

# Bovine fetal wastages in Nsukka Nigeria: prevalence, causes and public health implications

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## Summary

Slaughter of pregnant animals for meat is unethical, counterproductive and enhances zoonotic disease spread. This study determined the prevalence and reasons for slaughtering pregnant cows (SPCs) for meat. Pregnancy status of cows slaughtered was determined by evisceration and longitudinal incision of the uterus for presence of fetus. Closed-ended questionnaire was used to elicit information on causes of SPCs and disposal of eviscerated fetuses. Of the 851 cows slaughtered, 17.4% (148/851) were pregnant. Of the 148 pregnant cows, 87 (58.8) were slaughtered during dry season while 43.2% (64/148) of the recovered fetuses were in their third trimester. Reasons adduced for SPCs by the participants in the questionnaire were: ignorance of the animals' pregnancy status, 69.7% (n = 119), high demand for beef, 61.3% (n = 148), buyers preference for large-sized animals, 47.9% (n = 148), economic hardship, 52.1% (n = 148) and disease conditions, 42.9% (n = 148). Fetuses or uterine contents were sold for human consumption, 17.6% (n = 119) preparation of dog food, 27.7% (n = 119) or disposed by open refuse dump method, 54.6% (n = 119). The 17.4% SPCs prevalence is unacceptably high. This warrants ante-mortem pregnancy diagnosis in the slaughterhouses and strict implementation of the Animal Welfare Act (Meat Edict of 1968) to conserve livestock production and limit animal cruelty and the spread of zoonoses.

## Introduction

Slaughter of pregnant female animals (PFAs) for meat is unethical, threatens food security and connotes animal cruelty (Njoga *et al.* 2019). It is counterproductive also, considering the monumental losses in revenue and livestock resources thereof. Slaughter of pregnant cows (SPCs) does not just depopulate productive female animals but represents deletion of the future herd through the consequential fetal wastages. This practice jeopardizes effort towards achieving food security and self-sufficiency in provision of edible animal protein, especially in developing countries. It may also lead to introduction of exotic zoonoses, through meat importation, as a result of deficit in animal protein due herd depletion.

Diminution of animal protein is a major public

health problem associated with slaughter of PFAs in developing countries. Animal protein crisis may ensue through unwarranted off takes from the national herd, without replacement, as epitomized in SPCs or via deletion of future herd by the resultant decrease in calf yield. Although SPCs and the health and economic problems thereof are preventable, it is regrettable that this practice has persisted over the years in Nigeria where demand for edible animal products incidentally supersedes the supply (Njoga *et al.* 2018a).

Apart from the reduction in availability of animal protein, SPCs enhances dissemination of zoonotic pathogens, especially in the tropical climate, where favourable conditions for pathogens' survival abound (Okoli *et al.* 2018, Ajibo *et al.* 2020). *Brucella*, *Listeria* and zoonotic *Staphylococcus* species are transmissible to humans via wound contamination

during fetal evisceration or processing of slaughtered gravid animals (Ekere *et al.* 2018, Njoga *et al.* 2018b). Besides, slaughter or processing of pregnant animals infected with zoonotic pathogen may result in contamination of the meat or the environment, for onward transmission to humans; thereby facilitating the cycle of zoonotic infections between man, animals and the environment.

In order to curtail zoonoses and improve animal welfare, slaughter of PFAs is prohibited in Nigeria through the Meat Edict of 1968. The Act forbids to slaughter gravid animals except for emergency to relieve animal suffering, as recommended by veterinarians. However, reports show that fetal wastage due to slaughter of PFAs has continued over the years in some parts of the country (Cadmus and Adesokan 2010, Mishelia *et al.* 2015, Odeh *et al.* 2015, Iliyasu *et al.* 2017, Okorie-kanu *et al.* 2018). The immediate cause(s) of this menace have largely remained elusive but may be associated with the upsurge in demand for edible animal products in Nigeria due to the fast growing human population, currently estimated at 202 million at 2.63% annual growth rate occurring in the country (Abonyi and Njoga 2019).

