

Original Research Article

Prevalence of Endometritis and its associated risk factors in Dairy Cattle of Central Uganda

ABSTRACT

Aims: Endometritis is a major postpartum disease that affects dairy cattle productivity which is accompanied by heavy economic losses to the farmer. The status of Clinical endometritis (CE) and Sub-Clinical Endometritis (SCE) in sub-Saharan Africa is poorly understood, thus the study was carried out to provide information on the prevalence and associated risk factors that are responsible for the occurrence of SCE and CE in dairy cattle of Central Uganda.

Study design: This was a longitudinal study involving 35 dairy farms and 140 dairy cattle carried out in Central Uganda. Samples were analyzed at the Central Diagnostic Laboratory.

Methodology: A metrichcek® device was used to collect the cervico-vaginal discharge during the postpartum period and further clinical examination was carried out using a vaginal speculum. The objectives of the study were to determine the prevalence of CE and SCE in the Central Uganda and assess the risk factors involved.

Results: In this study, the prevalence of CE and SCE was established at 3.6% and 18.6% respectively and it was shown that the DRR due to SCE was six times greater than that due to CE. Dairy cattle that had calved more than three times were shown to be associated with a higher body appearance (BCS > 3) than those that had calved down fewer times. Dystocia, ovarian disease and delayed return to heat above 90 days were identified as the major predisposition factor ($P < 0.05$) to SCE and CE in this study. This would be due to the poor management of postpartum dairy cattle in the farms visited.

Conclusion: Management of endometritis in the region should address critical nutritional deficiencies through improved extension service delivery and subsequent studies should be carried out to explore the national burden of SCE.

Keywords: "Endometritis in dairy cattle," "Livestock reproduction challenges in Uganda," "Food security in Uganda," "Animal Disease Control."

1. INTRODUCTION

Microbial disease of the female reproductive tract is a major concern in dairy cattle production systems [1]. This is because microbial infections are highly associated with infertility as they disrupt uterine and ovarian function. Uterine disease within a week of parturition (metritis) has been shown to be common to dairy cattle [2]. The clinical presentation of endometritis has been clearly elaborated in previous studies, and it has been shown to include both Clinical Endometritis (CE) and Sub-Clinical Endometritis (SCE) [2] [3] [4] [5]. CE has been shown to be characterized by an enlarged uterus and a watery red-brown fluid to viscous off-white purulent uterine discharge, which often has a fetid odor [1]. SCE on the other hand is associated with inflammation of the endometrium that results in a significant reduction in reproductive performance in the absence of signs of clinical endometritis [6]. The inflammation is presumably associated with recovery of the tissues after clinical endometritis, trauma or other non-microbial disease. SCE has been shown to be defined by

polymorphonuclear neutrophils (PMNs) exceeding between 5.5% of cells and 10% of cells in samples collected by flushing the uterine lumen [1].

The prevalence of SCE and CE in Sub-Saharan Africa is not clearly known, but studies in Germany have shown it to be close to 15% to 20% in dairy cattle respectively [7] [8]. In dairy cattle, uterine infections are not life threatening and often unavoidable; however, they reduce fertility and increase the production costs of properties [9]. The major risk factors that have been identified associated with the endometritis include: health status, parity and body condition score (BCS) of cows, and calving date and it has been shown that the first service conception rate is lower in dairy cattle suffering from endometritis which significantly decreases reproductive performance of dairy herds [10]. The study was carried out to provide information on the prevalence and assessment of risk factors that are responsible for the occurrence of sub/clinical endometritis in Central Uganda.

2. MATERIAL AND METHODS

This was a longitudinal study carried out for a period of 13 months involving dairy farmers in the Central region (Kampala, Mukono and Wakiso districts) of Uganda. A total of 35 dairy farms involving 140 dairy cattle comprising of both local and exotic cattle breeds were randomly included in the study. The farmers were visited in two different seasons i.e. dry season (June to August 2013) and followed up in (April to June 2014). All dairy cattle within 60 days of postpartum were included in the study using farm reproductive records. Records were taken for breed, date of calving, calf health, status prepartum and postpartum complications prior to the physical examination and rectal palpation. The stage of parity was classified into three groups i.e. young (< 2 times), prime (3 times), mature (> 3 times). The body condition score (BCS) was recorded using a rank of 1-5 [11]. Briefly; the dairy production systems and farm descriptive data were recorded through observations that were made; a metrichheck® device was then used to collect the cervico-vaginal discharge and further clinical examination was carried out using a vaginal speculum for observations of the cervix status and any other anomalies in the genitalia[12] [13]. Data was recorded and expressed as frequencies and descriptive data analysis was carried out. For all tests, a P value < 0.05 will be considered significant. The objective of the study was to establish the prevalence of CE and SCE in Ugandan dairy cattle and identify its associated risk factors. Ethical clearance was acquired through the College of Veterinary Medicine Animal Resources and Biosecurity (CoVAB).

3. RESULTS AND DISCUSSION

The study revealed that the prevalence of clinical and sub-clinical endometritis is at 3.6% and 18.6% in the study area with a corresponding disease risk ratio of 3.7% and 22.8% as shown in **Table 1**.

Table 1 Showing the prevalence of endometritis in dairy cattle of Uganda

Endometritis	Clinical Endometritis / CE (%)	Sub-Clinical Endometritis / SCE (%)	Negative
Prevalence	5 (3.6)	26 (18.6)	109 (77.8)
DRR	3.7	22.8	

Key: DRR = Disease risk ratio.

It was also shown that the prevalence of SCE was higher in the dry season than in the rainy season. The severely affected breed by SCE being the Bos indicus (Zebu) followed by the Guernsey. The majority of the dairy cattle affected were shown to be associated with a BCS as well as parity of more than 3 as shown in **Table 2**.

