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Prevalence, Gestational Age, and Determinants of Pregnant Cattle Slaughter at the Techiman Abattoir, Ghana

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ABSTRACT
The slaughter of pregnant cattle raises moral and ethical questions regarding animal welfare and has significant implications for livestock productivity and economic sustainability. This study evaluates the prevalence of pregnant cattle slaughtered in Techiman, as well as the gestational age and reasons for the slaughter. Data on the overall number of cattle slaughtered, the number of bulls slaughtered, the number of cows slaughtered, and the number of pregnant cattle slaughtered were collected daily for three months at the slaughterhouse. A structured questionnaire was used to assess information on the demographics of the farmers, butchers, and traders, as well as the reasons behind the slaughter of pregnant cattle. A total of 3,963 cattle were slaughtered, of which 1,652 were female, and 23% (381) of the females were pregnant. About 63% (239) of pregnant cattle were in their first trimester, 24% (93) in the second trimester and 13% (49) in the third trimester. Pregnant cattle were mostly slaughtered because of lack of awareness of pregnancy status, economic reasons, health-related issues, and management decisions. Laws should be enacted in Ghana to prevent the slaughter of pregnant cattle, especially from the second to third trimesters. At the farmer level, training on early pregnancy detection and access to pregnancy detection kits would help prevent the unintended slaughter of pregnant cattle.

Keywords: *Cattle; Pregnant; Prevalence; Gestation age; Slaughter*

INTRODUCTION
Livestock are valuable resources that contribute to both the nutritional status and economic well-being of their owners, especially in Africa. Cattle serve a variety of purposes in many African nations, including draught power and the production of manure, milk, and meat (Raimi et al., 2017). Cattle are one of the main sources of animal protein for the public although disease and poor nutrition often constrain production. According to Statista, approximately 34.5 million people are living in Ghana, making it very challenging to meet national protein demand with animal protein without importing live animals, meat and meat products from external sources. The main barriers to the promotion of large-scale livestock holdings in Ghana are inadequate feed, imbalanced feeding, high disease prevalence, high newborn mortality, poor economic conditions, climate, inappropriate breeding and husbandry practices (Raimi et al., 2017). These obstacles are felt more keenly by Ghana's resource-poor traditional farmers in the north, who mostly rely on cattle for their subsistence (Atawalna et al., 2013).

Considering the constant need for animal protein, which is exacerbated by poverty, illiteracy, and population increase, most farmers often sell

off animals without taking into account the reproductive status of the animals, particularly breeding stock and pregnant animals (Atawalna et al., 2013). Reproduction is a vital component of the production cycle that produces dairy milk and meat. This produces calves for the production of veal and beef in the case of beef production, lactation for the cow, replacement heifers, and calves for the production of veal in the case of dairy production (Nielsen et al., 2019). Occasionally, pregnant animals are slaughtered, which affects the economic returns and productivity of the herd. Developing methods to improve animal welfare and economic outcomes in the cattle sector requires an understanding of the prevalence and causes of this practice. It is important to regularly assess data regarding the breed, weight, and reproductive state of animals that are intended for slaughter to prevent the unnecessary slaughtering of fertile females (Raimi et al., 2017).

Cattle have a gestation period of approximately 281 days. During this time, the animal may become prone to illness, trauma, or other unanticipated circumstances, which may influence a farmer to slaughter the animal even if they would not usually slaughter pregnant cattle (Nielsen et al., 2019). Previous studies have reported a prevalence of 26% of pregnant cattle slaughtered was recorded in the United States before 1954, and in the United Kingdom, a prevalence of 30%, 10%, 23%, and 23% of pregnant cattle slaughtered were recorded between 1959 and 1961, before 1970, in 1974–1975, and 1991, respectively (Nielsen et al., 2019). Additionally, a study in Australia estimated a prevalence of 63% of pregnant heifers and cows slaughtered among 7495 extensively farmed beef cattle (Nielsen et al., 2019).

