Determination of Factors That Influence Reproductive Conditions in Cows in the Rural Farms of the Ngaka Modiri Molema District of the North West Province

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ABSTRACT Reproductive disorders in communal farming remain answerable to economic losses and poor reproductive performance. The aim of this study was to identify factors that influence the prevalence of reproductive conditions in cattle in the semi-arid area of Ngaka Modiri Molema district, North West Province. This study focused on five reproductive conditions, that is, downer cow syndrome, dystocia, abortion, retained placenta and vaginal prolapses. Questionnaires were used to collect data from 65 farmers during farm visits and at community outreaches. Results obtained from the survey showed that among 65 cases of reproductive conditions encountered in this study, dystocia (26.2%), retained placentas (23.1%), abortion (23.1%), downer cow syndrome (20%) and vaginal prolapses (7.7%). The results also indicate the following probabilities including body condition score (P=0.37), breed type (P=0.025), parity (P=0.54), treatment given to the cow (P=0.68), cows supplemented (P=0.21) and medical history (P=0.58). The condition most encountered in this study was dystocia and the difference in the breed type showed to be very influential in the prevalence of these conditions. There is a need to implement sustainable strategies to improve production and educate the farmer on methods that can reduce the incidences of reproductive conditions.

INTRODUCTION

The global status of reproductive disorders is not precisely known (Perry and Sones 2009), due to lack of data and areas where diagnosis of reproductive condition can be made, it is therefore difficult to effectively monitor impact assessment (Thornton 2010). Development of reproductive conditions depends mainly on the immune response of the cow. Moreover, clinical signs usually vary with the virulence of the causative organisms and the presence of factors that predispose to the disease (Azawi 2008). Reproductive failure may occur for several reasons, and mostly management and the environment are often important contributing factors (Swai et al. 2014)

Dystocia refers to abnormal or difficulty in giving birth (Kahn 2005; Frame 2006). Oversized calves (Johanson and Berger 2003), fetal malposition (Meijering 1984), uterine inertia (Sloss and Dufty 1980) and retained placenta (Mee 2004) are some of the incriminated factors in the prevalence of dystocia. The probability of dystocia ascends by thirteen percent per kilogram increase in birth weight (Johanson and Berger 2003). Higher dystocia rates in dairy cows have been reported in tie stall housing (Bendixon et al. 1986).

Retained placenta can be defined as the retention of the fetal membrane from six to twenty-four hours (Swiefy 2003). Factors such as deficiency in selenium (Ishak et al. 1983), calf birth weight and placental weight (Echternkamp 1993), and delayed involution of the uterus (Swiefy 2003) have been implicated in the incidence of retained placenta. Other factors associated with increasing risk of retained placenta (RP) include dystocia, twinning, stillbirth, negative energy balance (ketosis) and hypocalcaemia (Correa et al. 2003).

Vaginal prolapse is a major but not very common reproductive disorder in cattle (Ahmed et al. 2005). It is regarded as an emergency condition and should be managed before mucosal trauma, contamination fatal hemorrhage and excessive edema lead to a grave prognosis (Miesner and Anderson 2008). The exact etiology of vaginal prolapse is still unclear and the exact causes still stand in a certain manner undefined (Noakes et al. 2001a; Kreplin and Yaremcio 2009). However, a high estrogen level is considered as a prime factor for ante partum vaginal prolapse (Roberts 1998; Abdullah et al. 2014). In addition, forced extraction of the fetus has also been incriminated as an etiological factor (Noakes et al. 2001a).

Abortions often result from an event that occurred weeks to months before the actual event, and the cause is probably invisible at the time of abortion itself (Kreplin and Yaremcio 2009). In twenty-five percent of the abortions, fungus invades the fetus, and red or white rings and worm-like lesions are seen (Anderson et al. 2000). Also, if the fetus remains in the uterus for any length of time after death, these lesions may no longer be visible. In addition, the afterbirth may be retained, causing even more problems (Humam 2014). Many causes are never discovered (Anka et al. 2014), and most abortions occur in the winter (Forar et al. 1996; Nadia et al. 2013). A study conducted by Harchkinson (2009) shows that in about seventy percent of abortions, the cause cannot be determined even with careful laboratory examination.

Downer cow syndrome is a condition that commonly occurs during the early postpartum period and this is a major concern in dairy farms worldwide (Kalaitzakis et al. 2010). Hypocalcaemia is the most common cause of downer cow syndrome (FitzGerald 2011). Hypocalcaemia results in myometrial fatigue and delays cervical involution, both of which could be predisposed to uterine prolapse (Murphy and Dobson 2002); Just prior to or after calving, the cow shows symptoms including loss of appetite, reduced body temperature and anxiety (Houe et al. 2001). As the disease progresses, the cow becomes unable to rise and if no treatment is given, the majority of the afflicted cows eventually die (Hibbs 1950; Orpin and Esslemont 2010).

