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Prevalence and Clinical Manifestations of Ketosis in Cows in and Around Bikaner

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A B S T R A C T

The present study was conducted to determine prevalence of ketosis in cows in and around Bikaner and clinical manifestations in ketotic cows. Based upon test results 40 cows were diagnosed as ketotic. The overall prevalence of ketosis amongst post-parturient cows was found to be 11.42 per cent, age-wise prevalence of ketosis was highest in 8-9 years of age (35 per cent) and lowest in >9 (5 per cent) years of age, parity-wise prevalence of ketosis was highest in 3rd and 4th parity (25 per cent) and lowest in 1st and 6th (5 per cent), stage of lactation-wise prevalence of ketosis was highest in 1-2 i.e. 45% and lowest in 4-5 month i.e 2.5% after parturition and month-wise prevalence of ketosis was highest in January (25 per cent) and lowest in April (13 percent). The clinical examination of these animals revealed non significant elevation in temperature and pulse rate but mild decrease in respiration rate, but there was highly significant increase ($P<0.01$) in ruminal movement (per two min.) and milk yield (lt. Per day) in treated cows in all groups (A, B and C).

Introduction

According to livestock census (2007) Rajasthan has 1.24 crore cattle and 1.15 crore buffaloes. In that population Bikaner has 7.28 lacs cattle and 1.42 lacs buffaloes. The state produces approximately 8713 MT of milk per year, which is approximately 11 per cent of total milk production in the country. At the onset of lactation, the dairy cow must accommodate a tremendous increase in energy demand by the mammary gland for milk production. This is realized partly by increasing feed intake and partly by fat mobilization from adipose tissue. However, excessive fat mobilization can induce an imbalance in hepatic carbohydrate and fat metabolism, characterized by elevated concentrations of ketone bodies called hyperketonemia Haelst *et al.,* (2008). Ketosis is a production disease with high intensity of prolonged morbidity causing substantial loss in dairy industry (Holmes, 1950; Radostits *et al.,* (2010). Ketosis has become a very common metabolic disorder in modern dairy production by causing decrease in milk production and increase in prevalence and duration of fresh cow diseases, enhancing

time to conception, and augmenting risk of culling. The prevalence of ketosis in most of the common management systems after calving has not been explored entailing high production loss to the dairy farmers McKay (2012). Ketosis can be diagnosed by measuring ketone bodies present in urine, milk, and blood. Because of the economic consequences, it is imperative to diagnose ketosis in dairy cows, particularly during early lactation for treatment in advance and prevention of further losses. Bovine ketosis is of substantial economic significance and has been found to be responsible for decline in milk production even two weeks before its clinical appearance. Major economic losses have been attributed to the loss of milk yield and failure of the animals to return to the peak production potential even after recovery in clear cut cases of ketosis (Teli and Ali, 2007). In this study, prevalence of ketosis in cows in and around Bikaner was determined in respect of different months of year, different stages of lactation, different age group and different parities during 2017-2018.

Materials and Methods

Under the present study, a total of a total of 350 post parturient cows having a history of anorexia, drop in milk yield, history of parturition, feeding, stage of lactation and milk-yield was taken from owners. Observation was made regarding general symptoms and clinical observations including rectal temperature, pulse, respiration rate, ruminal movement and milk yield. Urine samples of 350 post-parturient cows belonging to the college dairy farm, outdoor patients brought for treatment at medicine clinic of College of Veterinary and Animal Science, Bikaner and individual animals shown by owners at their holdings in and around Bikaner were examined for prevalence of ketosis during 2017-2018.

Treatment trials

The ketotic animals under treatment were divided into three groups:

Group A (n=15) received Isoflud (Zydus AHL) containing Isoflupredone Acetate (2 mg/ml) @ dose rate of 20 mg per animal.

Group B (n=15) received Decadurabolin (Cadilla Health Care Ltd.) containing Nandrolone Decanoate 100 mg per animal.

Group C (n=10) showing glycosuria were given Human Actrapid (Insulin) containing 40 IU per ml.

Results and Discussion

In the present investigation total of 350 post parturient cows having a history of anorexia and drop in milk yield were included. These cows were screened for ketosis using modified Rothera's test. Based upon test results 40 cows were diagnosed as ketotic. Prevalence of clinical ketosis in 40 cows with respect to age, parity, stage of lactation and month of year was studied.

Overall prevalence

The overall prevalence of ketosis amongst post-parturient cows was found to be 11.42 per cent. The disease emerged after parturition and the prevalence was higher mainly in (a) Colder month, (b) During first and second month after parturition, (c) Second to fifth parity, and (d) cows aged up to 9 years.