Pregnant cattle slaughter raises serious animal welfare concerns because the process can be more distressing and inhumane. It is unethical to slaughter pregnant animals because it reduces herd growth potential and lowers national herd replacement rates (Kashoma & Luziga, 2023). Concerns have been raised regarding the ability of fetuses to experience pain or other negative effects based on hormone values, behaviour, heart rate, and electroencephalograms in the last trimester of gestation (Nielsen et al., 2019). It also has implications for food safety and quality because the presence of fetuses can affect meat inspection and processing standards. In the European Union, it is forbidden to transport pregnant cattle after 90% of the gestation period has passed for reasons related to animal welfare (Zitterer & Paulsen, 2021). As of September 1st, 2017, Germany forbade the slaughter of cattle during the final third of their gestation, unless there were medical reasons (Zitterer & Paulsen, 2021). There is no clear prohibition on the slaughter of pregnant cattle after a specific gestation period across the European Union (Zitterer & Paulsen, 2021)

Additionally, the slaughtering of pregnant cattle aids in the spread of zoonotic infections by contaminating the meat, surroundings, or workers in the abattoir through exposure during the processing of gravid animals. These pathogens include Brucella, Listeria, and zoonotic Staphylococcus species (Njoga et al., 2021).

A thorough antemortem check can help identify or eliminate unfit animals or pregnant cattle; however, this is not the case in most Ghanaian abattoirs, such as the Techiman slaughterhouse. Anecdotal data and preliminary observations point to a significant number of pregnant cattle being slaughtered at the Techiman slaughterhouse. Nevertheless, there is limited information regarding the frequency of this activity, the gestational ages of the fetuses that are slaughtered, and the rationale behind it.

Reducing the number of pregnant cattle that are slaughtered can help implement more sustainable methods for managing livestock. Farmers can boost herd size and productivity by holding onto pregnant cattle, which promotes economic stability and food security.

This study evaluates the prevalence of pregnant cattle slaughtered in Techiman, as well as the gestational age and reasons for the slaughter. The data from this study will help to generate guidelines for future policy creation and strategic action plans.

MATERIALS AND METHODS

Study Area and Study Population

The study was carried out at the abattoir in the Techiman Municipality, Bono-East Region of

Ghana. The study population includes all cattle brought for slaughter from various parts of the country within the stipulated time of this research, all butchers working at the Techiman slaughterhouse, and the traders or farmers who brought their cattle for slaughter during the study.

Study Design and Data Collection

A cross-sectional study design was used for the research design. All cattle brought for slaughter at the Techiman slaughterhouse, including both male and female cattle, were presented for slaughter from April to June 2024. Questionnaires were administered to farmers, butchers and traders to collect data on the reasons for the slaughter of pregnant cattle. Data on the total number of cattle slaughtered was taken daily for three months, from April to June 2024, to assess the prevalence. The total number of male and female cattle was taken as well as the number of pregnant cattle slaughtered. Data on reasons for the slaughter of pregnant cattle were collected with the use of a structured questionnaire. Sixty respondents, including thirty butchers, twenty traders and ten livestock farmers were randomly sampled and given the questionnaire to answer. The questionnaire was designed to elicit information on socio-demographics, reasons for the sale and slaughter of pregnant cows as well as awareness of ethical issues involved in cattle slaughter.

Foetal Age Assessment

Data on the slaughter of pregnant cattle were collected to calculate the prevalence; the fetus was retrieved and the crown-rump length was measured to calculate the gestational age of the fetuses.

Gestational age = $\left\{\left(\sqrt{CRL}+1\right)-1\right\}^2$ (Schnorr and Kressin, 2001).

The crown-rump length of the retrieved fetus was measured with the help of a tape measure. The gestational age of the fetuses was calculated using the equation by Schnorr and Kressin (2006) as shown below. The gestational age of the fetuses was then grouped into three trimesters; the first trimester comprises fetuses aged three (3) months and below, the second trimester includes fetuses aged between 3 months and 6 months and the third or last trimester includes fetuses greater than 6 months.

