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Economic Impact of Foetal Wastage and Maternal Slaughter among Sheep and Goats in Bahr El-Ghazal Region, South Sudan

Deng AJ[1], Jubara AS[2], Jaja LK[3], Ochi EB[4]
[1,2]*Department of Clinical Studies, College of Veterinary Science, University of Bahr EL-Ghazal, South Sudan.*
[3,4] *School of Veterinary Medicine, University of Juba, South Sudan.*

ABSTRACT: *Small ruminants play a great role in providing animal protein and enhancing livelihoods of pastoral and agro-pastoral communities in South Sudan. However, rampant maternal slaughter of pregnant animals culminates in foetal wastages and subsequent economic losses. A 7-month cross-sectional study was conducted to determine the economic impact of foetal wastage among slaughterer pregnant sheep and goats in Bahr El-Ghazal region, South Sudan. Of the 34,379 sheep and goats slaughtered, foetal wastages were investigated in 5,530 (42.32%) ewes and 10,524 (49.38%) does. Direct economic losses due to such wastages were estimated to be SSP 3,157,250 (equivalent to USD 13,155.21). Other financial losses due to maternal slaughter, offtake rate for milk, hides and skins revealed a sum of SSP 3,249,084.2 (equivalent to USD 13,537.86) totaling a cost of SSP 6,406,334.2 (equivalent to USD 26,693.07). Ostensibly, financial losses of maternal slaughter and foetal wastages are economically infeasible for sustainable development of sheep and goats in the region. Incorporation of veterinary legislations and provision of quality extension delivery services to all key stakeholders are needed for sustainable development of livestock sector in South Sudan.*

Keywords: *Maternal slaughter; Foetal wastage; Economic losses; Bahr El-Ghazal region.*

I. INTRODUCTION

Maternal slaughter of pregnant animals causes substantial economic impacts due to foetal wastages that endanger sustainable development of livestock worldwide [1]. In South Sudan livestock sector is a cornerstone for all key stakeholders incorporating in the veterinary services and livestock development [2]. The sector poses a great potential for domestic demands and a surplus for export in South Sudan [3]. Generally speaking, in African continent, foetal wastages are rampantly practised in a number of countries including South Sudan [4,5]. It has been reported that there is no variation in sexes of wasted foeti, but the wasted female ones appear to be more than males in cattle, sheep and goats [5]. In Nigeria, Zambia and Tanzania livestock diseases constitute the major factors contributing to sale of pregnant cows and heifers for slaughter [6,7].

Slaughter of pregnant animals has been outlawed for nearly four decades, but the practice remains unabated due to slowness in law enforcement associated with low levels of penalties [8]. In South Sudan, the undesirable effect on meat quality from a pregnant animal has never been questioned compared to other countries [9]. Hence, meat of a female slaughtered in late pregnancy has lower mean initial yield and peak force shear value of *longissimus dorsi* muscles. Furthermore, Mckiernan et al. [10] reveal that meat of pregnant animal is characterized by lower dressing percentage compared to non-pregnant animal, which is related to the size of the fetus, the uterus, embryonic tissues and fluids.

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Little or no attention has been received on the phenomenon of foetal wastage for the past few decades in the Sudan and South Sudan. Not surprisingly, the current economic burdens and the need of pastoral and agropastoral communities for money have contributed to high maternal slaughter with consequences of foetal wastage in Bahr El-Ghazal region [11]. Supposedly, it is unethical and contrary to rules and regulations of slaughter for the provision of wholesome meat. However, the greatest problems resulting from this practice are enormous potential economic losses and wastage of protein values [5].

Efforts have been made to mitigate the rampant, indiscriminate slaughter of pregnant animals. In the slaughter houses and slabs across the country, many feoti recovered from the slaughtered gravid females are thrown out with condemned organs [11]. No cross-sectional study has been conducted in Bahr El-Ghazal region to investigate economic losses due to foetal wastages among the pregnant animals. This study explores the direct economic losses due to foetal wastage among slaughtered sheep and goats in Bahr El-Ghazal region, South Sudan.

II. IMATERIALS AND METHODS

This study was conducted in two main purposively selected slaughterhouses/slabs in Warrap and Western Bahr El-Ghazal States, where livestock population was estimated at 11.6 million of small ruminants [12]. Of which a population of 13,068 sheep and 21,311 goats were slaughtered and investigated for seven months using cross-sectional survey.

Maternal slaughter and foetal wastage

Ante-mortem for pregnancy diagnosis was conducted visually through abdominal ballotement of sheep and goats. At post-mortem examination, number of uteri were recorded and inspected to check for the presence or absence of foeti. Prevalence of foetal wastages was calculated as follows:

$$\text{Prevalence of foetal wastage} = \frac{\text{Number of recovered foeti}}{\text{Number of pregnant animal slaughtered}} \times 100$$

Economic Impact of Foetal Losses

Indirect economic loss of fetal wastages was estimated based on the following equation:

$$\text{Foetal Wastages} = \text{Price of Animal in SSP} \times \text{Number of Foetal Wastage}$$

The estimate for sheep and goats was based on the sexes as follows:

a. Rams and Bucks =1,000 - 2,000 SSP; and

b. Ewes and Does = 1,200-2,500 SSP.

