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Major Gross Reproductive Tract Abnormalities in Female Cattle Slaughtered at Sululta Slaughterhouse in Ethiopia

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Abstract: Female cattle reproductive tract abnormalities and pregnancy status were studied at Sululta town slaughterhouse. A total of 640 organs were collected, of which 22.3% (n=143) showed one or more gross reproductive tract abnormalities. Higher prevalence rate of atrophied and cystic ovaries, as well as ovarobursal adhesions were found and accounted for 7.7 3.3 and 2.5%, respectively. Breed and age significantly ($P<0.05$) affected the prevalence rates of these abnormalities. Of the 640 total female cattle reproductive tracts examined, 28.9% (n = 185) uterus were found pregnant, 66.6% (n = 426) were cycling ovarian activities. Of the cycling cows, 7.5% (n = 32) were pregnant. 65.4% of the fetuses were at early (<3 months), 30.3% were mid (3-6 Months) and the rest 4.3% were at late (>6 months) ages of pregnancies. In general, it can be concluded that atrophied ovaries, cystic ovaries and ovarobursal adhesions were the major reproductive abnormalities; and breed, age and body conditions were main factors influencing the prevalence rates of the abnormalities. The main reasons incriminated to sell female cattle were infertility, age, emergency economic needs, with frequencies of 33.3%, 15% and 13.3% respectively.

Key words: Cyclicity · Ovarian atrophy · Reproductive tract abnormalities

INTRODUCTION

Most of the third world countries are located in the tropics and productions of livestock resources are very important to their economies [1]. Cattle production is the main component of livestock production in sub-Saharan countries [2]. The total cattle population of Ethiopia is estimated to be 50.8 million. Out of this total cattle population, the female cattle constitute about 54.87 percent and the remaining 45.13 percent are male cattle [3]. However, the animal productivity is found to be lower than it should be [1] due to a number of constraints such as poor genetic potential, malnutrition, high disease incidence, thermal stress and poor management conditions [4 - 7].

Reproductive disorders have been found to be a major reason for decreased reproductive efficiency in cattle and consequently reproductive efficiency is the major determinant of lifetime productivity of cows [8]. Furthermore, reproductive abnormalities have resulted in lowered herd fertility [9-11]. The current level of reproductive performance in dairy herd is well below optimum [12]. Infertility among farm animals is one of the great economic problems, which confront the veterinarians. It is particularly widespread among dairy cattle and less important in beef breeds [4, 13, 14].

As female cattle are sources of milk and future herd expansion, their slaughter due to adverse economic problems, reduced reproductive efficiency or when they have diseases require attention [15]. Therefore, slaughterhouses have been used as the preferred sources for studying the pathological lesions of female cattle reproductive tracts, which determine the causes of infertility and/or sterility [16, 17].

There are differences in the incidences of gross reproductive tract abnormalities found in various areas. The incidences of the genital diseases, the amount of veterinary supervision and the critical appraisal of abnormalities by the person carrying out the survey affect findings as indicated by Al-Dahash and David [18]. The objectives of this study were: to determine the reproductive status of slaughtered female cattle and major reproductive gross abnormalities and to assess the livestock keepers and cattle traders view regarding the main reasons for selling female cattle in local market places.

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MATERIALS AND METHODS

Study Animals and Study Protocol: The study was conducted at Sululta slaughterhouse, which is part of the Sululta and Mulo districts, North Shewa zone of Oromia Regional state. A total of 640 (566 local boran and 74 holistin-boran cross bred) genital tracts of female cattle slaughtered at Sululta slaughterhouse were examined grossly for the investigation of status of reproductive tracts and macroscopic pathologies.

Ante Mortem Examination and Questionnaire Survey: General physical and clinical examinations were conducted before slaughters in female cattle, pregnancy diagnosis and gross abnormalities of the genital tracts were performed according to Roberts [13]. The ages of the animals were estimated on the basis of dentations according to De-Lahunta and Habel [19]. Body Condition Scoring (BCS) were considered as lean, medium and fat according to Nicholson and Butterworth [20]. A questionnaire based follow-up study was conducted to investigate the farmers and cattle traders view with respect to selling female cattle to be sent for slaughtering.

