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Losses of milk production due to *Babesia bigemina* infection in a cross bred cow: A case study

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ABSTRACT

High rise of temperature (41.3 °C), hemoglobinurea, anorexia, decrease milk production, anemia and diarrhea were observed in a cross-bred cow of aged 4 years, maintained in the dairy farm of ICAR research complex for North Eastern Hill Region, Umiam, Meghalaya, India, in its 3 months of lactation. After examination of Giemsa stained blood smears and molecular diagnosis using polymerase chain reaction, the disease was diagnosed as babesiosis caused by *Babesia bigemina*. The animal was treated successfully with a single injection of 4,4' diamidine diazoamine benzene diacetate in recommended dose. No parasite was detected by examination of Giemsa stained blood smears after a period of 48 hours post treatment onwards. A total loss of 51.6 liter milk production and an economic loss of Rs.1032.00 due to decreased milk production were calculated for a period of 30 days, from this clinical case of babesiosis caused by natural *B. bigemina* in a cross-bred cow. This may be considered as first report

Key words: *Babesia bigemina*; cow; loss; milk production

INTRODUCTION

Tick borne hemoprotozoan diseases like babesiosis, theileriosis and anaplasmosis are considered as constrain in cattle production and improvement, leading to economic loss. The research work regarding economic losses due to hemoprotozoan diseases in cattle are mostly done in abroad (Bock *et al.*, 2004, Gharbi *et al.*, 2006, Kiveria, 2006). Babesiosis in cattle of India is generally caused by *Babesia bigemina*. Several reports on occurrence of babesiosis in cattle in India are available (Jithendran, 1997; Ravindran *et al.*, 2002, Garg *et al.*, 2004, Singh *et al.*, 2009) along with reports of hypoagalactia and successful treatment of babesiosis (Banerjee *et al.*, 2005, Wadhwa *et al.*, 2008). But nobody quantified the amount of decreased milk yield during infection and post treatment period with its economic losses. Hence, here an effort has been made to quantify the loss of milk production due to natural *B. bigemina* infection in a cross-bred cow, just to have an idea, as such types of specific reports particularly losses in milk production due to natural *B. bigemina* infection is not available from India.

MATERIALS AND METHODS

A cross-bred cow of aged 4 years, maintained in the dairy farm of ICAR research complex for NEH Region, Umiam, Meghalaya, in its 3 months of lactation (first lactation period) was found suffering from high rise of temperature (41.3 °C), hemoglobinurea (Fig. 1 and 2), anorexia, decrease milk production, anemia (Fig. 3) and diarrhoea. Blood samples of this cow was collected on the day of acute stage of infection, 48 hours post treatment (PT) and then at an interval of 3 days up to a period of 21 days PT for diagnosis and monitoring of the infection as well as to observe the effect of this infection on milk production.

After examination of Giemsa stained blood smears and molecular diagnosis using polymerase chain reaction, the disease was diagnosed as babesiosis caused by *B. bigemina* (Laha *et al.*, 2011) (Fig. 4). After confirmative diagnosis of *B. bigemina*, the cow was treated with a single dose of 4,4' diamidine diazoamine benzene diacetate by deep intra muscular injection in recommended dose with supportive treatment. The effect of *B. bigemina* infection on milk production of the infected cow was calculated by taking daily milk production data of the particular infected cow before the onset of clinical symptoms, during acute stage of infection and during PT periods every day up to a period of 45 days PT. From this data mean milk production per week was calculated. Daily average loss of milk production was calculated by deducting daily average milk production during disease condition from daily normal average milk yield. Statistical analysis of data was done using the software SPSS 15.

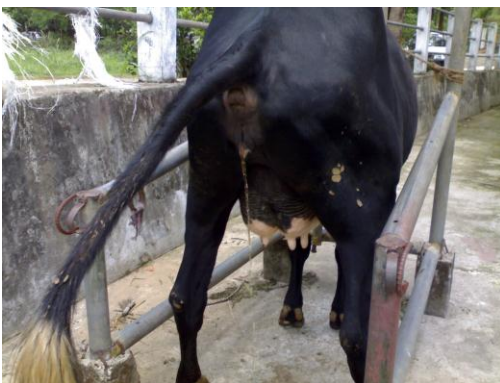


Fig. 1. Red colour urine as observed during acute stage of *B. bigemina* infection.

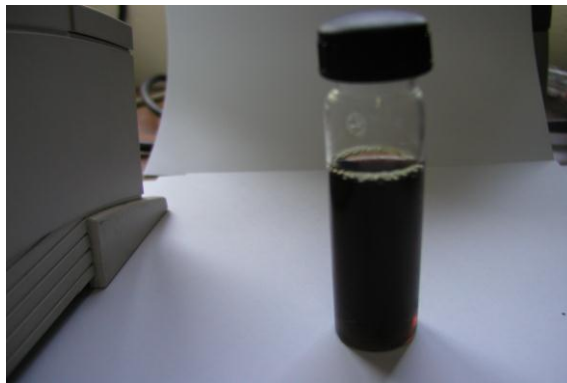


Fig. 2. Red colour urine as observed after collection in glass vial.



Fig. 3. Anemia observed during infection.

