

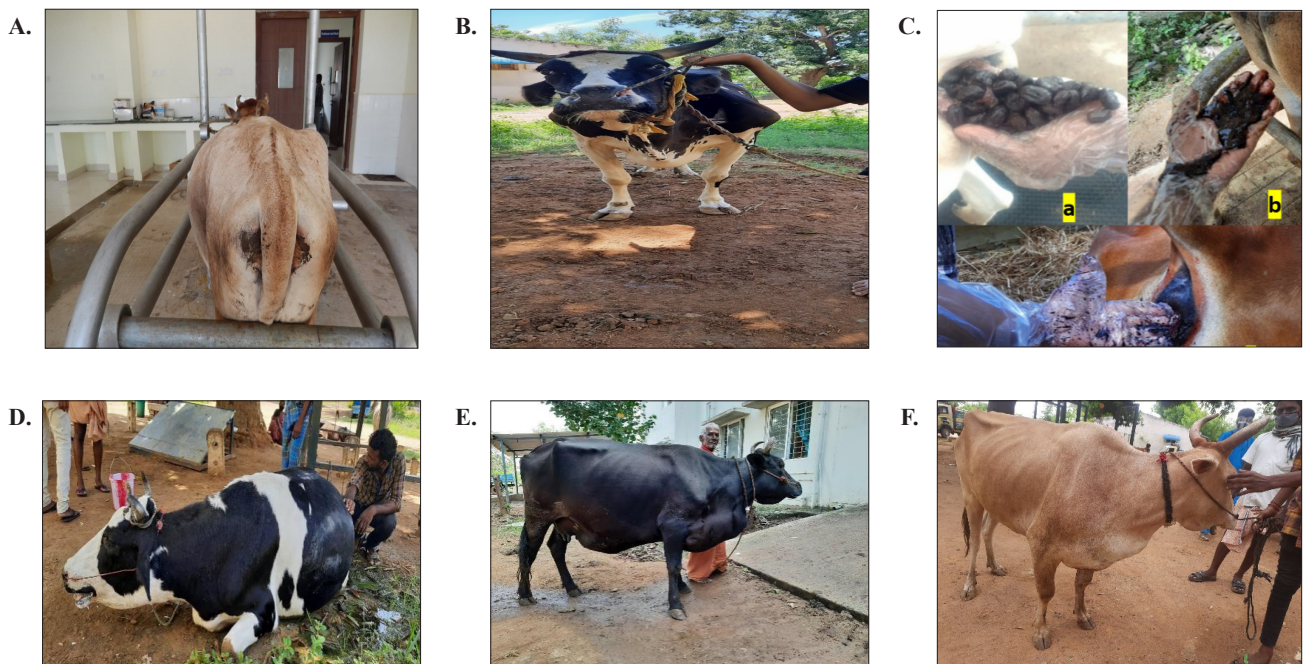


Comprehensive approaches to diagnose thoracic cavity disorders (TCD) in cattle

MUTHAMIZHSELVAN P¹, PREMALATHA N², MANI SARAVANAN^{3✉}, SATHESH KUMAR S³,
 SENTHIL KUMAR S⁴, VENKATESAN M⁴, YOGESHPRIYA S³ and VEERASELVAM M³

Tamil Nadu Veterinary and Animal Sciences University, Orathanadu, Thanjavur, Tamil Nadu 614 625 India

Received: 28 November 2023; Accepted: 1 February 2024



Supplementary Fig. 1. A. Cattle: Gas filled left flank (Bloat) due to Diaphragmatic hernia; B. Cattle: Abducted fore limb due to lung lesion; C. Cattle: dung - abnormal dung due to pericarditis. a) pelleted dung, b) scant dung and c) empty rectum; D. Cattle: Labored open mouth breathing due to severe pulmonary effusion; E. Cattle: Brisket, Jowl and ventral edema due to traumatic pericarditis; F. Cattle: Jugular vein engorgement due to traumatic pericarditis.