Postmortem Examination: The genital tracts were removed and closely inspected and palpated before any incision, there after the vagina and uterus were opened up to the uterotubal junction and examined [1, 21]. The presence and number of corpora albicantia replacing the corpus luteum of pregnancy are used to estimate the parity of the animals [13]. The gravid uterui were examined to determine the approximate age of the /fetus by using crown-rump length and other external features [4, 13, 15, 22-24] and the gestation ages were classified as early, mid and late.

Data Analysis: Data were analyzed using descriptive statistics and chi-square test. In all the cases, p-values less than 0.05 were considered as statistically significant.

RESULTS AND DISCUSSION

From the total 640 female cattle genitalia examined in the slaughterhouse, 22.3% (n = 143) were found with one or more abnormalities. Of the 21 different abnormalities observed, based on the anatomical classification, ovarian abnormalities were the prevalent ones accounting 14.5% with proportional frequency 57.4% as shown in Table 1. This is followed by uterine abnormalities (5.3%), oviductal and cervical vaginal abnormalities (2.2%) each and miscellaneous (1.1%). It is also noted that 73.8% of the non-cycling female cattle had no gross lesion in the reproductive tracts. Most of the abnormalities were more frequently encountered in cows than heifers.

This study indicates that there is a significant difference ($P<0.05$) between breeds and on the incidences of reproductive tract abnormalities in which it is higher in local breeds and also significant differences are observed among the different age groups at $P<0.005$ in which it is higher in advanced age and more productive cows.

The 22.34% overall incidence of macroscopic genital abnormalities found in the present study is in agreement with the various previous reports of 27.2% in Nekempte [25], the 26.3% in Assella [26], the 22% in Raya valley [11], the 23% in Bahirdar [27], the 29.2% in Jimma [28] and also similar to the 27.67% and 18.2% findings in Canada [24] and in Finland [16], respectively. However, it is lower than the reports of [29] in Awassa (33.3%), [30] in Addis Ababa (37%), [31] in Addis Ababa (34.3%) and [21] in Peru (41.1%) and higher than the reports of [1] in Tanzania (9%), [32] in Israel (13.5%), [33] in Nigeria (12.5%), [18] in England (10%) and [34] in Pennsylvania.

The variations are possibly due to differences in breed, sample size, geographical variation and feed; season of the year and reproductive health management the animals as indicated by Roine [16]. About 86% (n=123) of the total abnormalities being observed in parous cows clearly indicate that these animals were fertile initially but later developed infertility and/or sterility mainly attributed to improper or unskilled manipulation of genital tracts during parturition. The high incidence rate of 22.34% gross genital abnormalities found in crossbreds as compared to local is similar to the previous reports.

Owing to the occurrence of more than one abnormality in the same animal (23 animals), the summarized percentages in the table does not always match with the number of animals.

Ovarian Abnormalities: There is a significant difference ($P< 0.005$) among different body conditions in the incidences of atrophied ovaries, which is higher in poor body conditioned animals and is inline with (35).

There was a significant difference ($P<0.005$) between the two breeds included in this study which is higher in the local breeds. The incidence was higher in local zebu cattle and this could be due to the prominently larger sizes of the corpus albicantia in local zebu than the crosses. The occurrence is higher in the right ovary than the left and this might be due to the higher activity of the right ovary.