Data Analysis

Data collected by the survey questionnaires was analyzed by using SPSS version 22. The results were presented in tables and figures.

RESULTS

Socio-demographic Information

Of the 60 respondents, 50% are butchers, 33.3% are cattle traders and 16.7% represent cattle farmers. A majority (96.7%) of the respondents were males aged between 25 and 60 years. About 78.3 % of the population have some form of formal education while 21.7% have no formal education. Also, a majority (70%) of the respondents are Muslims while Christians represent 30%.

Number of cattle slaughtered during the study period

A total number of 3,963 cattle were slaughtered during the study period, of which 58% (2,311) were males and 42% (1,652) were female (Table 1). Of the female cattle slaughtered, 23% (381)

Table 1: Data showing the total number of cattle slaughtered, the total number of male cattle slaughtered, the total number of cows and the total number of pregnant cattle slaughtered

Month	Number of Cattle Slaughtered	Number of Male Cattle Slaughtered	Number of Cows Slaughtered	Number of pregnant Cows Slaughtered
April	1,256	722	534	151
May	1,331	768	563	128
June	1,376	821	555	102
Total	3,963	2,311	1,652	381

Table 2: Table showing the prevalence of pregnant cattle slaughtered

Months	Number of Cows slaughtered	Number of pregnant cattle slaughtered	Prevalence of pregnant cattle slaughtered	Percentage (%)
April	534	151	0.28	28
May	563	128	0.23	23
June	555	102	0.18	18
Total	1652	381	0.23	23

were pregnant which represents 9.6% of the total number of cattle slaughtered.

Prevalence of pregnant cattle slaughtered

Of the 1,652 female cattle slaughtered, 381 were pregnant constituting a prevalence of 0.23 (Table 2). For April, 534 females were slaughtered, of which 128 were pregnant representing a prevalence of 0.28. A prevalence of 0.23 and 0.8 was recorded for May and June respectively.

Gestational age of fetus

The gestational age was grouped into three, first trimester (≤3 months), second trimester, (>3–6 months), and third trimester (>6–9 months). A total of 381 fetuses were retrieved from the pregnant cattle, out of these, 239 were in the first trimester, 93 in the second trimester and 49 in the third trimester, representing 63%, 24% and 13% respectively (Table 3). In April, 151 fetuses were retrieved, 88 in the first trimester, 40 in the second trimester and 23 in the last or third trimester. In May, a total of 128 fetuses were retrieved, 83 in the first trimester, 29 in the second trimester, 16 in the third trimester in June, 68 fetuses were in the first trimester, 24 in the second trimester and 10 in the third trimester for a total of 102 fetuses.

Prevalence of pregnant cattle slaughtered according to stage of pregnancy

The prevalence of pregnant cattle slaughtered in their first trimester was 63%, 24% in their second trimester and 13% in the third trimester (Table 4). Monthly, a total of 151 pregnant cattle were slaughtered in April, 58, 27 and 15% were slaughtered in their first, second and third trimester respectively. In May, 65, 23 and 12% of pregnant cattle were slaughtered in their first, second and third trimester respectively. Similar numbers were recorded in June where 67, 23 and 10% of pregnant cattle were slaughtered in their first, second and third trimester respectively.

