

## Evaluation of foetal wastage and incidence of gross foetal and uterine abnormalities in goats at Gujungu slaughterhouse Jigawa State

<sup>1</sup>Zubair A. H., <sup>2</sup>Haruna, U., <sup>3\*</sup>Ilyasu, D., <sup>3</sup>Mustapha, A.R., <sup>4</sup>Lawan, A. F., <sup>5</sup>Abba, A.,

<sup>5</sup>Bamanga U.M. & <sup>6</sup>Muhammad, S. T

<sup>1</sup>College of Veterinary Surgeon Nigeria, Ahmadu Bello University, Zaria Study Centre, Kaduna State, <sup>2</sup>Department of Agricultural Economics and Extension, Federal University Dutse, Jigawa State, <sup>3</sup>Department of Theriogenology, University of Maiduguri, <sup>4</sup>Department of Veterinary Microbiology, University of Maiduguri, <sup>5</sup>Veterinary Teaching Hospital, University of Maiduguri, <sup>6</sup>Veterinary Teaching Hospital, Ahmadu Bello University, Zaria, Nigeria.

\*Corresponding author: [ilyasu.dauda@yahoo.com](mailto:ilyasu.dauda@yahoo.com), +234 (0) 8063294756

### ABSTRACT

This study was designed to evaluate foetal wastage, associated economic loss and incidence of gross foetal and uterine abnormalities in goats (does) slaughtered at Gujungu slaughter house, Jigawa state, Nigeria. The studies were carried out within six months (January-June, 2021). A total of 1,899 does were slaughtered over the study period, out of which 642 (33.8 %) were pregnant and 62 % of the pregnancies were in the second trimester. Nine hundred and eighty-one (981) fetuses were recovered from the gravid does of which 32 % (n=315) were singletons while 64.6 % (n=634) were twins. Triplets and quadruplets fetuses constituted 2.5 % (n=24) and 0.8 % (n=8) of the fetuses wasted respectively. Incidence rates of gross foetal and uterine abnormalities were hydrometra (2.0 %); mucometra (1.2 %); pyometra (2.3%), foetal emphysema (0.05 %), foetal mummification (0.1 %) and foetal maceration (0.2%). The overall incidence rate of the foetal gross abnormalities recorded was 5.85 %. The mean monthly rate of foetal wastage (38%) and the foetal sex ratio (F 56.4: M 43.6) were used in the economic analysis for estimation of the foetal loss in monetary terms. The estimated loss was N6, 979,000 (\$18,145.4USD) for six months period or N13, 958,000 (\$36,290.8 USD) per annum, which is worrisome because such practice may impact negatively on the livelihood of the various stakeholders along goat value chain by drastically reducing the future productive herd at the study area. Adequate ante mortem inspection of does for detection of pregnancies and reinforcement of the legislation against the indiscriminate slaughter of gravid animals at the slaughterhouse should be enforced. Public education on proper management and breeding practices to reduce the incidence of diseases of infertility in does should be advocated.

**Keywords:** Does foetal wastage, financial loss, gross foetal, uterine abnormalities.

### INTRODUCTION

Goats are one of the oldest domesticated species of livestock and have been used for their milk, meat, hair and skin in all parts of the world (Coffey *et al.*, 2004). According to the Food and agricultural Organization (FAO) of the United Nations, there were an estimated 962 million goats in the world (FAO, 2014). Today, goats are among the most important livestock species in developing countries and they are of significant socio-economic, nutritional and cultural importance in small holder farming system (Onzima *et al.*,

2018). Goats are very important in alleviation of poverty and considered as “*poor man’s cow*” in rural communities and they provide job opportunities for women, children and a source of livelihood to the entire household (Abdelazeez 2010; Mahgoub *et al.*, 2012). Currently, goats are used as microcredit facility for empowerment of widows and rural women to enhance their livelihoods by Jigawa State government and Non-governmental development agencies within the state.

Small ruminants are widely distributed in rural, urban and peri-urban areas representing about 63.7 % of total grazing domestic animals in Nigeria (Gefu & Adu, 1982). The 2011 National Agricultural Sample Survey indicated that, Nigeria was endowed with an estimated population of 72.5 million goats (F.M.A.R.D; 2011). Livestock is a common household asset in almost all homes in Jigawa State with goats constituting about 4.11 million of the livestock population of the state (J.A.P, 2016).

Pregnancy wastage has been reported to account for about 20 - 25% of the total livestock production in Sub-Saharan Africa (Ngbede, 2012). Foetal wastage have been reported as common finding across abattoirs in Nigeria (Abdulkadir, 2008; Oduguwa *et al.*, 2013, Odeh *et al.*, 2015). The incidence has been observed in bovine and caprine species with a higher rate in goats (22.6 %) compared to bovine (4.5 %) according to Dunka *et al.* (2017).