Table 1: Gross female genital tract abnormalities encountered in slaughtered female cattle of Sululta slaughterhouse

		Parity status			
		Null-parous	Parous	Total in %	
Ovarian Abnormalities		14	79	14.5%(n=93)	57.4
	Atrophied ovaries	10	39	7.7% (n=49)	
	Cystic ovaries	0	21	3.3%(n=21)	
	Ov.bur. adhesions	3	13	2.5%(n=16)	
	Oophoritis	0	3	0.5%(n=3)	
	Parovarian cysts	1	2	0.5%(n=3)	
	Bursal hematoma	0	1	0.2%(n=1)	
Uterine Abnormalities		1	33	5.3%(n=34)	21
	Pyometra	0	10	1.6%(n=10)	
	Mucometra	1	8	1.4%(n=9)	
	Endometritis	0	8	1.3%(n=8)	
	Uterine tumor	0	4	0.6%(n=4)	
	Hydrometra	0	2	0.3%(n=2)	
	Uterine hypertrophy	0	1	0.2%(n=1)	
Oviductal Abnormalities		0	14	2.2%(n=14)	8.6
	Salpingitis	0	7	1.1%(n=7)	
	Hydrosalpinx	0	6	0.9%(n=6)	
	Pyosalpinx	0	1	0.2%(n=1)	
Cervico-Vaginal Abnormalities		0	14	2.2%(n=14)	8.6
	Cervicitis	0	7	1.1%(n=7)	
	Vaginitis	0	6	0.9%(n=6)	
	Hypertrophied Cervix	0	1	0.2%(n=1)	
Miscellaneous Abnormalities		5	2	1.1%(n=7)	4.4
	Freemartins	5	0	0.8%(n=5)	
	Macerated fetus	0	1	0.2%(n=1)	
	Mummified fetus	0	1	0.2%(n=1)	
Total		3.1%(n=20)	22.2%(n=142)	25.3%(n=162)	100

Table 2: Different factors associated with the occurrence of overall abnormalities, atrophied ovaries and overobursal adhesion

	Breed		Age (yrs)				Parity		Body condition		
	Cross	Local	=3	4-6	7-9	=10	Null	Parous	Lean	Medium	Fat
						Overall abnormalities					
Yes	25	118	9	57	51	26	20	123	32	65	46
No	49	448	65	245	113	74	105	392	92	240	165
X^2	6.31	14.54	3.6	1.08							
P-value	0.01	0.002	0.058	0.58							
						Atrophied Ovary					
Yes	5	44	7	26	10	6	10	39	17	11	21
No	69	522	67	276	154	94	115	476	107	294	190
X^2	0.1	1.68	0.02	15.08							
P-value	0.76	0.64	0.87	0.001							
						Ovaro-Bursal adhesion					
Yes	7	9	0	10	3	3	3	13	2	9	5
No	67	557	74	292	161	97	122	502	122	296	206
X^2	16.6										
P-value	0.00										

Table 3: Distribution of cystic ovaries, ovarian atrophy and ovarobursal adhesions on the sides of ovaries

Abnormalities	Right	Left	Bilateral	Total
Ovarian atrophy	21	20	8	49
Cystic ovaries	12	5	4	21
Ovarobursal adhesion	10	4	2	16

Table 4: Type, position and frequency of occurrence of ovarian cysts

Cyst type	Position	No. Affected	Percentage
	Right	5	23.6
	Left	0	0
	Bilateral	4	10.1
	Right	6	28.6
	Left	4	19.1
	Bilateral	0	0
	Right	1	4.8
	Left	1	4.8
	Bilateral	0	0
Total		21	100

Uterine and Oviduct Abnormalities: The incidence of pyometra 1.6% (n=10), which is in agreement with almost all of the previous studies but lower than Herenda's report which is 5% in Canada and this was due to megesterol acetate feeding of cows before slaughter as indicated by Herenda [24]. The uterine walls with mucometra were thin and the lumen was filled with clear mucoid fluid. Three of them were associated with cystic ovaries.

Eight (1.3%) of the total genital tracts of cows showed endometritis and four of them were seen in combination with cervicitis and vaginitis and one of them with salpingtis, which shows the possibility of ascending infection from distal tubes to the uterus. Endometritis are common findings at abattoir surveys in cows than heifers with possible complications related to parturition and this also might be evidenced by the increasing rate of occurrence with age [27].

Hydrosalpinx was observed in 0.9% (n=6) and is in close proximity with the reports of [29] and [25] but higher than the lower reports of [24] and lower than the report of [28]. After tubal occlusion, adhesion may be developed between the mucosal folds leading to formation of large dilated cysts.