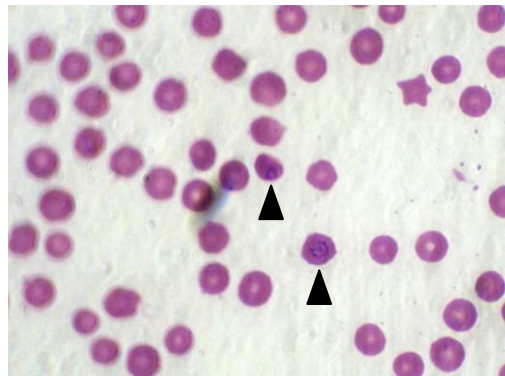


Fig.4: *Babesia bigemina* (arrowheads) in RBC of Giemsa stained blood smears.

RESULTS AND DISCUSSION

After 48 hours PT onwards, the animal was found negative for *B. bigemina* infections. The average milk production (in liter) per week has been presented in Table 1 and Fig. 5. It could be observed from this table and figure that there is significant decrease in milk production throughout the month of May in comparison to the months of April and June which were considered as months of normal milk yield of the cow. On 14th of May the cow showed acute clinical symptoms and on this day *B. bigemina* infection was diagnosed and treated. After treatment the milk production gradually increased and reached to normal production after 17 days PT. Average daily decrease milk production as observed was 1.72 liter (8.66 liter -

6.94 liter). This decrease milk production was noticed for 30days. Hence total decreased milk production during disease condition was calculated as $1.72 \times 30 = 51.6$ liter. And economic losses due to decreased milk production was estimated as $51.6 \times \text{Rs.}20.00$ (Price of milk Rs. 20.00 per liter as fixed by the Institute) = Rs.1032.00. For a period of one month the loss continued.

The clinical signs, hypoagalactia and successful treatment with Berenil as observed in the present study, also observed earlier in India (Banerjee *et al.*, 2005; Wadhwa *et al.*, 2008) but nobody quantified the amount of decreased milk yield during infection and PT period with its economic losses. The milk production was found as decreased from 2 weeks before the onset of acute clinical symptoms and continued up to 2 weeks after PT. During the sub clinical form of the disease there was also loss of milk production. During the post treatment period as there was no infection, so milk production also gradually increased but took time to recover its normal production. In a study Banerjee *et al.* (2005) observed that milk production of affected cow returned to its normal status after 18 days of initiation of treatment. In a study it has been observed that the total annual loss due to tick borne diseases (TBD) was estimated as 364 million USD and 6% of the total annual loss was estimated due to loss of milk production (Kiveria, 2006). An economic loss of Rs.1032.00 is estimated only due to loss of milk production as a result of this infection from one cow only. If we include the cost of medicines and fees of veterinarians and labour charges for management of animals during disease condition, the estimated losses will be more than Rs.1032.00, which may be considered as substantial amount for any Indian farmer. As there is no such report of economic losses due to natural *B. bigemina* infection in cross bred cow of India, this estimation will be helpful for farmers and veterinarians to have an idea regarding economic losses due to natural *B. bigemina* infection in a cross bred cow.

Table 1. Average milk production (in liter) per week

Months	Weeks	Daily Average Milk Production (ℓ) (Mean $\pm$ SE)	Overall (Mean $\pm$ SE)
April	1	8.60 ± 0.1573	$8.66^a \pm 0.0819$
	2	8.47 ± 0.1267	
	3	8.85 ± 0.0812	
	4	8.73 ± 0.3956	
May*	1	7.98 ± 0.2530	$6.94^b \pm 0.0615$
	2	6.07 ± 0.5069	
	3	5.70 ± 0.5186	
	4	8.02 ± 0.0993	
June	1	8.27 ± 0.2428	$8.05^a \pm 0.071$
	2	7.97 ± 0.1148	
	3	8.02 ± 0.1084	
	4	7.97 ± 0.1169	

Mean bearing different superscript in row differ significantly ($P < 0.05$).

*On 14th of this month the cow showed acute clinical symptoms. On this day *B. bigemina* infection was diagnosed and treated.

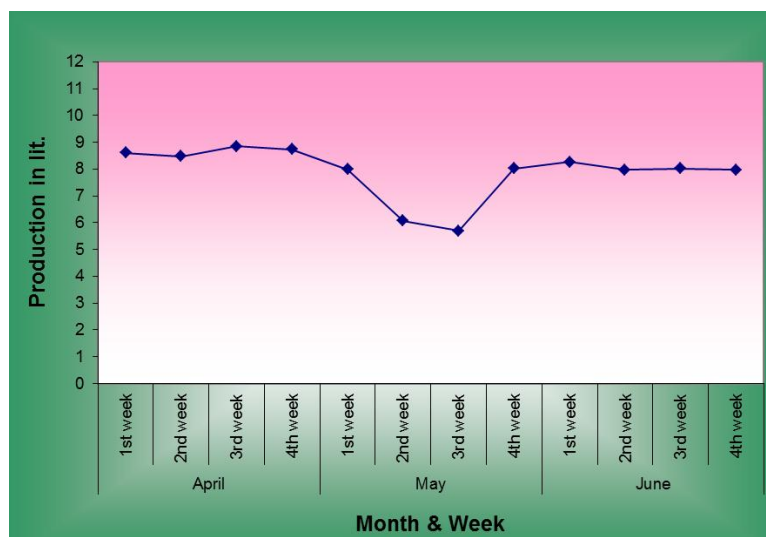


Fig. 5. Average milk production (in liter) per week

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