






## Main diseases of cattle in the midwestern region of São Paulo state<sup>1</sup>

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**ABSTRACT.**- Bromberger C.R., Oliveira J.P.M., Costa A.M.D., Amorim R.M., Borges A.S. & Oliveira-Filho J.P. 2023. **Main diseases of cattle in the midwestern region of São Paulo state.** *Pesquisa Veterinária Brasileira* 43:e07216, 2023. Departamento de Clínica Veterinária, Faculdade de Medicina Veterinária e Zootecnia, Universidade Estadual Paulista "Júlio de Mesquita Filho", Rua Prof. Doutor Walter Mauricio Correa s/n, Cx. Postal 560, Botucatu, SP 18618-681, Brazil. E-mail: [jose.oliveira-filho@unesp.br](mailto:jose.oliveira-filho@unesp.br)

São Paulo state is one of the country's largest producers of beef and milk, and the midwestern region plays a key role in this production, as half of São Paulo's cattle herd is found in this region. These numbers alone demonstrate the importance of livestock in this region. Therefore, this study aimed to describe the main epidemiological and clinical signs in cattle cases at the Large Animal Hospital at FMVZ-Unesp, located in the midwestern region of São Paulo state. The present retrospective study assessed 638 clinical cases of cattle treated from January 2010 to December 2019 (10 years). Digestive system diseases were the most prevalent, diagnosed in 30.3% of patients, followed by neurological diseases (19.1%) and respiratory diseases (10.5%). The other diseases were distributed in decreasing order as follows: musculoskeletal (7.8%), hematopoietic (6.1%), genitourinary (5.6%), metabolic and nutritional (5.5%), neonatal (4.7%), cutaneous (2.6%), poisoning (2.5%), lymphatic (2.2%), cardiovascular (1.6%) and other diseases (1.4%). Rabies, a fatal zoonotic disease, was the main cause of death in this study and the main disease associated with neurological signs (23.7%). Recognizing the main diseases of cattle in this region will promote the adoption of prophylactic measures to minimize their occurrence and manage treatment to avoid economic losses and decreased productivity of herds.

INDEX TERMS: Retrospective study, ruminants, cattle, risk factors, diseases.

**RESUMO.**- [Principais doenças de bovinos na região centro-oeste do estado de São Paulo.] O estado de São Paulo é um dos maiores produtores de carne e leite bovino do país e a região centro-oeste do estado tem papel fundamental nessa produção, pois possui a metade do rebanho de bovinos do estado. Portanto, este estudo descreve os principais achados clínicos e epidemiológicos de bovinos atendidos no Hospital de Grandes Animais da FMVZ/Unesp, localizado na região centro-oeste paulista. Foi realizado um levantamento nos arquivos da Clínica de Grandes Animais do Hospital Veterinário da FMVZ-Unesp, Botucatu/SP, dos 638 casos clínicos de bovinos atendidos de janeiro de 2010 a dezembro

de 2019. Enfermidades do sistema digestório foram as mais prevalentes (30,3%), seguidas das doenças neurológicas (19,1%) e respiratórias (10,5%). As demais enfermidades foram distribuídas, em ordem decrescente, em: musculoesquelético (7,8%), hematopoiético (6,1%), geniturinário (5,6%), cutânea (2,6%), linfático (2,2%) e cardiovascular (1,6%) ou foram classificadas em doenças metabólicas e nutricionais (5,5%), neonatais (4,7%), tóxicas (2,5%) ou outros distúrbios (1,4%). A raiva, uma zoonose fatal, foi a principal causa de óbito neste estudo e a principal doença neurológica (23,7%). O reconhecimento das principais doenças dos bovinos desta região permite a adoção de medidas profiláticas e de manejo para minimizar sua ocorrência e evitar perdas econômicas com o tratamento e menor produtividade do rebanho.

TERMOS DE INDEXAÇÃO: Estudo retrospectivo, ruminantes, bovinos, fatores de risco, doenças.

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## INTRODUCTION

Brazil has the second largest cattle herd in the world, with approximately 213 million heads, and it is the second largest meat producer (10.4 million tons of carcass/year) (ABIEC 2021) and the fifth largest dairy producer (33 billion tons of milk/year) in the world (Embrapa 2018). Cattle rearing is an important part of agribusiness, and São Paulo state is responsible for 37% of the national meat production and is the sixth largest dairy producer in the country, with 1.6 billion tons of milk/year, which corresponds to 5% of the national dairy production (Embrapa 2018). Sanitary control for food safety and herd quality is fundamental to maintaining cattle rearing as an agribusiness segment (Lucena et al. 2010). Recognizing the diseases that affect cattle and adopting strategies to reduce their economic impact is essential to maximizing production in this area.

