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Original Research Article

Effect of Disbudding on Haematological Parameters in Calves

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A B S T R A C T

The aim of the present investigation was to examine the effect on haematological profile before and after disbudding in calves. The study was carried out at the Instructional Livestock Farm Complex, College of Veterinary Science and Animal Husbandry, NDUAT, Kumarganj, Faizabad and nearby villages. Twenty four cattle calves were utilized to study haematological parameters (Hb (gm/dl), Neutrophil (%), Basophil (%), PCV (%), Lymphocyte (%), Monocyte (%), TLC (10^3/ µl), Eosinophil (%) and N/L ratio) before and after disbudding in to four groups viz. control (T_0), lignocaine (T_L), tremadol (T_T) and lignocaine + tremadol (T_{L-T}). After medication calves were disbudded by hot iron method. The blood samples were collected for haematological parameters just before (0h) and after disbudding on 6h, 24h and 72h. Haematological responses recorded before and after disbudding. The results showed that, at 24h, T_0 group showed significantly lowest Hb (10.66±0.49%) which was statistically similar to T_T and T_{L-T} groups but significantly different from T_L groups. At 0h, 6h and 72h means of PCV% were significantly different among treatment groups. There was no significant different in eosinophil, neutrophil and TLC among different treatment groups during the whole period of study. The lowest lymphocytes (64.00±1.00) was observed in T_T group which was statistically similar with T_{L-T} group but significantly differed with T_L and T_T groups at 6h. The T_0 group showed significantly lowest basophil (0.00±0.00) which was statistically similar to T_T and T_{L-T} groups but significantly different from T_L group at 6h. At the same interval, T_0 group showed significantly lowest monocytes (4.66±0.61) which was significantly different with T_L, T_T and T_{L-T} groups. At 6h, T_0 group showed significantly lowest N/ L ratio (0.15±0.01) which was statistically similar to T_T and T_{L-T} groups but significantly different from T_L group. It may be concluded that no significant difference was observed in eosinophil%, TLC, neutrophil% and monocyte% counts between control and treatment groups. However Hb%, basophil%, PCV% and lymphocyte% were significantly different between control and treatment groups. N/L ratio was significant only at 6h. Most of the cases T_{L-T} group showed comparatively better performance.

Keywords

Disbudding, Hematology, lignocaine, tremadol, N/L ratio, calves

Introduction

Disbudding is painful yet common husbandry practice in the cattle industry, especially on dairy farms, because hornless cattle are safer (ALCASDE, 2009) and injuries to cattle and other animals are reduced (Prayaga, 2007). Dehorned cattle are safer to handle and cause fewer injuries to workers, other cattle, and farm animals (Stafford and Mellor, 2005). Cattle are also dehorned to reduce bruising and hide damage and to meet transport requirements (Goonewardene and Hand, 1991; Faulkner and Weary, 2000; Prayaga, 2007). Several disbudding methods exist, including cautery, the use of caustic paste, and hot iron. All of these methods involve tissue damage and have been described as painful (Stafford and Mellor, 2005a; 2011). Disbudding calves at an early age (before 3-4 weeks) may help mitigate the pain and stress associated with the procedure. Removal of the horn before its attachment to the skull (disbudding) tends to create a more superficial and less traumatic wound, likely resulting in less pain and bleeding and a shorter healing time (Petherick, 2011). The *Model Code of Practice for the Welfare of Animals: Cattle*, however, strongly advises against caustic disbudding (PISC, 2004). The present study was undertaken to observe the effect of disbudding under local anesthesia on hematological responses on calves.

Materials and Methods

The aim of the present investigation was to examine the effect on haematological profile before and after disbudding in calves. The study was carried out at the Instructional Livestock Farm Complex, College of Veterinary Science and Animal Husbandry, NDUAT, Kumarganj, Faizabad and nearby villages. Twenty four farm born cattle calves of 2 to 3 weeks were randomly divided into four groups within each comprising of 3 males and 3 females, as per following plan:

Medication was done 5-10 minutes before disbudding. Two doses of ligocaine per bud were injected for cornual nerve block in calves. The needle for first injection was inserted, as close as possible, to caudal ridge of the root of the supra-orbit process (for blocking of cornual branch of the lacrimal nerve) to a depth of 1.0-1.5 cm.