Reasons for slaughter of pregnant cattle

Reasons for the slaughter of pregnant cattle were grouped into; Didn't know, health issues, economic reasons, and management decisions. The results revealed that out of the 60, 45% of the respondents admitted they sent pregnant cattle for slaughter because they didn't know, 26.7% reported that it was due to economic reasons, 18.3 reported health issues, and 18.3% reported management decisions as a reason (Table 5). For health reasons, 55% reported that the cattle were diseased, 16.7% reported horn butting, and

Table 3: Data on pregnant cattle slaughtered according to their various trimesters

Month/ Trimester	First trimester (1 -3 months)	Second trimester (>3 – 6 months)	Third trimester (>6 – 9 months)	Total
April	88	40	23	151
May	83	29	16	128
June	68	24	10	102
Total	239	93	49	381

Table 4: Prevalence of pregnant cattle slaughtered according to the gestational age of the fetuses

Month	Total	1st Trimester (1-3 months)	Prevalence (%)	2nd Trimester (>3–6 months)	Prevalence (%)	3rd Trimester (>6– 9 months)	Prevalence (%)
April	151	88	58	40	27	23	15
May	128	83	65	29	23	16	12
June	102	68	67	24	23	10	10
Total	381	239	63	93	24	49	13

28.3% reported reproductive issues such as suspected bareness. Of the economic reasons for the slaughter of pregnant cattle, 66.7% reported increased market demand for beef, and 33.3% reported high cost of treatment of illness. The management decisions for the slaughter of pregnant cattle were old age of cattle, 23.3% gave a reason as old age, while 33.3% reported increased market demand for beef.

Table 5: Reasons for Slaughter of Pregnant Cattle

Reason	Frequency	Percentage (%)
Didn't Know	27	45.0
Health Issues	11	18.3
Economic Reasons	16	26.7
Management Decision	6	10.0
Total	60	100.0

Ethical beliefs about the slaughter of pregnant cattle

Ethical belief on the slaughter of pregnant cattle was grouped into ethical and unethical. About 23.3 % (14) of the respondents believe it is ethical to slaughter pregnant cattle and forty-six believe it is unethical to slaughter pregnant cattle representing 76.7%.

Table 6: Ethical Belief about the slaughter of pregnant cattle

Ethical Belief	Frequency	Percentage (%)
Unethical	46	76.7
Ethical	14	23.3
Total	60	100.0

DISCUSSION

Majority of the respondents were males with an age range between 25-40, this suggests the work is physically demanding and individuals in this age range often have a balance of youthful energy and practical experience. The majority of respondents being married or divorced implies that income from this occupation is crucial to catering for or supporting their families and which agrees with findings by Raimi et al. (2017). The predominance of Muslims among the butchers indicates that the halal method of slaughter is practiced in the abattoir in the Techiman municipality.

The overall prevalence of pregnant cattle slaughtered was 23%, similar to previous findings in Denmark in 2019 (Nielsen et al., 2019) and the United Kingdom in 1995 and 1997 (Zitterer & Paulsen, 2021). In contrast, a prevalence of <10% of pregnant cattle slaughtered was reported in Austria (2021), Germany (2006 & 2011), Italy (2006), Luxembourg (2006), Switzerland (2014) and Nigeria (1998) as reported by Zitterer & Paulsen (2021). This result is also higher than a study conducted in Nigeria, where for every 90 cattle slaughtered, 10 were pregnant (Raimi et al., 2017). Based on the average prevalence of 23% of pregnant cattle slaughtered, it is estimated that an average of 6,612 female cattle would be slaughtered per annum.

A prevalence of 23% indicates a significant proportion of pregnant cattle are being slaughtered, hence raise concerns about animal welfare and the potential for distress and suffering. Therefore, there is a need to enhance antemortem inspection at the slaughterhouse and pregnancy detection methods used to reduce the number of

pregnant cattle slaughtered. Slaughtering of pregnant cattle reduces the cattle population in the country and affects the revenue as well. When measures are put in place and the slaughter of pregnant cattle is reduced to its minimum, there will be a significant increase in cattle population in Techiman and Ghana as a whole, which would help reduce the importation of live cattle and cattle products into the country and therefore increasing our revenue. Pregnant cattle slaughter has been found to reduce daily milk production and income from selling fresh milk as a result of fetal wastage (Raimi et al., 2017).