Supplementary Table 1. Clinical signs observed in thoracic cavity disorders in cattle (n=32)

Clinical parameter	Control (n=6)	DH (n=6)	LD (n=7)	CD (n=12)	Over all n=32 (%)
Inappetence	4 (66.67)	3 (42.86)	5 (41.67)	2 (28.57)	14 (43.75)
Anorectic	2 (33.33)	1 (14.29)	6 (50)	5 (71.43)	14 (43.75)
Abduction of elbow	3 (50)	4 (57.14)	7 (58.33)	6 (85.71)	20 (62.5)
Reluctant to move	2 (33.33)	2 (28.57)	4 (33.33)	3 (42.86)	11 (34.38)
Recumbent	0	0	4 (33.33)	4 (57.14)	8 (25)
Nasal discharge - serous	1 (16.67)	2 (28.57)	3 (25)	3 (42.86)	9 (28.13)
Nasal discharge - purulent	0	1 (14.29)	2 (16.67)	2 (28.57)	5 (15.63)
Nasal discharge - mucopurulent	0	1 (14.29)	0	0	1 (3.13)
Respiratory dyspnea	4 (66.67)	6 (85.71)	4 (28.57)	6 (85.71)	21 (65.63)
Bruxism	1 (16.67)	0	3 (25)	2 (28.57)	6 (18.75)
Grunting	4 (66.67)	5 (71.43)	8 (66.67)	6 (85.71)	23 (71.88)
Jugular vein engorgement	0	1 (14.29)	12 (100)	5 (71.43)	18 (56.25)
Jowl oedema	1 (16.67)	2 (28.57)	9 (75)	5 (71.43)	17 (53.13)
Brisket oedema	1 (16.67)	2 (28.57)	12 (100)	5 (71.43)	20 (62.5)
Ventral oedema	0	0	3 (25)	0	3 (9.38)
Muffled lung sound	1 (16.67)	4 (57.14)	2 (16.67)	3 (42.86)	10 (31.25)
Pleuritic rubbing sound	0	2 (28.57)	0	3 (42.86)	5 (15.63)
Fluid splashing in lung	0	1 (14.29)	0	1 (14.29)	2 (6.25)
Muffled heart sound	0	0	7 (58.33)	5 (71.43)	12 (37.5)
Pericardial rubbing sound	0	0	2 (16.67)	0	2 (6.25)
Fluid splashing in heart	0	0	3 (25)	2 (28.57)	5 (15.63)
Bloat	6 (100)	0	4 (33.33)	4 (57.14)	14 (43.75)
Suspended rumen motility	4 (66.67)	5 (71.43)	6 (50)	2 (28.57)	17 (53.13)
Absence of rumen motility	2 (33.33)	2 (28.57)	6 (50)	5 (71.43)	15 (46.88)
Positive slope test	0	0	2 (16.67)	3 (42.86)	5 (15.63)
Positive withers pinch test	0	0	4 (33.33)	2 (28.57)	6 (18.75)
Diarrhoea	1 (16.67)	1 (14.29)	4 (33.33)	2 (28.57)	8 (25)
Pellety feces	1 (16.67)	2 (28.57)	2 (16.67)	0	5 (15.63)
Scanty feces	2 (33.33)	1 (14.29)	3 (25)	2 (28.57)	8 (25)
Empty rectum	2 (33.33)	0	3 (25)	3 (42.86)	8 (25)

Supplementary Table 2. Haematology (Mean $\pm$ S.E) of healthy and diseased cattle