Cervico-Vaginal Abnormalities: Cervicitis is not in itself an entity but occurs with an overshadowing endometritis or vaginitis [36, 37]. All the six vaginal abnormalities in this study were from parous cows and this is probably due to the possible complications associated with parturition.

Miscellaneous Abnormalities: Free martins, macerated and mummified fetuses with incidence rates of 0.8%, 0.2% and 0.2%, respectively, were encountered as miscellaneous abnormalities. Even though their occurrence rates were lower, they can have their own impacts on the reproduction ability or productivity of the animals.

Stages of Pregnancies and Position of Fetuses: Of the total pregnancies, 65.4% (n = 121) were found with early, 30.3% (n=56) mid and 4.3% (n=8) were late stages. The 76.8 % (n=142) and 23.2% (n=43) were in the right and left uterine horns, respectively. Among the right side pregnancies of the uterus, 65.5% (n=93), 28.9% (n=41) and 5.6% (n=8) were early, mid and late stages of pregnancies, respectively. The position of corpus luteum of pregnancy related to the fetal location in the uterine horn was ipsi-lateral but two (1.1%) were contra-lateral. Various reproductive abnormalities were observed in 10.3% (n=19) of the pregnant tract showing that the conditions were not severe to affect the fertility of the cows completely. The slaughtered animals had an average age at slaughter was about 7-9 years.

The current result clearly showed that the right ovary is more active than the left and this agrees with almost all of the previous reports. According to Azage *et al* [38] cows in tropics are known to show reduced ovarian activity as a result of poor nutrition but the relatively high cyclicity of the female cattle observed in this study may be due to adequate feed availability in the study area (personal observation and communication with field staff veterinarian). Pregnancy significantly influenced cyclicity in which it is higher in non-pregnant females as reported by other workers.

Ovarian Activities: A total of 426 animals (336 cows and 90 heifers) slaughtered, female cattle showed actively cycling status of the ovaries. There is a significant difference ($p<0.05$) among the different age groups and majority of the cycling female cattle were under the age category 4-6 (n=203) and 7-9 years (n=103) and their body condition scores are shown in table 7.

Around 74% (n=158) of the non-cycling animals did not show any gross lesions or abnormalities in their genitalia, which could have interfered with normal cyclicity and, in most cases non-cyclicity was not related to poor body condition. According to Assey *et al.* [1],

Table 5: Distribution of Pregnancy with respect to sides of the uterine horns (n=185)

	Uterine Horns		
	Right	Left	
Early(< 3 months)	76.9% (n=93)	13.1%(n=28)	65.4% (n=121)
Mid (3-6 months)	73.2% (n=41)	26.8%(n=15)	30.3% (n=56)
Late (>6 months)	100%(n=8)	0 % (n=0)	4.3% (n=8)
Total	76.8%(n=142)	23.2% (n=43)	100% (n=185)

Chi-square = 1.29, P-value = 0.26

Table 6: Association of ovarian activity and pregnancy status (n = 640)

	Cyclicity		
	Cycling	Non-cycling	
Pregnant Non - pregnant	17.3%(n=32)	86. 6%(n=394)	82.7%(n=153)
	13.4%(n=61)	28.9%(n=185)	71.1%(n=455)
Total	66.6%(n=426)	33.4%(n=214)	100%(n=640)