The majority of the pregnant cattle slaughtered were in their first trimester and at this stage, pregnancy in cattle is often less visible and harder to detect, especially without proper checks and record keeping. The high percentage suggests that many of these cattle may have been slaughtered because their pregnancy was not known or detected. These results conflict with studies conducted in Denmark, which found a prevalence of 16% (Nielsen et al., 2019), 13.1% in Canada (1987), and 22.1% in the United Kingdom (1977) of pregnant cattle slaughtered during the first trimester (Zitterer & Paulsen, 2021). This could be due to improved record keeping, availability and access to pregnancy detection methods and better regulatory procedures in those areas. The 24% of all pregnant cattle slaughtered in their second trimester is higher than the 5% prevalence reported from research conducted in Denmark (Nielsen et al., 2019) but lower than the 67% reported in Nigeria, 50.9% in the United Kingdom 50.9% and 62.6% in Canada. The prevalence of 13% of pregnant cattle slaughtered in their third trimester found in this study is similar to what was reported by studies conducted in Austria (2021) by Zitterer & Paulsen (2021). However, the findings are inconsistent with research conducted in Germany (2006) which reported a higher (62%) of pregnant cattle slaughtered in the third trimester (Zitterer & Paulsen, 2021). This observation is surprising given that pregnancies in the third trimester are relatively easier to diagnose than those of the first trimester (Raimi et al., 2017). This indicates that there are very compelling reasons other than the inability to detect pregnancy that led to the slaughter of these pregnant cattle and because countries such as Germany have laws against the slaughter of pregnant cattle in their third trimester (Zitterer & Paulsen, 2021). This law should be enacted in Ghana to help prevent pregnant cattle from being slaughtered from the second to third trimester although this would require adequate premortem inspection by well-trained veterinary professionals. Apart from legislation, pregnancy detection practices or adequate training of those involved in cattle management could reduce the unintended slaughter of pregnant cattle.

Interestingly but not surprisingly, a majority (45%) sent cattle for slaughter because they didn't know, 26.7% were economic reasons, health issues and management decisions were 18.3% and 10% respectively. The slaughter of pregnant cattle out of ignorance of their pregnancy indicates that there is inadequate knowledge on how to determine pregnancy and a lack of good record keeping. The lack of good record keeping can be a result of the housing system used since most people practice the extensive system, free range and pastoralism. This justifies why most of the pregnant cattle that were slaughtered were in their first trimester. Also, 26.7% citing economic reasons highlights the financial pressures that influence slaughter decisions, possibly due to the need for immediate income or influence by external market forces. This reflects the economic reality that farmers prioritize immediate financial gain, responding to market opportunities when beef demand is high. This result is inconsistent with research conducted in Nigeria, where most of the pregnant cattle were slaughtered because of festivals or ceremonies (89.1%), poverty (6.3%) and disease (4.3%) as reported by Raimi et al. (2017). Also, the results differ from a study in Denmark that reported that most of the respondents (49%), sent pregnant cattle for slaughter because of reasons related to production, 48% were because of reasons related to health and only 3% were due to old age (Nielsen et al., 2019). Many of the respondents were aware of the ethical considerations related to the slaughter of pregnant cattle as most respondents believe it's unethical to slaughter pregnant cattle.

In conclusion, an overall prevalence of 23% of the 1,652 female cattle slaughtered were pregnant and most (63%) occurred in the first tri-

mester of pregnancy. Ignorance of the pregnancy status of the animals accounted for the major reason why pregnant cattle are slaughtered with economic reasons also contributing to the high percentage. Many of the respondents were aware of the ethical considerations related to the slaughter of pregnant cattle. Therefore, to reduce the number of pregnant cattle slaughtered, there is a need to enact laws in Ghana to prevent the slaughter of pregnant animals, especially those at the second to third-trimester stages. Additionally, training in early pregnancy detection kits should be made available to cattle farmers to prevent the unintended sale and slaughter of pregnant cattle.

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