The present study is in agreement with previous findings of (Bihani, 2001; Sharma, 2006; Sahoo *et al.*, 2009; Thirunavukkarasu *et al.*, 2010) who reported an overall prevalence of 12.50, 9.90, 10.20, 16.80 and 9.38 per cent, respectively. However, Yameogo *et al.*,

(2008) recorded low incidence rate of 4.40 and 6.43 per cent, and (Duffield, 2000; Pourjafar and Heidari, 2003) recorded higher incidence 30.33, 34 and 38 per cent, respectively in ketotic cows. The incidence can vary depending upon the breed, management practices and feeding regimens opted.

Age-wise prevalence

Analysis of age-wise prevalence of ketosis (Table 1) showed that it was highest in cows of in 8-9 years of age (35 per cent) followed by 7-8 (22.50 per cent), < 6 (20 per cent), 6-7 (17.50 per cent) and > 9 (5 per cent) years of age. Similar findings were previously reported by (Mir and Malik, 2002; Bihani *et al.,* 2001 and Sharma, 2006), who reported the highest prevalence of cows in the age group of 8-9 years.

Parity-wise prevalence

Parity-wise prevalence of ketosis (Table 2) was highest in 3rd and 4th parity (25 per cent), followed by 2nd and 5th (20 per cent) and 1st and 6th (5 per cent). The present investigation is in agreement with (Bihani, 2001; Sharma, 2006), who reported highest prevalence in 3rd and 4th parity.

Lactation-wise prevalence

Stage of lactation-wise prevalence of ketosis (Table 3) between 0-1, 1-2, 2-3, 3-4 and 4-5 month after parturition was 37.50, 45, 10, 5 and 2.50 per cent respectively. Similar findings were given by (Chakrabarti, 2006; Sharma, 2006; Teli and Ali, 2007; Radostitis *et al.,* 2007; Nazifi *et al.,* 2008), who have reported maximum cases within one month after parturition. These figures suggested that prevalence of clinical ketosis among lactating cows were maximum in first two months of lactation, when the animals are in peak phase of production. One of the reason is that at this stage there is maximum physiological stress due to post-parturient depletion of body reserves and lactational stress due to high milk production.

Month-wise prevalence

Month-wise prevalence of ketosis (Table 4) was highest in January (25 per cent), followed by February (20 percent), March (15 per cent), May and June (13.50 per cent) and April (13 percent). The present study is in agreement with (Bihani, 2001; Sharma, 2006; Radostitis *et al.,* 2007). Who have reported highest prevalence in winter months because the animal have to divert a part of its energy to combat the stress of low temperature to maintain body temperature. Bhuin and Chakrabarti (1993) observed the highest incidence of ketosis from September to December month of the year.

Rectal temperature, pulse rate, respiration rate, ruminal movement and milk yield

The Mean ± SE value of temperature, pulse rate, respiration rate, ruminal movements and milk yield in ketotic cows are presented in Table 5, 6 and 7 for group A, B and C respectively.

The Mean ± SE value of temperature, pulse rate, respiration rate, ruminal movements and milk yield in ketotic cows in group A, B and C were (101.48±0.15, 101.44±0.20 and 101.48±20 °F), (56.27±1.02, 55.80±0.73 and 56.30±1.11 per min.), (19.27±0.63, 19.33±0.57 and 19.30±0.84 per min.), (1.60±0.19, 1.60±0.13 and 1.50±0.22 per two min.) and (5.58±0.15, 5.33±0.22 and 5.37±0.28 lt. per day) respectively. The Mean ± SE value of temperature, pulse rate, respiration rate, ruminal movements and milk yield in healthy cows were 101.26±0.23 °F, 55.60±1.76 per min., 19.90±0.90 per min.,

2.90±0.18 per two min. and 15.50±1.04 lt. per day, respectively.

Comparison of the results showed non significant elevation in temperature and pulse rate but mild decrease in respiration rate in all groups (A, B and C). Ruminal movement and milk yield were highly significant decreased (P<0.01) in all three groups (A, B and C) as compared to healthy values. The present study is in agreement with Sharma (2006). Similar findings were reported by Mir and Malik (2003). Panda (2003) reported 40.28 per cent reduction in milk yield in ketotic cows. Panda (2003) and Singh (2001) reported temperature, pulse rate and respiration rate were in normal physiological ranges. Ruminal movements and milk yield were reduced significantly (p<0.01).