Foetuses from pregnant animals slaughtered at Jigawa State abattoirs and slaughter houses are discovered daily but there is apparently dearth of information on goat foetal wastage at the abattoirs and slaughter houses around the State. Hence, this work was designed to evaluate foetal wastage and incidence of gross foetal and uterine abnormalities in goats at Gujungu slaughter house, Jigawa State. The study also translated the foetal wastage into economic term and proffered worthwhile advice that might mitigate the problems to ensure sustainability in livestock productivity and economic growth.

## MATERIALS AND METHOD

### STUDY LOCATION

The study was conducted at Gujungu slaughter house, Jigawa State, Nigeria. Jigawa State is situated in the North-Western geopolitical zone of Nigeria and lies between latitudes 11:00 °N to 13:00 °N and longitudes 8:00 °E to 10:15 °E. The climate presents a typical sub-tropical condition characterized by hot wet summer and cool dry winter with an average rainy season of 3-5 months (Zubairu *et al.*, 2022). The mean annual rainfall ranges from 574-852 mm; the mean maximum temperature ranges from 32-37 °C while the mean minimum temperature ranges from 18-22 °C (Zubairu *et al.*, 2022). The state lies within the three vegetation zones of Nigeria that is Guinea Savannah; Sudan Savannah and Sahel savannah. The state is endowed with vast grazing reserves suitable for livestock production (J.A.P, 2016).

### EXPERIMENTAL DESIGN

The target animal study population comprises of all the female goats (does) brought for slaughter at the study location. The predominant breeds slaughtered were Red Sokoto and Kano Brown. A survey on foetal wastage in

goats was carried out on daily basis for six consecutive months (January-June, 2021).

The uteri of all the slaughtered does were physically examined and incisions were made along the large curvature of the uterine bodies through the left and right uterine horns. The number, sex and gestational age of all the foetuses recovered from the gravid uteri were recorded according to the method described by Iliyasu *et al.*, (2015). Crown-rump length of the foetuses were measured using flexible metric-tape after stretching the foetuses and the foetuses gestational age were calculated by applying Richardson (1980) formula as outlined below:

$X = 2.1 (y + 17)$ ; where  $y$  = crown-rump length (CRL) in centimetre while  $X$  = foetal developmental age in days.

Gross abnormalities of the foetuses and the uteri during the study period were recorded and subjected to detailed examinations as described by others (Assey *et al.*, (1998), Arthur *et al.*, (2001), Sam *et al.*, (2019)). The incidence rates in respect to each of the pathologies observed were recorded.

### COMPUTATION OF THE ECONOMIC LOSS FOR THE FOETUSES

In the current study, the loss incurred from the foetal wastage was determined using the E.C.A. method (1988). Pregnancy wastage of 38 % was recorded a total of 1,899 does with 722 foetuses recovered from those that are pregnant. Hence, the expected mortality before attaining maturity is 40% of 722, which equal to 289 foetuses. Therefore, total number of foetuses that could have been born and attain culling age would be 433 (722 – 289) foetuses. The foetal sex ratio obtained in the current study was F 56: M 44 (approx.); hence from 433 foetuses, 242 would be females and 191 would be males. Each female goat was expected to cost N17, 000 while each male goat was expected to cost N15, 000 at culling age (Personal consultation with livestock marketers). From the foregoing, total monetary value for 242 does and 191 bucks would be = (N17, 000 x 242) + (N15, 000 x 191) = N6, 979, 000 (\$16,939 USD) over a period of six months or N13, 958,000 (\$33,878 USD) per annum at average exchange rate of 1 USD to 412 NGN.

### DATA ANALYSIS

Data generated were analyzed using descriptive statistics, tables, means, percentages and ratios.

### RESULTS

Table I shows number of slaughtered does, number of foetuses wasted, rate of foetal wastage as well as foetal types and sex ratio obtained in the current study. A total of 1,899 does were slaughtered of which 642 corresponding to 33.8 % of the does slaughtered were pregnant.

In this study, majority of the pregnancies encountered at slaughter (62%) were in the second trimester of their gestation as presented in Table II.

Table III shows incidence of gross foetal and uterine abnormalities encountered during the current study. Out of 1,899 does examined, 111 were found with different foetal

**Table III: Incidence of Gross Foetal and Uterine abnormalities encountered during the study period.**

Gross Abnormality	Number Observed	Incidence Rate (%)
Foetal Emphysema	1	0.05
Foetal Mummification	2	0.1
Foetal Maceration	3	0.2
Pyometra	44	2.3
Hydrometra	38	2.0
Mucometra	23	1.2
<b>Total</b>	<b>111</b>	<b>5.85</b>

and uterine gross abnormalities. Overall incidence rate of 5.85 % for gross foetal and uterine abnormalities were recorded. Foetal emphysema was recorded in only one goat

dystocia in ruminants. Foetal mummification and maceration were also recorded with incidence rates of 0.1% and 0.2 % respectively in the current study.