Since SPCs counteracts the growth of the national herd, and the only available report on SPCs in Southeast Nigeria was dated back to three decades ago (Wosu 1988), it is imperative to determine the current status of SPCs in this region, and also to unravel the drivers underpinning this unethical practice. This will highlight the public health and economic consequences thereof, and proffer cost-effective solutions against this problem.

## Materials and methods

### Data collection

The study location, Nsukka, Southeast Nigeria, has already been described by Nwanta and colleagues (Nwanta *et al.* 2011). The study adopted a cross-sectional survey design to determine the prevalence and causes of SPCs in the selected area. Three major slaughterhouses in the study area were visited weekly, for six months, (three month during dry season and another three months during wet season) for data collection. Pregnancy status of cows slaughtered was ascertained by visual inspection of the uterine horns, for presence or absence of fetus after evisceration and longitudinal incision of the organ.

The ages of the dams were estimated by dentition method (Pace and Wakeman, 2003). For the fetuses, ageing was done by crown-rump length measurement (Odeh *et al.* 2015) while sex was

determined by visual examination of the external genitalia at the inguinal region or below the base of the tail. Thereafter, the gestational age of the recovered fetuses were categorized as first (< 90 days), second (90-180 days) or third (> 180 days) trimester. Structured and pretested open-ended questionnaire was used to elicit information on possible causes of SPCs, and method of disposal of eviscerated fetuses or gravid uterine contents, from 119 randomly selected slaughterhouse workers.

### Data analysis

Information obtained from the study were collated, analyzed and presented in tables. Fishers' exact test was used to determine whether there is significant association ( $p \leq 0.05$ ) between SPCs and seasons, age, breed, months of the year and slaughterhouse locations. The statistic was performed at 5% probability level using GraphPad® Prism software version 6.04 (GraphPad Inc., San Diego, California, USA).

## Results

### Causes of slaughter of pregnant cows

Reasons adduced for slaughter of gravid cows are presented in Table I. Some of the causes for SPCs and proportion of the respondents were: ignorance of the animals' pregnancy status 69.7% (83/119), high demand for beef 61.3% (73/148), buyers preference for large-sized animals 47.9% (57/148), feed scarcity during dry seasons 26.9% (32/148), economic hardship 52.1% (62/148) and disease conditions 42.9% (51/148).

### Distribution of pregnant cows slaughtered

Results on age, season and breed distribution of pregnant cows slaughtered for meat are shown in

**Table I.** Reasons for sale or slaughter of pregnant cows for meat among abattoir workers ( $n = 119$ ) in Southeast Nigeria.

Reasons	Number (%) of respondents		
	Yes	No	No response
High demand for beef	73 (61.3)	21 (17.6)	25 (21.0)
Economic hardship	62 (52.1)	57 (47.9)	0
Ignorance of the pregnancy status of the animal	83 (69.7)	32 (26.9)	4 (3.4)
Preference for pregnant cows because of size	57 (47.9)	46 (38.7)	16 (13.4)
Feed scarcity during dry seasons	32 (26.9)	87 (73.1)	0
Disease conditions	51 (42.9)	42 (35.3)	26 (21.8)

**Table II.** Age, season and breed distribution of pregnant cows ( $n = 148$ ) slaughtered in Southeast Nigeria.

Variables	Number (%) of cows slaughtered	Number (%) of pregnant cows slaughtered	Prevalence	P-value
<b>Age</b>				
< 4 years	126 (14.8)	30 (23.8)	20.3	0.029*
4-8 years	498 (58.5)	89 (17.8)	60.1	
> 8 years	227 (26.7)	29 (12.8)	19.6	
<b>Season</b>				
Wet	418 (49.1)	61 (14.6)	41.2	0.038*
Dry	433 (50.9)	87 (20.1)	58.8	
<b>Breed</b>				
White Fulani	621 (72.9)	119 (19.2)	80.4	0.149
Sokoto gudali	130 (15.3)	18 (13.8)	12.2	
Red bororo	63 (7.4)	7 (11.1)	4.7	
Mixed breeds	37 (4.3)	4 (10.8)	2.7	

\*Significant statistical association ( $P \leq 0.05$ ), Fisher's exact test.

