.

Tizhe, M.A., Kubkomawa. H.I., Waba, Y.E. and Addas, P.A. (2010). Fetal Wastage in Ruminants and Sustainable Livestock Industry in Nigeria. *Journ Agric and Vet. Sci* 2, 72-80.

Zulu, V., Mwanza, A.M., Banda, F.C., Yusuda, J. and Yoshida, M. (2013) Cattle reproductive waste in Zambia: A case of Mongu abattoir. *Bulletin of the Faculty of Agriculture, Kagoshima University,* 63: 49-54.