Tramadol at prescribed dose was injected intramuscularly. In case of combined medication Lignocaine was injected first and then Tramadol was injected after 5 minutes, after final injection disbudding was performed. After medication calves were disbudded by hot iron method. After disbudding, antiseptic Soframycin skin cream® and Topicure Herbal spray® as fly repellent were applied on each bud till complete healing of wound. The blood samples were collected for haematological parameters just before (0h) and after disbudding on 6h, 24h and 72h. Haematological responses recorded before and after disbudding were as follows

Statistical analysis

Statistical analysis of data was done by using SPSS 20.0 software. The data obtained were subjected to variance (ANOVA) and mean were compared using Ducan's Multiple Range Test.

Results and Discussion

Twenty four cattle calves were utilized to study haematological parameters before and after disbudding in to four groups viz. control (T_0), lignocaine (T_L), tremadol (T_T) and lignocaine + tremadol (T_{L-T}). Results on different haematological parameters have been shown as below:

Heamoglobin (Hb)

The least squares mean of haemoglobin (%) of cattle calves at different intervals in different treatment groups have been shown in Table 1. At 24h and 72h Hb were significantly different among treatment groups.

At 24h, T_0 group showed significantly lowest Hb (10.66±0.49%) which was statistically similar to T_T and T_{L-T} groups but significantly different from T_L groups however, Doherty, *et al.*, (2007) found that there was no treatment or sampling time effects for the remaining blood measurements.

Packed Cell Volume (PCV)

The least squares mean of packed cell volume (%) of cattle calves at different intervals in different treatment groups have been shown in Table 1. At 0h, 6h and 72h means of PCV% were significantly different among treatment groups.

At 0h, T_0 group showed significantly lowest PCV (31.83±0.40) which was statistically similar to T_{L-T} group but significantly different from T_L and T_T groups. At 6h, T_0 group showed significantly lowest PCV (30.33±0.84) but significantly different from T_L, T_T and T_{L-T} groups. At 72h, T_0 group showed significantly lowest PCV (31.50±0.72) which was statistically similar to T_L and T_T groups but significantly different from T_{L-T} group however, Doherty, *et al.*, (2007) found that there was no treatment or sampling time effects for the remaining blood measurements.

Total Leucocytes Count (TLC)

The least squares mean of total leukocytes count (10^3/µl) of cattle calves at different intervals in different treatment groups have been shown in Table 1.

There was no significant different in TLC among different treatment groups during the whole period of study which is similar to the finding of Doherty, *et al.*, (2007).

Neutrophil (N)

The least squares mean of neutrophil (%) of cattle calves at different intervals in different treatment groups have been shown in Table 2. There was no significant different in neutrophil among different treatment groups during the whole period of study however, Doherty, *et al.*, (2007) observed that the percentage of circulating neutrophil was greatest ($p<0.05$) at 12 h with saline- and 2% lidocaine-treated animals.

Lymphocytes (L)

The least squares mean of lymphocytes (%) of cattle calves at different intervals in different treatment groups have been shown in Table 2. There was significantly different only at 6h among different treatment groups. At 6h lowest lymphocytes (64.00±1.00) was observed in T_T group which was statistically similar with T_{L-T} group but significantly differed with T_L and T_T groups however, Doherty, *et al.*, (2007) found that there was no treatment or sampling time effects for the remaining blood measurements.

Eosinophil (E)

The least squares mean of eosinophil (%) of cattle calves at different intervals in different treatment groups have been shown in Table 2. There was no significant different in eosinophil among different treatment groups during the whole period of study which is similar to the finding of Doherty, *et al.*, (2007).