During the immediate postpartum period, the cow's immune system is compromised severely (Goff 2006). The incidence of diseases and disorders can be high during this time period and have a negative impact on reproductive performance (Goshen and Shpigel 2006; Santos et al. 2008). Reproductive competency of cattle in most rural communities is not precisely known. However, according to Thornton (2010), reproductive performance of cattle in rural areas is low. There is an increased prevalence of reproductive condition such as downer cow syndromes, abortion, dystocia, retained placenta and vaginal prolapses in the communal areas of Ngaka Modiri Molema District of the North West Province.

MATERIAL AND METHODS

Structural questionnaires were used to collect data from 65 farmers in Ngaka Modiri Molema District of the North West Province. Farmers were interviewed during farm visits and at community outreaches. The questions they were asked included the type of conditions that their cows had experienced, age of the cow, breed, the body condition score, incidences of the condition, parity, were the cows supplemented or not, was there any treatment given to the cows prior to the condition and medical history. The data from completed questionnaires was coded, captured and analyzed using Statistical Package for Social Sciences (SPSS) version 21. Descriptive statistics (frequencies and percentages) were used to determine proportions of the different factors and how often they are experienced in rural areas. The chi-square test was used to determine the association between dependent (downer cow syndrome, dystocia, abortion, retained placenta and vaginal prolapses) and independent variables (age, body condition score, breed, parity, supplementation, treatment given to the cows prior to the condition and medical history).

RESULTS AND DISCUSSION

The aim of this study was to assess factors influencing the occurrence of reproductive conditions in bovine in the semiarid areas of the North West province in South Africa. Results obtained from the assessment of farmers are summarized in Table 1 show the most prevalent conditions recorded in cows were downer cow syndrome, dystocia, abortion, retained placenta and vaginal prolapses in farms around Ngaka Modiri Molema District, North West Province. Table 2 indicates the frequencies of the type of reproductive condition experience, treatment given, and supplementation status, obtained farmers in Ngaka Modiri Molema district. Table 3 represent the chi-square results indicating the association between downer cow syndromes, abortion, retained placenta, dystocia, vaginal prolapse and constrains, which may influence the incidences of the reproduction disorders.

This study aims to obtain information, which farmers can use as a tool to prevent or reduce the incidences of reproductive conditions by implementing the knowledge acquired. A total number of 65 communal farms participated in this investigation. Majority of cows (46.45 %) affected by reproductive conditions were between 4-6 years followed by of those at 1-3 years (38.3%) and 7-10 years (18.46%) indicating that

the conditions were predominant in younger cows as compared to the older ones, shown in Table 1. The results agree with those of Gaafar et al. (2011) who stated that cow age is among some of the greatly implicated factors in the prevalence of reproductive condition.

Table 1: Summary of conditions and frequencies of conditions recorded in the study area (2013-2015)

Variables	Frequencies	%
Age		
1-3 years	23	38.3
4-6 years	30	46.15
7-10 years	12	18.46
Body Score Condition		
2-poor	13	20
3-good	41	63.1
4-very good	11	16.9
Breeds		
Brahman	18	27.7
Mixed Breed	9	13.8
Nguni	6	9.2
Bonsmara	6	9.2
Afrikander	22	33.8
Drakensberger	2	3.1
Charolaise	2	3.1
Parity		
1st	27	41.1
2nd	19	29.2
3rd	9	13.8
4th	6	9.2
5th	1	1.5
6th	2	3.1
8th	1	1.5
Number of Incidences		
1st	58	89.2
2nd	3	4.6
3rd	4	6.2

It is also indicated in Table 1 that the most frequent condition score was 3 (good) with the percentage of 63.1, while twenty percent were 2 (poor) and only 16.9 percent were found to be having a body condition score of 4 (very good). Pryce et al. (2001) indicated that the body condition score (BSC) is directly affected by nutrition particularly protein and energy, which is required in large quantities in order to increase reproductive performance. However, in this study, the body score condition did not show to have a high influence in the occurrence of the reproductive conditions. Furthermore, Zaborski et al. (2009) also stated that cow's body condition (BSC) could induce calving difficulty. The results show that the breed types, which appeared to be more frequently affected were Afrikaner (33.8%), Brahman (27.7%), and mixed breed (in-

describable breed) (13.8%), while (9.2%) were found for both Nguni and Bonsmara, lastly were both Drakensberger and Charolaise (3.1%). Most of the affected cows (41.5%) were calving for the first time, these results partly agreed with those obtained by Roughsedge and Dwyer (2006), which revealed that first-calf heifers account for the majority of calving difficulties and associated calf losses. The results found in this study indicate also the other proportions of the number of calving were as follows:

- 29.2 percent for second time
- 13.8 percent for third time
- 9.2 percent for fourth time
- 3.1 percent for sixth time
- Lastly, 1.5 percent calving for the fifth and eighth time

Table 2 represents frequencies of the prevalence of the reproductive condition. Dystocia was the condition found to have the highest frequency at 26.2 percent, followed by abortion and retained placenta (23.1 %), then downer cow syndrome (20 %) and vaginal prolapses (7.7 %). Due to the finding of this study, which indicated that the majority of the cows affected were first time calves, could be the reason for the increased incidence of dystocia.

Table 2: Summary of reproductive condition and frequencies as recorded in the study area

Variables	Frequency	%
Condition		
Downer cow syndrome	13	20
Abortion	15	23.1
Retained placenta	15	23.1
Dystocia	17	26.2
Vaginal prolapse	5	7.7
Cows Given Treatment		
Yes	4	6.2
No	61	93.8
Supplementation		
Yes	12	18.5
No	53	81.5
Feeding System		
Natural grazing	65	100
Medical History		
Yes	1	1.5
No	64	98.5

Table 2 also shows that 93.8 percent of the cows were reported to having not been given any treatment prior to the condition and only about 6.2 percent were given some treatment prior to the occurrence of the conditions. The treatments given were administered to the cows

without advice of a veterinarian, this showing that in rural areas farmers employ improper management practices in their cattle, which can also bring about health complications. Management practices, diseases, breeds, nutrition, parity and age at puberty are factors, which influence reproductive efficiency (Kanuya et al. 2006; Matiko et al. 2008).

In Africa, one of the major production constraints in smallholder farming systems is poor nutrition. Research has been carried out to improve the quality and availability of feed resources by strategic supplementation (Thornton 2010). This study found that only 18.5 percent of the cows were supplemented and the majori-

ty (81.5 %) of cases occurring in cows were not supplemented. However, there was no significant statistical difference (P>0.05) observed between supplementation and prevalence of the reproductive conditions. Moreover, the results shown in Table 2 indicate that all of the cows depended largely on natural pasture for feed. About 98.5 percent of the cows did not have previous encounters with the reproductive conditions, and it was only reported in 1.5 percent of the cows.

This implies that most of the cases were the cow's first encounter. Results in Table 3 show that of the five reproductive conditions (downer cow syndrome, abortion, retained placenta,

Table 3: Prevalence of reproductive conditions in the study areas (2013-2015)

Variable	Reproductive conditions				
	Downer cow syndrome (%)	Abortion (%)	Retained placenta(%)	Dystocia (%)	Vaginal prolapse (%)
Age					
1-3 years	53.85	60.00	13.33	40.00	29.41
4-6 years	38.5	33.33	60.00	60.00	41.18
7-10 years	7.67	6.67	6.67	0.00	29.41
Breed					
Brahman	23.08	60.00	13.33	11.76	40.00
Nguni	7.69	13.33	13.33	5.88	0.00
Bonsmara	0.00	6.67	13.33	17.65	0.00
Afrikaner	23.08	13.33	53.33	41.18	40.00
Drakensberger	0.00	6.67	0.00	0.00	20.00
Charolaise	15.3	0.00	0.00	0.00	0.00
Mixed breed	830.7	0.00	6.67	23.53	0.00
BCS					
2-poor	30.77	7.69	26.67	23.53	0.00
3-good	69.2	21.95	60.00	58.82	80.00
4-very good	30.00	45.45	13.33	17.65	20.00
Parity					
1st	38.46	46.67	40.00	41.18	40.00
2nd	46.15	26.32	6.67	29.41	40.00
3rd	7.69	33.33	20.00	5.88	20.00
4th	7.69	0.00	20.00	11.76	0.00
5th	0.00	0.00	6.67	0.00	0.00
6th	0.00	0.00	0.00	11.76	0.00
8th	0.00	0.00	6.67	0.00	0.00
Number of Incidence					
1st	93.31	100.00	50.00	94.12	80.00
2rd	7.67	0.00	6.67	5.88	20.00
3th	0.00	0.00	13.33	13.33	0.00
Cow Given Treatment					
Yes	7.691	6.67	0.00	11.76	0.00
No	792.31	93.33	100.00	88.24	100.00
Cow Supplemented					
Yes	7.69	6.67	13.33	17.65	0.00
No	92.31	93.33	86.67	82.35	100.00
Feeding System					
Natural grazing	100.00	100.00	100.00	100.00	100.00
Medical History					
Yes	0.00	0.00	0.00	25.00	7.8
No	20.31	23.44	23.44	5.88	10.00

dystocia and vaginal prolapse), abortions were found to be most (60%) occurring in younger cows (1-3 years) and these results agree with those of Norman et al. (2012), who stated that younger cows have less acquired immunity and they are more susceptible to infectious agents than older cows.