The exchange rate for USD during the study period was 1$=240 SSP

Ethical Considerations

Ethics and informed consents of local authority and the livestock owners were obtained prior to commencing the study. Ethical clearance was obtained from the Ministry of Agriculture and Forestry, Animal Resources and Fisheries, Warrap State, Bahr El-Ghazal region.

III. RESULTS

Tables 1 and 2 show a total of 696 sheep and 1,107 goats'foetal wastage and prevalence of 12.59 % and 10.52% foetal wastages in 13,068 sheep and 21,311 goats, respectively slaughtered in Wau and Kuajok towns, Bahr El-Ghazal region. The means of sheep maternal slaughter of 790 (42.94%) with 12.8% prevalence

rate of foetal wastage were revealed compared to relatively high 1,503.43 (49.19%) goats maternal slaughter and low mean prevalence of foetal wastages (9.84%).

Table 1. Maternal slaughter and Fetal Wastage among sheep in Bahr El-Ghazal region

Period/ Month	Frequency (Number) of Sheep Slaughtered	Frequency of Ewes Slaughtered	Maternal Slaughter (%)	Frequency of Wasted Foeti	Prevalence of Fetal Wastage (%)
January	991	471	47.53	112	23.78
February	1,151	535	46.48	18	3.36
March	2,523	1,093	43.32	71	6.50
April	1,529	623	40.75	62	9.95
May	2,251	1,034	45.93	176	17.02
June	2,190	804	36.71	115	14.30
July	2,433	970	39.87	142	14.63
Total	13,068	5,530	42.32	696	12.59
Mean	1,867.86	790	42.94	99.43	12.80
Mean ±SD	1,867.86±632.02	790±251.20	42.94±23.40	99.43±53.10	12.80±6.84

Table 2. Maternal slaughter and Fetal Wastage among goats in Bahr El-Ghazal region

Period/ Month	Frequency (Number) of Goats slaughtered	Frequency of Does Slaughtered	Maternal Slaughter (%)	Frequency of Wasted Foeti	Prevalence of Fetal Wastage (%)
January	2,783	1,543	55.44	184	11.92
February	2,303	848	36.82	104	12.26
March	4,139	1,915	46.27	212	11.07
April	2,831	1,514	53.48	124	8.19
May	3,054	1,671	54.72	186	11.13
June	2,945	1,375	46.69	136	4.62
July	3,256	1,658	50.92	161	9.71
Total	21, 311	10,524	49.38	1,107	10.52
Mean	3,044.43	1,503.43	49.19	158.14	9.84
Mean±SD	3,044.43±565.20	1,503.43±333.95	49.19±6.57	158.14±38.60	9.84±2.70

Tables 3 shows that male foetal wastages in sheep is relatively higher (1:0.97) than female ones compared to females which are higher than males in goats (1:1.12).

Table 3. Prevalence of Foetal Wastage by sex in Bahr El-Ghazal region

Animal species	Total Number of Female slaughtered	Sex of wasted foeti		Total Number of foetal wastages	Prevalence of total foetal wastages (%)	Male: Female Ratio
		Male	Female			
Sheep	5,530	342	354	696	12.59	1:0.97
Goats	10,524	586	521	1,107	10.52	1:1.12
Total	16,054	928	875	1,803	11.23	1:1.06
Mean	6,795.67	465.33	443	908.33	13.37	1:1.05

Financial losses due to foetal wastages

Tables 4 and 5 show that average financial losses incurred from female foetal wastages were higher compared to males. Moreover, losses from sheep foetal wastages were higher compared to goats.

Table 4. Estimated Direct Economic Losses due to foetal wastages in sheep and goats in Bahr El-Ghazal region.

Animal species	Animal sex	Total wasted foeti	Estimated Economic Losses (average amount)	
			SSP	USD
Sheep	Ewes	354	654,900	2,728.75
	Rams	342	513,000	2,137.5
Goats	Does	521	963,850	4,016.04
	Bucks	586	1,025,500	4,272.92
Total		1,803	3,157,250	13,155.21

Table 5. Estimates of Indirect Economic Losses due to other wastages (Off take) in sheep and goats in Bahr El-Ghazal region.