Chi-square =283.77, P-value = 0.000

Table 7: Different factors associated with ovarian activities

	Within a group frequency (%)				
	Cycling	Non-cycling			
Age (years)					
= 3	82.4%(n=61)	17.6%(n=13)	74	12.04	0.01
4-6	67.2%(n=203)	32.8%(n=99)	302		
7-9	62.8%(n=103)	37.2%(n=61)	104		
= 10	59% (n=59)	41% (n=41)	100		
Total	66.6%(n=426)	33.4%(n=214)	640		
Body condition					
Lean	66.1%(n=82)	33.9%(n=42)	124	1.95	0.38
Medium	64.3%(n=196)	35.74%(n=109)	305		
Fat	70.1% (n=148)	29.86%(n=63)	211		
Total	66.6%(n=426)	33.4%(n=214)	640		
Parity					
Null-parous	72%(n=90)	28%(n=35)	125	2.08	0.15
Parous	65.2%(n=336)	34.8%(n=179)	515		
Total	66.6%(n=426)	33.4%(n=214)	640		
Breed					
Cross	58.1%(n=43)	41.9%(n=31)	74	2.69	0.1
Local	67.7%(n=383)	32.3%(n=183)	566		
Total	66.6%(n=426)	33.4%(n=214)	640		

lack of cyclicity was also reported in zebu cattle, which were in good body condition by supplementary feeding. Therefore, other factors like mineral deficiency or other environmental factors could have caused the non-cyclicity, but this requires further investigations.

Questionnaire Survey Results: From the total interviewed persons 76.7 %(n=46) were cattle owners where as the remaining 14(23.3%) were cattle traders who had bought the female cattle from livestock keepers or other traders. The main reasons incriminated to sell female cattle were infertility, age, emergency economic needs, mastitis, low milk yield, behavior problems and other reasons with frequencies of 33.3, 15, 13.3, 8.4, 5, 3.3 and 21.7%, respectively as shown in Figure 1. About 67% (n=40) of the female cattle sold were not pregnant.

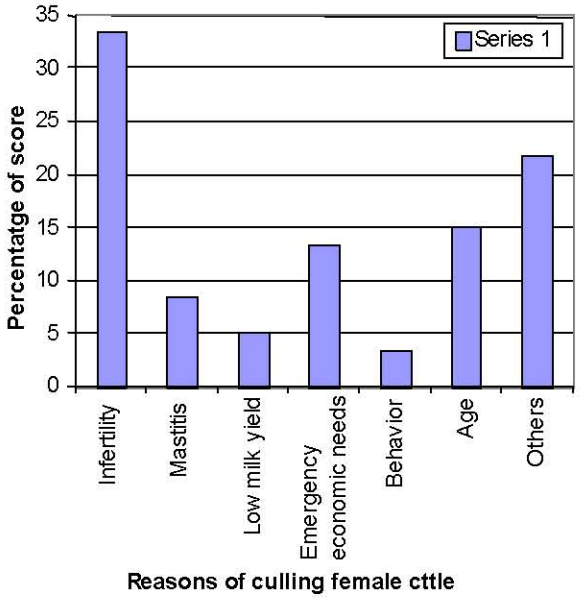

Fig. 1: Percentage scores of different reasons for culling female cattle by cattle owners

The reasons incriminated in this report to sell female cattle are very similar to reports of Singleton and Dobson [15] and Endalew [26]. Although majority of the female cattle sold were empty, pregnancy diagnosis services were available neither in the villages nor at livestock markets. Most of the cattle keepers were able to know pregnancy during the late stage. If availed with information of the animals being pregnant almost all of the real cattle owners showed reluctance to sell such animals, especially if the pregnancy is more than four months whereas the cattle traders expressed to sell for slaughterhouses since their body condition were better than non-pregnant ones.

CONCLUSIONS

From the present study it can be concluded that atrophied and cystic ovaries, as well as ovarobursal adhesions were the major reproductive abnormalities and breed, age, body conditions and parity were found to be the main factors influencing the occurrence rates of the abnormalities. Female cattle slaughter is highly practiced in the study area. In line with these conclusions the following points are recommended: Efforts and collaborations have to be done integrated with cattle traders and keepers in order not to lose pregnant and fertile female cattle and legislation that prohibits slaughtering of fertile female cattle should be implemented and obstetrical refresher training for veterinarians should be organized; early diagnosis of reproductive tract abnormalities (favors us culling for congenital and treating for acquired cases) should be adopted to prevent heritability and irreversible infertility; and finally detailed studies should also be conducted in different seasons since some abnormalities are related to seasons and histopathology studies should also be included.

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