Table.1 Least squares mean of Hb (%), PCV (%) and TLC (%) of cattle calves at different intervals in different treatments

Treatments	Time intervals			
	0 h	6 h	24 h	72 h
	Heamoglobin (Hb)			
Control (T_0)	11.16±0.30	10.16±0.30	^{a}10.66 ±0.49	^{a}11.16 ±0.30
Lignocaine (T_L)	11.67±0.21	10.83±0.31	^{b}12.00 ±0.00	^{ab}11.83 ±0.31
Tramadol (T_T)	11.64±0.19	10.83±0.30	^{ab}11.33 ±0.32	^{ab}11.33 ±0.21
Lignocaine + Tramadol (T_{L-T})	11.50±0.22	11.00±0.00	^{ab}11.16 ±0.17	^{b}12.00 ±0.00
Packed Cell Volume (PCV)				
Control (T_0)	^{a}31.83 ±0.40	^{a}30.33 ±0.84	31.67±0.61	^{a}31.50 ±0.72
Lignocaine (T_L)	^{b}34.00 ±0.73	^{ab}32.83 ±0.79	33.83±0.75	^{ab}33.83 ±0.75
Tramadol (T_T)	^{b}33.83 ±0.75	^{b}32.16 ±0.90	33.67±1.20	^{a}33.17 ±1.10
Lignocaine + Tramadol (T_{L-T})	^{ab}32.67 ±0.21	^{b}32.66 ±0.21	32.17±0.54	^{b}35.66 ±0.33
Total Leucocytes Count (TLC)				
Control (T_0)	7.33±0.42	6.67±0.33	7.50±0.34	7.83±0.54
Lignocaine (T_L)	7.50±0.34	7.68±0.34	7.67±0.33	7.66±0.33
Tramadol (T_T)	7.66±0.33	6.67±0.42	6.66±0.67	8.00±0.00
Lignocaine + Tramadol (T_{L-T})	6.83±0.65	7.01±0.68	7.33±0.42	7.67±0.33

Means with different superscripts in a column differ significantly ($p<0.05$)

Table.2 Least squares mean of Neutrophils (%) Lymphocytes (%) and Eosinophil (%) of cattle calves at different intervals in different treatments

Treatments	Time intervals			
	0 h	6 h	24 h	72 h
	Neutrophil (N)			
Control (T_0)	20.66±0.31	10.50±0.50	10.16±0.40	19.32±1.89
Lignocaine (T_L)	20.50±0.80	15.16±1.64	13.50±1.40	22.00±0.73
Tramadol (T_T)	19.66±0.32	12.67±1.68	12.31±1.20	20.31±0.61
Lignocaine + Tramadol (T_{L-T})	20.50±0.34	13.33±1.83	13.00±1.61	21.00±0.44
Lymphocytes (L)				
Control (T_0)	64.00±1.48	^{b}69.50 ±0.96	67.33±1.52	66.83±0.87
Lignocaine (T_L)	65.00±1.36	^{a}65.67 ±1.17	67.34±1.12	66.00±1.26
Tramadol (T_T)	62.67±0.88	^{a}64.00 ±1.00	66.33±1.41	65.66±1.40
Lignocaine + Tramadol (T_{L-T})	64.34±1.52	^{ab}66.83 ±0.91	65.67±0.92	68.65±0.42
Eosinophil (E)				
Control (T_0)	11.83±0.47	10.66±0.67	11.50±1.40	10.50±0.80
Lignocaine (T_L)	11.00±0.36	11.00±0.89	11.00±0.73	10.33±0.80
Tramadol (T_T)	11.83±0.40	10.83±0.40	12.50±1.14	11.83±1.40
Lignocaine + Tramadol (T_{L-T})	12.00±0.25	11.83±0.16	11.50±0.22	11.00±0.63

Means with different superscripts in a column differ significantly ($p<0.05$)

Table.3 Least squares mean of Basophil (%), Monocytes (%) and N/ L Ratio of cattle calves at different intervals in different treatments