Parameter	Control (n=6)	DH (n=6)	LD (n=7)	CD (n=12)	LCD(n=7)	F-value
Hb (g/dL)	11.50 $\pm$ 0.40 ^c	7.70 $\pm$ 0.38 ^{ab}	9.21 $\pm$ 0.33 ^{bc}	6.91 $\pm$ 0.49 ^a	8.49 $\pm$ 0.23 ^{ab}	15.96 ^{**}
PCV (%)	35.50 $\pm$ 0.72 ^b	25.83 $\pm$ 1.70 ^a	28.14 $\pm$ 0.91 ^a	24.17 $\pm$ 1.64 ^a	29.71 $\pm$ 0.87 ^{ab}	8.89 ^{**}
RBC (x10 ⁶ /μl)	5.33 $\pm$ 0.06 ^c	3.79 $\pm$ 0.27 ^b	4.11 $\pm$ 0.16 ^b	3.01 $\pm$ 0.19 ^a	3.65 $\pm$ 0.11 ^{ab}	21.58 ^{**}
MCV (fL)	66.59 $\pm$ 1.43 ^a	68.81 $\pm$ 3.18 ^a	68.79 $\pm$ 1.81 ^a	83.16 $\pm$ 7.29 ^a	81.63 $\pm$ 2.68 ^a	2.14 ^{NS}
MCH (pg)	21.57 $\pm$ 0.78 ^a	20.64 $\pm$ 1.17 ^a	22.59 $\pm$ 0.98 ^a	23.80 $\pm$ 1.96 ^a	23.38 $\pm$ 1.07 ^a	0.64 ^{NS}
MCHC (g/dl)	32.37 $\pm$ 0.71 ^a	30.17 $\pm$ 1.67 ^a	32.80 $\pm$ 0.90 ^a	29.04 $\pm$ 1.67 ^a	28.62 $\pm$ 0.71 ^a	1.70 ^{NS}
WBC (x10 ³ /μl)	5.47 $\pm$ 0.82 ^a	9.50 $\pm$ 1.87 ^{ab}	14.16 $\pm$ 1.46 ^{bc}	20.66 $\pm$ 2.18 ^c	13.16 $\pm$ 1.91 ^{abc}	9.08 ^{**}
Neutrophil – Mature (%)	32.00 $\pm$ 0.86 ^a	39.00 $\pm$ 1.21 ^{ab}	47.00 $\pm$ 3.18 ^{bc}	54.67 $\pm$ 1.34 ^{cd}	58.14 $\pm$ 2.85 ^d	25.31 ^{**}
Neutrophil-Immature (%)	0.33 $\pm$ 0.21 ^a	1.50 $\pm$ 0.22 ^a	3.71 $\pm$ 1.06 ^{ab}	10.67 $\pm$ 1.57 ^c	8.86 $\pm$ 1.14 ^{bc}	12.85 ^{**}
Neutrophil-Total (%)	32.33 $\pm$ 0.95 ^a	40.50 $\pm$ 1.12 ^b	50.71 $\pm$ 2.26 ^c	65.33 $\pm$ 1.27 ^d	67.00 $\pm$ 2.67 ^d	69.80 ^{**}
Lymphocytes (%)	59.50 $\pm$ 1.06 ^d	50.17 $\pm$ 0.91 ^c	41.00 $\pm$ 2.01 ^b	25.08 $\pm$ 1.60 ^a	22.29 $\pm$ 2.49 ^a	73.94 ^{**}
Monocytes (%)	4.83 $\pm$ 0.31 ^a	5.50 $\pm$ 0.50 ^a	5.00 $\pm$ 1.23 ^a	5.92 $\pm$ 0.34 ^a	6.43 $\pm$ 0.90 ^a	0.81 ^{NS}
Eosinophils (%)	2.67 $\pm$ 0.49 ^a	3.17 $\pm$ 0.60 ^a	2.86 $\pm$ 1.22 ^a	3.67 $\pm$ 0.40 ^a	4.29 $\pm$ 1.21 ^a	0.605 ^{NS}
Basophills (%)	0.67 $\pm$ 0.33 ^a	0.67 $\pm$ 0.33 ^a	0.43 $\pm$ 0.20 ^a	0.00 $\pm$ 0.00 ^a	0.00 $\pm$ 0.00 ^a	3.38 ^{NS}
Platelet (x10 ⁵ /μl)	3.17 $\pm$ 0.20 ^b	2.84 $\pm$ 0.35 ^{ab}	2.20 $\pm$ 0.14 ^{ab}	2.12 $\pm$ 0.18 ^a	2.55 $\pm$ 0.30 ^{ab}	3.40 [*]

Where, Hb – haemoglobin, PCV – Packed cell volume, RBC – Red blood cell, MCV - Mean Corpuscular volume, MCH – Mean Corpuscular haemoglobin, MCHC - Mean Corpuscular hemoconcentration, WBC – White blood cells.

Supplementary Table 3. Serum biochemistry (Mean $\pm$ S.E) of healthy and diseased cattle