Table II while the spatial and temporal distribution of pregnant cows slaughtered are presented in Table III. Majority of the slaughtered pregnant cows (60.1%) were in their active reproductive age (4-8 years). About 59% (87/148) of the pregnant animals were slaughtered during the dry season while 80.4% (119/148) of the SPCs were of the White Fulani breed. Similarly, highest prevalence of the slaughter (34.5%) was recorded in December while 38.5% (57/148) of the pregnant animals were slaughtered at Akwata slaughterhouse, located in Enugu State, Nigeria.

In addition, 55.4% (82/148) of fetuses recovered were male while 22.3% (33/148), 34.5% (51/148) and 43.2% (64/148) were in their first, second and third trimester, respectively (Table IV). Significant association ( $p \leq 0.05$ ) existed between SPCs and age ( $p = 0.029$ ) and season ( $p = 0.038$ ). In the same vein, there was significant association ( $p \leq 0.05$ ) between SPCs and months of the year, but no association was evidenced between SPCs and slaughterhouse location ( $p = 0.406$ ).

**Table IV.** Age and sex distribution of fetuses ( $n = 148$ ) recovered from pregnant cows slaughtered in Southeast Nigeria.

Variables	Number (%) of fetuses
<b>AGE</b>	
First trimester	33 (22.3)
Second trimester	51 (34.5)
Third trimester	64 (43.2)
<b>SEX</b>	
Male	82 (55.4)
Female	66 (44.5)

**Table III.** Spatial and temporal distribution of pregnant cows ( $n = 148$ ) slaughtered in major slaughterhouses in Southeast Nigeria

Variables	Number (%) of cows slaughtered	Number (%) of pregnant cows slaughtered	Prevalence	P-value
<b>Months</b>				
December	197 (23.1)	51 (25.9)	34.5	0.021*
January	157 (18.4)	24 (15.3)	16.2	
February	129 (15.2)	21 (16.3)	14.2	
July	118 (13.9)	17 (14.4)	11.5	
August	121 (14.2)	16 (13.2)	10.8	
September	129 (15.2)	19 (14.7)	12.8	
<b>Slaughter locations</b>				
Enugu	327 (38.4)	57 (17.4)	38.5	0.406
Nsukka	315 (37.0)	49 (15.6)	33.1	
Awka	209 (24.6)	42 (20.1)	28.4	

\*Significant statistical association ( $P \leq 0.05$ ), Fisher's exact test.

## Disposal of eviscerated fetuses

Eviscerated fetuses or uterine contents were sold for human consumption 17.6% (21/119), preparation of dog food 27.7% (33/119) or disposed by open refuse dump method 54.6% (65/119). Likewise, 23.5% (28/119) of the slaughterhouse surveyed workers sold fetuses or afterbirth materials for feeding of pigs or fishes (Table V). Only 5.9% (7/119) and 3.4% (4/119) of the respondents disposed the materials by burial and incineration, respectively (Table V).

## Discussion

Slaughter of 17.4% pregnant cows for meat is unacceptably high. This is probably due to the average annual cattle growth rate (1.85%) (Dunka et al. 2017) which is too slow to cope with the beef and dairy needs of over 200 million Nigerians with a population growth rate of 2.63% per annum (Njoga and Abonyi 2019). Slaughter of pregnant females creates multiple problems including unwarranted

**Table V.** Method of disposal of eviscerated fetuses among abattoir workers ( $n = 119$ ) surveyed in Southeast Nigeria.

Method of fetus disposal*	Number (%) of YES respondents
Sold fetuses for human consumption	21 (17.6)
Sold fetuses for preparation of dog food	33 (27.7)
Sold eviscerated fetus for feeding of fishes or pigs	28 (23.5)
Dumped unsold fetus or gravid uterine contents in municipal refuse dump	65 (54.6)
Incinerated unsold fetus or gravid uterine tissues	4 (3.4)
Buried unsold fetus or gravid uterine contents	7 (5.9)

\*Many respondents disposed fetuses by more than one method.

offtakes from the already depopulated national herd, as well as deletion of the future herd, through the consequent foetal wastages.