This study also indicated that in cows of 4-6 years both retained placenta and dystocia occurred at equal proportions of (60%). These results agree with those found by Correa (2003) who indicated that that most retained placentas in cows occur as a result of dystocia (calving difficulty). On the other hand, vaginal prolapses showed to be more prevalent in older (7-10 years) cows at 29.41 percent. Sixty percent of the Brahman breeds were the majority cows affected by abortions. Most of Nguni breed encountered 13.33 percent of both abortions and retained placenta. About 17.65 percent of dystocia occurred in the Bonsmara breed, which was the highest compared to the other reproductive conditions.

Afrikander breed experienced 53.33 percent of retained placenta, which was the maximum in all conditions. Charolaise was found to have encountered 15.38 percent downer cow syndrome while thirty percent of downers occurred in mixed breeds cows. The results in Table 3 showed downer cow syndrome as the most (30.77%) occurring cases having poor body condition score. Most downer cow syndrome cases occur as a result of hypocalcaemia and in this study it was found that most of the cows were not supplemented, and suffered nutritional deficiency could be implicated in the prevalence of such increased incidence of downer cow syndrome. Hence the cows had poor condition score. Table 3 also indicates that 26.67 percent of retained placentas and 23.53 percent of dystocia cases were with poor body conditions. However, it was observed that eighty percent of vaginal prolapses cases had a good body condition score, also 69.23 percent of downer cow syndrome, sixty percent of retained placenta and 58.82 percent of dystocia had good BCS, in addition only abortion cases showed to be those occurring mostly with very good BCS of 45.45 percent. The results in this study indicate that the body condition score did not show a significant difference (P>0.05) in the incidence of the conditions.

In this study, with the majority of cases the reproductive conditions occurred in the first calving cows represented in Table 3, abortion (46.67%), dystocia (41.18%), retained placenta (40.00%), vaginal prolapse (40.00%) and downer cow syndrome (38.46%) in descending order. These results agree with those found in a study of Norman et al. (2012), which showed that reproductive conditions are more prevalent in cows of low parity than in older cows. Table 3 also shows dystocia (46.67%) for the second time calving, abortions (33.33%) for third time calving, retained placenta (6.67%) for the fifth time calving, and dystocia (11.76%) was also the only condition prevalent in cows calving for the sixth time and in those calving for the eighth time was retained placenta (6.67%).

In all conditions the cows were not given any treatment without the advice of a veterinarian. Hundred percent of vaginal prolapses, one hundred percent of retained placentas, 93.33 percent of abortions and 92.31 percent of downer cow syndrome were not on any treatment. The majority of cows were not supplemented for one hundred percent of vaginal prolapses, one hundred percent of retained placentas, 93.33 percent of abortions, 92.31 percent downer cow syndrome and 88.35 percent. All cows in this survey were reported to depend on natural grazing as a feed source. These results agree with those of Gaafar et al. (2011), who stated that most nutritional deficiencies occur during winter when usually there is a shortage of feed and the nutritive value of those present is low.

Only dystocia (25.00%) and vaginal prolapses (7.81%) were reported to be conditions previously experienced by the cows. The cow's latest medical and treatment record should be cautiously evaluated, thereafter determining whether the condition resulted from progression of or as a complication of a pre-existing disease, or from inadequate treatment or misdiagnosis (Carson et al. 1978). It is important to mention that another factor such as bovine brucellosis, which was not assessed in this study, might be implicated in the all discussed conditions. Brucellosis is known to induce abortion in the trimester and mostly during first calving after contamination. In addition, nutrition quality in pregnant cow needs to be monitored, as it might induce all these reproductive conditions.

CONCLUSION

This study was conducted in order to identify factors that influence the occurrence of reproductive conditions affecting cattle in Ngaka

Modiri Molema Districtof the North West province of South Africa. It was observed in this study that most of the cows were not given supplements and relied mostly on native grassland for feed. The majority of cows were found to be with a good body condition score. The difference in the breed types showed to have more significance than all of the other independent variable with P <0.05. There should also be an emphasis on enabling farmers to acquire skills through developmental training and provision of information regarding prevention strategies in relation to reproductive conditions in different breed types. These strategies will aid in the reduction of reproductive disorders and maximizing production.

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