## DISCUSSION

The proportion of pregnant does slaughtered in the current study area agrees with the findings reported by Wosu & Dibua (1992) but is lower than that reported by Onyinye *et al.* (2018) and Sanusi *et al.* (2006). . Twins, triplets and quadruplets fetuses wastages were reported in the current study and this agrees with the findings of Onyinye *et al.* (2018) who reported incidence of twin fetuses in goats. However, Adebambo *et al.* (1994) and Arun *et al.* (2001) reported higher incidences of twin goats compared to what was obtained in the current study, the variation in the incidence of twins or multiple births in goats between studies may be attributed to differences in breed, genetic trait or breeding management practices and geographical location of the goats. Goats are prolific breeders with high rates of fecundity as reported from numerous countries by several scholars (Robertson *et al.* (2020). However, the ovulation

**Table I: Total number of Slaughtered Does, Rate of Foetal Wastage, Foetal Types and Foetal Sex Ratio recorded at Gujungu Slaughter house Jigawa State from January to July 2021**

\* (%) Figures in parenthesis represent percentages.

Key: NDS -.No. of Does Slaughtered, NDP – No. of Does Pregnant, NFW – No. of Foetuses Wasted, :% FW – Percentage Foetal Wastage.

Months	NDS	NDP	NFW	% FW	Foetal types				Foetal number and sex ratio		
					Singleton	Twins	Triplets	Quadruplets	Female	Male	Total
Jan.	379	129	196	40.1	63	65	1	0	112	84	196
Feb.	368	116	179	38.2	55	60	0	1	102	77	179
Mar.	305	103	158	39.0	50	52	0	1	91	67	158
Apr.	339	112	184	42.0	42	68	2	0	101	83	184
May	319	113	163	39.0	66	44	3	0	93	70	163
Jun.	307	69	101	30.0	39	28	2	0	54	47	101
<b>Total</b>	<b>1899</b>	<b>642</b>	<b>981</b>	-	<b>315</b>	<b>317</b>	<b>8</b>	<b>2</b>	<b>553</b>	<b>428</b>	<b>981</b>
	(100)	(33.8)*	(100)◇		(32)◇	(64.6)◇	(2.5)◇	(0.8)◇			(100)
<b>Mean monthly</b>	-	-	-	<b>38.0</b>					<b>Foetal sex ratio</b>	<b>56.4</b>	<b>43.6</b>

**Table II: Pregnancy Status of the Gravid Does Slaughtered Over Six Months Period of Study.**

Figures in bracket represent percentages.

Trimester	Duration (Days)	Number of Gravid Does
<b>First</b>	1 – 50	214 (33.4%)
<b>Second</b>	50 – 100	399 (62.0%)
<b>Third</b>	100 – 150	29 (4.6%)
<b>Total</b>	-	642

in the current study with a very low incidence rate of 0.05 %.

Foetal emphysema usually occurs as a result of complication during parturition which might resulted from protracted

rates set the upper limit to fecundity and several factors that influence the situation include age, health status, photoperiod, management, breed, parity, season, live weight and nutritional status (Robertson *et al.*, 2020).

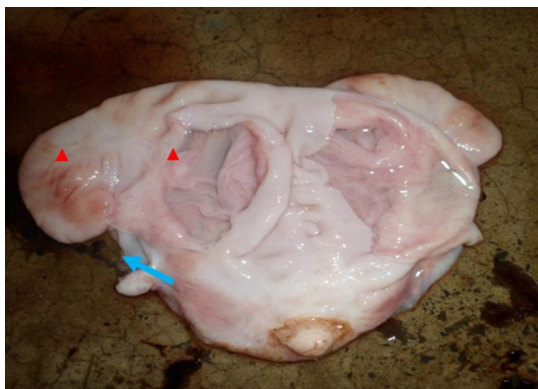
The foetal sex ratio obtained in the current study agrees with the ratio reported by Onyinye *et al.* (2018). The mean percentage of foetal wastage obtained in the current study is higher compared to the report presented by Chama *et al.* (2019) and Dunka *et al.* (2018). Similarly, it agrees with the findings reported by Sanusi *et al.* (2015) but it was lower compared to the findings reported by Garba *et al.* (2019).