Variables	**Amount (SSP)**	**Amount (USD)**
Sale and slaughter	3,157,250	13,155.21
Losses from wasted skins	27,045	112.69
Losses from milk	64,789.2	269.96
Total	3,249,084.2	13,537.86

IV. DISCUSSIONS

Foetal wastages due to rampant maternal slaughter among small ruminants vary between sheep and goats in Bahr El-Ghazal region. Seemingly, such a variation could be explained by the customary and socio-cultural preferences of the inhabitants to animal species specificity. Furthermore, the current economic turmoil may have created socioeconomic pressures among the pastoral and agropastoral communities to sell and slaughter animals indiscriminately. Nonetheless, in Tanzania maternal slaughter was attributed to inaccessibility to pasture and water sources that had prompted the farmers to sell livestock to reduce and mitigate risks of losses during a harsh period [14]. It is evidenced that adult females including the pregnant ones have been exclusively exposed to sales during the dry season [15,16]. Therefore, there is indiscriminate slaughter of ruminants without considering animal's sex, age and pregnancy status that would eventually culminate to substantial economic loss.

This study reveals a slight discrepancy between female(does) and male(bucks) goats slaughtered. Ostensibly, males were slaughtered more than females in Nigeria [17]. In Bahr El-Ghazal region it has been revealed that both male and female goats were slaughtered more than sheep which usually depends on affordability of goats. The disparity might be associated with consumers' preference and taste besides the traditional and cultural differences. On the other hand, the higher prevalence of maternal slaughter in does

compared to ewes (female sheep) could pose a great danger to reproductive efficiency of the goats' population as more females are required for reproduction than males in Bahr El-Ghazal region. Furthermore, the act of slaughtering female animals is deterrent to animals' reproduction [18].

Despite more does were slaughtered (49.38%) than ewes (42.32%), the rate of twining seemed to be more in does than ewes and that some foeti might be missed and smuggled away from the abattoir without being detected. However, the MRF in cattle seems to be high compared to some reports in sheep and goats [19 - 22]. The disparities could be due to factors associated with dry season. This study has revealed lower Male to Female Ratio (MFR) for sheep and goats, which is not in line with the highest MFR of 5:1 and 6:1 in sheep and goats, respectively reported in Ghana [20] .It seems that in Ghana people may have more tendencies to rear sheep and goats compared to cattle in Bahr El-Ghazal region, South Sudan.

Ostensibly, lack of legislation and law enforcement, poor veterinary extension services, and inefficient pregnancy diagnosis are justifiable for indiscriminate slaughter. Moreover, livestock owners, butchers and livestock traders seem to be unaware of the impact of maternal slaughter, foetal wastages and the consumption of meat of pregnant animal, culminating in rampant slaughter of female or pregnant animals in South Sudan. These findings justify the magnitude of maternal slaughter and foetal wastages in this study which concurred with reports of some investigators [23,24]. Furthermore, the discrepancy may be due to very low level of literacy and exposure of the farmers to extension delivery services.

Nevertheless, the situation is incomparable to other countries where emergency slaughter may be an exceptional case that necessitates slaughter of pregnant animal [25-27]. Therefore, an official veterinarian must declare the fitness or unfitness of meat for human consumption following the post-mortem examination [28]. In USA, maternal slaughter is considered as cruelty to animal and culprits are fined [29,30], the guilty abattoir operator goes through a series of punishments which may end up by suspension or revocation for conviction of a crime on animal cruelty [31]. In Srilanka, a sum of Rs100,000. equivalent to USD 888.54 is paid as a fine for violating the revolutionary legislation on cruelty to animal [29]. Moreover, in Tanzania, the slaughter of pregnant cows is a violation of the provisions in Animal Welfare Act [30].

Livestock play a pivotal role in enhancing the livelihood of pastoralists and agro-pastoralists as well as farmers in South Sudan. Therefore, maternal slaughter and foetal wastages cause substantial economic losses and threats to sustainable development of livestock. Financial losses that would be accrued from female foeti at adulthood are more comparable to males which can be explicitly explained by the reproductive efficiency of female to deliver more offspring. In Bahr El-Ghazal region, financial losses resulting from cattle foetal wastages is higher compared to sheep and goats' foeti. This is possibly due to local consumers' preference to beef.

The estimated total financial losses (USD 26,693.07) incurred in Bahr El-Ghazal region concurred with a 3-month study period in Makurdi slaughter house [15]. In this study, the economic losses from sheep and goats wasted foeti (USD 13,155.21) are not enormous compared to USD 56,828.57 in a 10-year survey of pregnant cows in Minna slaughter house, Nigeria [18]. The variations in the study period, animal species, the magnitude of maternal slaughter and the wasted foeti could suggest this apparent disparity.

V. CONCLUSIONS

Maternal slaughter of the pregnant sheep and goats and the consequent foetal wastages are of high magnitude causing alarming and substantial economic losses in Bahr El-Ghazal region. Foeti of both sexes were recovered from the slaughtered females culminating in reproductive inefficiency and offtake. Enactment of veterinary legislations to limit the rampant slaughter of female animals is needed. Pregnancy diagnostic skills at ante-mortem inspection be strengthened to mitigate maternal slaughter and foetal wastages for sustainable development of livestock in South Sudan.

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