Parameter	Control (n=6)	DH (n=6)	LD (n=7)	CD (n=12)	LCD(n=7)	F-value
TP (g/dL)	7.45 $\pm$ 0.24 ^b	7.07 $\pm$ 0.23 ^{ab}	6.22 $\pm$ 0.18 ^{ab}	5.83 $\pm$ 0.35 ^a	5.95 $\pm$ 0.32 ^a	4.79 ^{**}
Albumin (g/dL)	3.49 $\pm$ 0.07 ^c	3.13 $\pm$ 0.20 ^{bc}	2.66 $\pm$ 0.13 ^{ab}	2.47 $\pm$ 0.12 ^a	2.64 $\pm$ 0.14 ^{ab}	8.57 ^{**}
Globulin (g/dL)	3.97 $\pm$ 0.29 ^a	3.94 $\pm$ 0.17 ^a	3.56 $\pm$ 0.15 ^a	3.36 $\pm$ 0.31 ^a	3.31 $\pm$ 0.28 ^a	1.10 ^{NS}
A/G ratio	0.91 $\pm$ 0.09 ^a	0.81 $\pm$ 0.07 ^a	0.76 $\pm$ 0.05 ^a	0.79 $\pm$ 0.07 ^a	0.84 $\pm$ 0.09 ^a	0.48 ^{NS}
BUN (mg/dL)	26.83 $\pm$ 2.24 ^a	38.33 $\pm$ 8.52 ^a	29.43 $\pm$ 1.15 ^a	41.83 $\pm$ 5.07 ^a	31.57 $\pm$ 4.19 ^a	1.68 ^{NS}
Creatinine mg/dL)	1.05 $\pm$ 0.03 ^a	1.14 $\pm$ 0.08 ^a	1.22 $\pm$ 0.07 ^a	1.23 $\pm$ 0.07 ^a	1.25 $\pm$ 0.12 ^a	0.90 ^{NS}
Glucose (mg/dL)	71.83 $\pm$ 2.71 ^b	57.67 $\pm$ 2.60 ^{ab}	42.86 $\pm$ 3.98 ^a	45.17 $\pm$ 4.60 ^a	41.29 $\pm$ 4.34 ^a	7.73 ^{**}
Cholesterol (mg/dL)	114.17 $\pm$ 10.57 ^b	87.83 $\pm$ 8.17 ^{ab}	76.14 $\pm$ 4.67 ^a	61.58 $\pm$ 6.96 ^a	65.14 $\pm$ 3.84 ^a	7.97 ^{**}
ALP (U/L)	96.00 $\pm$ 16.47 ^a	114.00 $\pm$ 16.06 ^a	248.57 $\pm$ 24.37 ^c	237.42 $\pm$ 17.90 ^{bc}	157.71 $\pm$ 13.18 ^{ab}	13.15 ^{**}
AST (U/L)	64.17 $\pm$ 3.22 ^a	114.33 $\pm$ 29.70 ^{ab}	169.57 $\pm$ 26.31 ^b	185.67 $\pm$ 18.76 ^b	106.29 $\pm$ 14.31 ^{ab}	5.75 ^{**}

Where, TP - Total protein, BUN - Blood Urea Nitrogen ALP - Alkaline phosphatase, AST - Aspartate aminotransferase.

Supplementary Table 4. Electrolytes (Mean $\pm$ S.E) of healthy and diseased cattle

Parameter	Control (n=6)	DH (n=6)	LD (n=7)	CD (n=12)	LCD(n=7)	F-value
Sodium (mmol/L)	134.95 $\pm$ 0.7 ^a	133.38 $\pm$ 0.9 ^a	130.90 $\pm$ 1.96 ^a	130.17 $\pm$ 1.54 ^a	133.36 $\pm$ 1.07	1.83 ^{NS}
Potassium (mmol/L)	5.35 $\pm$ 0.10 ^b	4.17 $\pm$ 0.12 ^a	4.76 $\pm$ 0.14 ^{ab}	4.75 $\pm$ 0.25 ^{ab}	4.53 $\pm$ 0.20 ^{ab}	3.16 [*]
Chloride (mmol/L)	100.28 $\pm$ 0.43 ^a	101.72 $\pm$ 2.84 ^a	93.77 $\pm$ 2.70 ^a	100.83 $\pm$ 2.34 ^a	102.73 $\pm$ 1.64 ^a	2.07 ^{NS}
Total Calcium (mg/dL)	12.18 $\pm$ 0.11 ^c	10.00 $\pm$ 0.13 ^b	8.31 $\pm$ 0.29 ^a	8.55 $\pm$ 0.41 ^a	7.74 $\pm$ 0.24 ^a	23.84 ^{**}
Phosphorus (mg/dL)	4.54 $\pm$ 0.18 ^c	4.30 $\pm$ 0.17 ^{bc}	3.53 $\pm$ 0.15 ^b	2.26 $\pm$ 0.26 ^a	2.22 $\pm$ 0.20 ^a	21.92 ^{**}
Magnesium (mmol/L)	2.37 $\pm$ 0.16 ^b	2.13 $\pm$ 0.17 ^{ab}	1.95 $\pm$ 0.13 ^{ab}	2.20 $\pm$ 0.13 ^{ab}	1.56 $\pm$ 0.29 ^a	2.65 [*]