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Table 2 Showing risk factors associated with endometritis from study area

Variable	Parameter	CE	SCE	Neg.
Season	Dry	2 (2.2)	13 (14.6)	74 (83.1)
	Rainy	3 (5.9)	13 (25.5)	35 (68.6)
Breed	Holstein Friesian	4 (3.4)	22 (18.5)	93 (78.2)
	Guernsey	1 (6.2)	3 (18.8)	12 (75)
	Zebu	0 (0)	1 (20)	4 (80)
BCS	Less than three	2 (5.7)	7 (20)	26 (74.3)
	Three	1 (3.3)	4 (13.3)	25 (83.3)
	Above three	5 (3.6)	26 (18.6)	109 (77.9)
Parity	Less than three times	0 (0)	10 (17.5)	47 (82.5)
	Three	2 (6.5)	8 (25.8)	21 (67.7)
	More than three times	5 (3.6)	26 (18.6)	109 (77.9)
Postpartum complications	Non reported	4 (4.1)	4 (4.1%)	90 (91.8%)
	Ovarian diseases	5 (20.8)	1 (4.2)	18 (75)
	Reproductive diseases	0 (0)	4 ((22.2)	14 (77.8)
Service after return on Heat	Within 90 days	0 (0)	2 (6.9)	27 (93.1)
	Between 90 - 180 days	0 (0)	4 (9.8)	37 (90)
	Above 180 days	5 (7.1)	20 (28.6)	45 (64.3)
	Non reported	0 (0)	19 (15.6)	103 (84.4)
Predisposition Factors at Parturition	Retained fetal membranes	2 (66.7)	1 (33.3)	0 (0)
	Dystocia	1 (33.3)	2 (66.7)	0 (0)
	Abortion	2 (66.7)	1 (33.3)	0 (0)
	Ill health	0 (0)	3 (33.3)	6 (66.7)

69 **Key:** CE = Clinical endometritis; SCE = Sub-Clinical endometritis; Neg. = Negative; BCS = Body condition score.

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Further analysis of the different breeds and location showed no marked inferences. ($P > 0.05$). Dystocia was identified as the major predisposition factor to subclinical endometritis in this study (66.7%, $P < 0.01$), while ovarian disease was shown to be the major postpartum complication on the dairy farms (20.8%, $P < 0.01$). Delayed return to heat was shown to be between 90 – 180 days ($P = 0.003$).

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The study revealed that the prevalence of endometritis was high in the Central Uganda. The SCE prevalence reported in this study highlights the risk raised by several sub-clinical reproductive infections in the dairy industry as it has been shown to have high economic implications [7]. This is important since farmers in the region have often been reported to institute treatment without necessarily seeking the services of professional veterinarian as a result of the liberal industry [14] [15]. This has continuously made it difficult for the farmer and the animal health scientists to easily diagnose diseases that continue to cripple the productivity of the livestock industry as shown in **Table 1**. The disease risk ratio was shown to be greater in SCE than in CE. This was thought to be responsible for the poor involution of the uterus thus delaying ovulation further and being a major contributing factor to missed estrus by the farmer which is in agreement with a recent study [1]. The incidence of endometritis i.e. both CE and SCE was shown to be constant during both the dry and rainy seasons illustrating that disease occurrence is independent of the time of study and not associated with endometritis ($P > 0.05$) which was in agreement with recent findings [1]. Following the government's recent efforts to improve the livestock industry through the National Agricultural Advisory Directorate Services (NAADs) project that provided mainly Holstein

Friesian to farmers countrywide, the major breeds of most farmers were found to be composed of a majority of *Bos taurus* (Table 2).

Dystocia, ovarian disease and delayed return to heat above 90 days were identified as the major predisposition factor to SCE and CE in this study. This would be due to the poor management of postpartum dairy cattle in the farms visited. Dairy cattle that had calved more than three times were shown to be associated with a higher body condition score (BCS > 3) than those that had calved down fewer times. Those that had calved down fewer times were associated with a poorer body condition score (BCS < 3) and higher SCE burden contrary to what had been illustrated in a previous study [1]. These discrepancies may reflect differences in the geography, the study population, the case definitions and the procedures among the studies and above all management practices despite the fact that majority of the herd involved in both regions were the same (Table 2). The drop in BCS from the previous parturition postpartum has been shown to increase pregnancy loss probably accounting for the low parity associated with this group [9]. Co-existing nutritional deficiencies that the postpartum dairy cattle probably would be suffering from such as Sub-Clinical Ketosis (SCK) are probably responsible for the loss of the protective advantage gained prepartum [16]. The abnormally lengthened calving intervals due to endometritis have been shown to be associated with low productivity and thus serious financial implications to the farmer as productivity of the livestock herd is reduced severely [5] [17]. This is partly responsible for the poor reproductive performance of most of the dairy cattle in Central region thus making the realization of the millennial developmental goals impossible at the moment. Bacteria often infect the endometrium of cattle to cause endometritis, uterine disease, and infertility. In the endometrium, epithelial and stromal cells are the first to encounter invading bacteria. The accumulation of interleukins and the ovarian steroids estradiol and progesterone have been shown to have little impact on inflammatory responses to inflammation of the endometrium [2].

4. CONCLUSION

The prevalence of CE and SCE was established at 3.6% and 18.6% respectively and the DRR due to SCE was found to be about six times greater than that due to CE. The major risk factor associated with the high SCE burden was increasing parity accompanied by increasing BCS, which is thought to be due to the management practices of the herds in the study area. Endometritis observed in the study area is believed to be multifactorial thus intervention approaches for its management to improve on livestock productivity should address critical nutritional deficiencies through improved extension service delivery. Subsequent studies should be carried out to explore fully major limiting factors in relation to SCE in the study area.

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