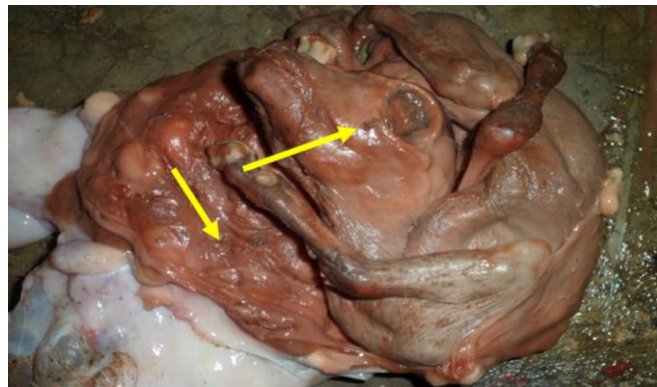
**Figure I:** Twenty nine (29) foetuses recovered in single day with different stages of gestation period at Gujungu slaughter house in Jigawa state Nigeria



**Figure II:** Pyometra. Note the yellow to brown pus exuding from the opened cervix and the incised right uterine horn (red arrow heads) and a corpus luteum on the left ovary (blue arrow).



**Figure III:** Hydrometra. Note the incised ventral aspect of the uterine body, showing a clear fluid in-utero (red arrow heads) and closed cervix blue arrow).



**Figure IV:** Hematic mummified foetus. (Yellow arrow) showing dehydrated foetal tissues membrane and absence of foetal fluid with chocolate coloured and viscous material covering a malformed foetus.



**Figure V:** Foetal Maceration. (Blue arrow) showing the soft tissues undergoing autolysis (red arrowhead) showing intact skeletal parts (ribs) in between forceps and scissor

The variation in the rate of foetal wastage in the current study disagrees with the findings reported by Robertson et al. (2020) and this might be due to differences in the number of animals examined within the study period, period and location of the study as well as lack of public awareness on the negative implications associated with slaughter of gravid goats and failure of the government to enforce the laws that goats and failure of the government to enforce the laws that

are against slaughter of gravid goats supported and approved by the legislation on the prohibition and indiscriminate slaughter of pregnant animals.

This indicates that, most of the foetuses wasted were as a result of failure to properly diagnose pregnancy at the point of slaughter as reported by Babatunde *et al.* (2011). Other factors might be related to the attitude of livestock owners as reported by Robertson *et al.* (2020). This might be attributed to the owners driven economic factors to sell-off their pregnant animals without consideration to their pregnancy status. While, in the current study a high foetal wastage were recorded at the second and third trimesters and this concur with the findings reported by Ndi *et al.* (1990) Mshellia *et al.* (2015), Adeyemi *et al.*, (2016). The slaughter of pregnant does at second and third trimesters at their active reproductive age might be attributed to the high demand with special preference for big sized goats and good market price irrespective of their pregnancies status as reported by Onyinye *et al.* (2018).

In does, foetal mummification is uncommon and is usually associated with *Toxoplasma*, *chlamydothelium*, border disease and *coxiella burnetii* infections as reported by (Edmondson, 2012). The low incidence of foetal mummification might

help and explain the scarcity of information in the recent literatures as reported by (Rejean, 2015) while foetal maceration is common in cattle and few were also reported in goat (Rupali *et al.*, 2016).

The incidence rate of hydrometra and mucometra in the current study is in agreement with the findings of earlier studies (Hasselink (1993), Wittek *et al.* (1998), Batista *et al.* (2000)). Higher incidence rate of hydrometra and mucometra was also reported by Moraes *et al.* (2007). However, Garba *et al.* (2019) reported a lower incidence rate for hydrometra in Red Sokoto goats which agree with the incidence rate of hydrometra obtained in the current study. However, the incidence rate for mucometra in the current study is lower than the mucometra reported by Garba *et al.* (2019), which might be due to variation in the period of study and the number of samples examined. Incidence rate of pyometra obtained in this study also concurred with the report of Garba *et al.* (2019). The overall incidence rate for gross foetal and uterine abnormalities recorded in the present study is higher and indicated that such abnormalities might have direct impact on reproduction performance, particularly in aspect of reduced fertility rate which might led to reproductive failure and infertility in the affected animals, this is in accord with the findings reported by Garba *et al.* (2019).

The current study revealed a total loss of 433 normal fetuses from the pregnant does slaughtered and implies a retardation in the growth of the future productive herd as well as financial loss to the tune of N6, 979,000 (\$18,145.4 USD) in six months or an annual loss of N13, 958,000 (\$36,290.8USD). However, in a previous study, Iliyasu *et al.* (2015) reported a lower economic loss due to foetal wastage, this might be due to different location, seasons and shorter study period of only three months as compared to the six months period in the current study.

## CONCLUSION

In conclusion, adequate training of animal attendant and ante mortem inspection facilities should be provided to veterinarians in the abattoir and slaughter house for efficient detection of pregnancies in does to avert huge foetal wastage. Reinforcement of the legislation against indiscriminate slaughter of gravid animals and public education on the economic implications and risk of food security, as well as challenges involve with increase herd size that might be posed by slaughter of gravid animals, this advocacy is highly recommended in our society.

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## CONFLICTS OF INTEREST

The authors declare no conflicts of interest.

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