Table.1 Age-wise prevalence

S.No.	Occurrence of ketosis	No. of ketotic cows	Per cent prevalence
	Age of cows in year		
1.	<6	8	20.0
2.	6-7	7	17.50
3.	7-8	9	22.50
4.	8-9	14	35.0
5.	>9	2	5.0

Table.2 Parity-wise prevalence

S.No.	Occurrence of ketosis	No. of ketotic cows	Per cent prevalence
	Parity of cows (Number)		
	First	2	5.0
	Second	8	20.0
	Third	10	25.0
	Fourth	10	25.0
	Fifth	8	20.0
	Sixth	2	5.0

Table.3 Lactation-wise prevalence

S.No.	Occurrence of ketosis	No. of ketotic cows	Per cent prevalence
	Stage of lactation in month		
1.	First (0-1)	15	37.50
2.	Second (1-2)	18	45.0
3.	Third (2-3)	4	10.0
4.	Fourth (3-4)	2	5.0
5.	Fifth (4-5)	1	2.50

Table.4 Month-wise prevalence (%)

S.No.	Occurrence of ketosis	No. of ketotic cows	Per cent prevalence
	Month of the year		
1.	January	6	25.0
2.	February	5	20.0
3.	March	10	15.0
4.	April	6	13.0
5.	May	8	13.50
6.	June	5	13.50s

Table.5 Mean ± SE value of clinical parameters in apparently healthy and ketotic cows (before and after treatment with Isofluid) (Group: A)

S.No.	Parameters	Healthy Cows (n=10)	Before treatment (n=15)	After treatment (N=15)
1	Body Temperature (°F)	101.26±0.23^{a}	101.48±0.15^{a}	101.51±0.11^{a}
2	Pulse Rate/Min	55.60±1.76^{a}	56.27±1.02^{a}	56.47±0.77^{a}
3	Respiration Rate/Min	19.90±0.90^{a}	19.27±0.63^{a}	19.87±0.53^{a}
4	Ruminal Movement/2 Min (**)	2.90±0.18^{c}	1.60±0.19^{a}	2.13±0.09^{b}
5	Milk Yield (in lit.) per day (**)	15.50±1.04^{c}	5.58±0.15^{a}	8.77±0.32^{b}

* ($p<0.05$) ** ($p<0.01$)
Means with different superscripted letters in the same row differ significantly

Table.6 Mean ± SE value of clinical parameters in apparently healthy and ketotic cows (before and after treatment with Decadurabolin) (Group: B)

S.No	Parameters	Healthy Cows (n=10)	Before treatment (n=15)	After treatment (N=15)
1	Body Temperature (°F)	101.26±0.23^{a}	101.44±0.20^{a}	101.53±0.15^{a}
2	Pulse Rate/Min	55.60±1.76^{a}	55.80±0.73^{a}	56.13±0.81^{a}
3	Respiration Rate/Min	19.90±0.90^{a}	19.33±0.57^{a}	19.33±0.63^{a}
4	Ruminal Movement/2 Min (**)	2.90±0.18^{b}	1.60±0.13^{a}	2.73±0.12^{b}
5	Milk Yield (in lit.) per day (**)	15.50±1.04^{c}	5.33±0.22^{a}	9.35±0.32^{b}

* ($p<0.05$) ** ($p<0.01$)
Means with different superscripted letters in the same row differ significantly

Table.7 Mean ± SE value of clinical parameters in apparently healthy and ketotic cows (before and after treatment with Insulin) (Group: C)

S.No.	Parameters	Healthy Cows (n=10)	Before treatment (n=15)	After treatment (N=15)
1	Body Temperature (°F)	101.26±0.23[a]	101.48±0.20[a]	101.64±0.18[a]
2	Pulse Rate/Min	55.60±1.76[a]	56.30±1.11[a]	56.60±0.98[a]
3	Respiration Rate/Min	19.90±0.90[a]	19.30±0.84[a]	19.70±0.87[a]
4	Ruminal Movement/2 Min (**)	2.90±0.18[b]	1.50±0.22[a]	2.50±0.17[b]
5	Milk Yield (in lit.) per day (**)	15.50±1.04[c]	5.37±0.28[a]	8.87±0.41[b]

*(p<0.05) ** (p<0.01)
Means with different superscripted letters in the same row differ significantly

In conclusion, the overall prevalence of ketosis amongst post-parturient cows was found to be 11.42 per cent, age-wise prevalence of ketosis was highest in 8-9 years of age (35 per cent) and lowest in >9 (5 per cent) years of age, parity-wise prevalence of ketosis was highest in 3rd and 4th parity (25 per cent) and lowest in 1st and 6th (5 per cent), stage of lactation-wise prevalence of ketosis was highest in 1-2 i.e 45% and lowest in 4-5 month i.e 2.5% after parturition and month-wise prevalence of ketosis was highest in January (25 per cent) and lowest in April (13 percent). Non significant elevation in temperature and pulse rate but mild decrease in respiration rate but ruminal movement and milk yield were highly significant decreased (P<0.01) in all three groups (A, B and C).

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