Given that most developing countries are yet to achieve self-sufficiency in beef production (FAO 2013), it is unacceptable to imagine the colossal loss of tons of beef that would have accrued if the foetuses were born alive and raised to maturity. This translates to loss of about 20 tons of beef (based on 52% carcass yield and average maturity live weight of 260 kg), in only one of the six geopolitical zones of the country, in just six months. This avoidable loss is a major setback to food security, in a country where meat supply grossly lags behind the demand (Njoga *et al.* 2018b), and protein malnutrition is glaring, especially in rural areas.

Apart from the losses and the inherent economic wastages, SPCs facilities transmission and spread of zoonotic pathogens inhabiting the reproductive tract of cows. Contamination of processed meat and infection of the slaughterhouse workers during carcass processing is almost inevitable, considering the fact that slaughterhouse workers in the study area usually do not wear personal protective equipment during routine operations (Ekere *et al.* 2018, Njoga *et al.* 2018a). Additionally, infection of food animals grazing around abattoir environment contaminated with zoonotic organisms, for onward transmission to humans, via the food chain is most probable. These underscore the need to curtail SPCs to curb the possible cycle of zoonotic transmission inherent in the practice.

Lack of man-power and proficiency in pregnancy diagnosis among slaughterhouses workers, may have contributed to high rate of SPCs being reported (Fayemi and Muchenje 2013). In Nigeria, the local and state governments have the responsibility to oversee and regulate the operations of slaughterhouses but most of these authorities have transferred this oversight and regulatory functions to privately owned organizations. As a result, ante-mortem and post-mortem inspections have been reduced to mere collection of revenue per slaughtered animal. As a cost saving strategy, veterinarians who by training are competent on pregnancy and disease diagnosis in animals, are hardly employed in slaughterhouses nowadays by the new owners. These may have given rise to indiscriminate slaughter of gravid cows, including those in their last stage of gestation.

Slaughter of gravid females and the resultant foetal wastages are usually higher during the dry

season or soon afterwards. Significant loss of body condition, rampant during this period because of drought-related food and water scarcity, usually compels livestock owners to salvage their animals by selling them off. Additionally, demand for meat is usually uttermost during the dry seasons due to socio-cultural and religious celebrations. For economic reasons, some farmers usually sell some of their animals, including females, irrespective of their pregnancy status during this period. These may explain the high prevalence of SPCs noted during the dry season, particularly in December, when drought is at peak and festivities abound.

Slaughtering of pregnant animals in their second (34.5%) and third trimesters (43.2%), as revealed in this study, is worrisome as pregnancies at these stages can easily be detected, even by visual assessment. This finding is in tandem with that of Wosu (Wosu 1988) in which 74% of pregnant cows slaughtered were in their second or third trimesters. This destructive practice does not only worsen the already precarious animal protein shortfall in the country, but also threatens the development of its livestock industry through excessive offtakes and loss of good genetics in the future herds (Fayemi and Muchenje 2013).

The SPCs for meat is unprofitable in all ramifications. Farmers, who may have erroneously culled their cows for infertility reasons, probably due to poor proficiency in pregnancy detection, are at loss. The butchers and beef sellers are equally at loss; as pregnant animals, especially those in late stage of pregnancy, yield less meat than the non-pregnant ones (Wythes *et al.* 1990, Okorie-kanu *et al.* 2018). The quality of meat from pregnant animals is doubtful. Meats sourced from pregnant animals are watery, have high PH and peak shear force values, poor eye appeal and also smells and tastes abnormal due to high progesterone tissue level (Wythes *et al.* 1990).

Therefore, SPCs for meat should be prevented to grow the national herd size and limit spread of important livestock and zoonotic diseases. Since veterinarians are proficiently trained on pregnancy and disease detection in animals to forestall rampant slaughter of gravid animals for meat, they should be engaged and kept in the realm of affairs in the day to day running of slaughterhouses in the Southeast region. There is a need to step up animal welfare via strict implementation of the provisions of the Meat Edict of 1968, which may warrant incorporation of pregnancy diagnosis in ante-mortem inspection in slaughterhouses in Southeast Nigeria.

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