Treatments	Time intervals			
	0 h	6th h	24th h	72nd h
	Basophil (B)			
Control (T_0)	0.16 ± 0.16	^{a}0.00 ±0.00	0.16±0.16	0.50±0.22
Lignocaine (T_L)	0.00±0.00	^{b}0.67 ±0.33	0.34±0.21	0.17±0.16
Tramadol (T_T)	0.50±0.22	^{ab}0.16 ±0.16	0.00±0.00	0.50±0.22
Lignocaine + Tramadol (T_{L-T})	0.33±0.21	^{a}0.00 ±0.00	0.33±0.21	0.00±0.00
Monocytes (M)				
Control (T_0)	5.83±0.54	^{a}4.66 ±0.61	6.00±0.44	6.00±0.52
Lignocaine (T_L)	5.67±0.62	^{b}6.34 ±0.62	7.00±0.68	6.33±0.34
Tramadol (T_T)	6.33±0.31	^{b}7.32 ±0.42	6.66±0.67	5.68±0.32
Lignocaine + Tramadol (T_{L-T})	5.32±0.30	^{b}6.33 ±0.33	6.17±0.54	6.00±0.56
N/ L Ratio (N/L)				
Control (T_0)	0.31±0.01	^{a}0.15 ±0.01	0.15±0.01	0.29±0.03
Lignocaine (T_L)	0.32±0.00	^{b}0.23 ±0.03	0.20±0.02	0.33±0.01
Tramadol (T_T)	0.31±0.01	^{ab}0.19 ±0.02	0.18±0.02	0.31±0.01
Lignocaine + Tramadol (T_{L-T})	0.32±0.01	^{ab}0.19 ±0.02	0.19±0.03	0.31±0.01

Means with different superscripts in a column differ significantly ($p<0.05$)

Treatment

Treatment	Medication
T_o	Control, no medication
T_L	Lignocaine hydrochloride (2%) @ 1 ml/ bud
T_T	Tramadol @ 0.25 mg/ kg body weight I/M
T_{L-T}	Lignocaine + Tramadol at above dose rate

Haematological responses recorded before and after disbudding

a) Hb (gm/dl)	d) Neutrophil (%)	g) Basophil (%)
b) PCV (%)	e) Lymphocyte (%)	h) Monocyte (%)
c) TLC (10^3/ µl)	f) Eosinophil (%)	i) N/L ratio

Basophil (B)

The least squares mean of basophil (%) of cattle calves at different intervals in different treatment groups have been shown in Table 3. There was significantly different only at 6h among different treatment groups. At 6h, T_0 group showed significantly lowest basophil (0.00±0.00) which was statistically similar to T_T and T_{L-T} groups but significantly different from T_L group however, Doherty, *et al.*, (2007) found that

there was no treatment or sampling time effects for the remaining blood measurements.

Monocytes (M)

The least squares mean of monocytes (%) of cattle calves at different intervals in different treatment groups have been shown in Table 3. There was significantly different only at 6h among different treatment groups. At 6h, T_0 group showed significantly lowest monocytes (4.66±0.61) which was significantly different with T_L, T_T and T_{L-T} groups however, Doherty, *et al.*, (2007) found that there was no treatment or sampling time effects for the remaining blood measurements.

N/ L Ratio (N/L)

The least squares mean of N/ L ratio of cattle calves at different intervals in different treatment groups have been shown in Table 3.

There was significantly different only at 6h among different treatment groups. At 6h, T_0 group showed significantly lowest N/ L ratio (0.15±0.01) which was statistically similar to T_T and T_{L-T} groups but significantly different from T_L group however, Doherty, *et al.*, (2007) observed that the neutrophil: lymphocyte ratio was greatest ($P<0.001$) at 12 h with saline- and 2% lidocaine-treated animals.

It may be concluded that no significant difference was observed in eosinophil%, TLC, neutrophil% and monocyte% counts between control and treatment groups. However Hb%, basophil%, PCV% and lymphocyte% were significantly different between control and treatment groups. N/L ratio was significant only at 6h. Most of the cases T_{L-T} group showed comparatively better performance.

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