Epidemiological and/or clinical records of the most important diseases affecting cattle were reported in the states of Goiás (Terra et al. 2018), Mato Grosso (Rondelli et al. 2017), Mato Grosso do Sul (Ribas et al. 2013), Paraná (Sprenger et al. 2015), Rio Grande do Sul (Sanches et al. 2000, Lucena et al. 2010, Mello et al. 2017, Borowsky et al. 2019), Santa Catarina (Camargo et al. 2014), Tocantins (Burns et al. 2013), and in the northeastern semiarid region (Galiza et al. 2010, Marques et al. 2018). These epidemiological records can help veterinarians investigate clinical cases and adopt prevention and control measures for beef and dairy cattle diseases (Lucena et al. 2010, Burns et al. 2013, Mello et al. 2017). This study aimed to describe the main epidemiological and clinical signs in cattle cases at the Large Animal Hospital at FMVZ-Unesp, Botucatu, located in the midwestern region of São Paulo state.

## MATERIALS AND METHODS

This retrospective study was performed using the clinical records of cattle admitted to the Large Animal Hospital at "Faculdade de Medicina Veterinária e Zootecnia", "Universidade Estadual Paulista 'Júlio de Mesquita Filho'" (FMVZ-Unesp), Botucatu (22°53'09" S, 48°26'42" W), Brazil, from January 2010 to December 2019. Information according to the propriety location, day of clinical attendance, age, sex, breed, aptitude, production system, clinical signs and evolution of the case, diagnosis, time of hospitalization, organic system affected, and season of admission were analyzed. Records were analyzed individually, regardless of whether the disease affected only the animal admitted to the hospital or occurred as an outbreak.

The cattle were divided into groups according to their age, as suggested by Lucena et al. (2010): newborn (until one day of birth), calf (from one day of birth to 12 months of age), stirk (steer or heifer from 13 months of age to 24 months), young adult (bull, ox or cow from 25 months of age to 60 months), and adult (bull, ox or cow more than 60 months of age). The diseases were classified according to the organic system affected. Although metabolic diseases and nutritional disturbances were classified as "metabolic and nutritional diseases", multiple systemic diseases in animals under ten days of age were classified as "neonatal diseases", intoxications, independent of the cause, were clustered as "poisonings", and cases in which no specific system was affected were classified as "other disturbances". Beyond that, no surgical or inconclusive cases were included in this report.

The statistical analysis was performed according to the disease distribution, classification, and diagnosis. This report was approved by the Ethics and Animal Use Commission (CEUA-FMVZ-Unesp, Botucatu), protocol number 0165/2020.

## RESULTS

A total of 2,166 animals were admitted to the hospital during the study period, including 786 (36.3%) horses, 657 (30.3%) cattle, 650 (30%) small ruminants (sheep and goats), 51 (2.4%) swine, and 22 (1%) buffaloes. A diagnosis was established in 97.1% (638/657) cases, and 2.9% (19/657) were inconclusive and removed from the study.

The 638 cattle (417 [65.4%] females and 221 [34.6%] males) were categorized according to their age, wherein 1.7% (11/638) were newborns, 41.2% (263/638) were calves, 13% (83/638) were stirks, 22.3% (142/638) were young adults, and 18.8% (120/638) were adults; no age was provided for 3% (19/638) of the cases. Among the breeds, the Nelore (21.9%, 140/638), Holstein (18%, 115/638), and Girolando (16.3%, 104/638) breeds were the most prevalent, followed by the Gir (3.3%, 21/638), Jersey (3.3%, 21/638), Simental (3.3%, 21/638), Angus (2.5%, 16/638), Brahman (1.6%, 10/638) and Miniature Cattle (1.3%, 8/638) breeds. Each of the other breeds (Red Angus, Tabapuã, Guzerá, Senepol, Caracu, Bonsmara, Guzolando, Brown Swiss, Bradford, Hereford, Wagyu, Simbrasil, Marchigiana, Charolais, and Hotlander) represented 0.7% of the cases and cumulatively totaled 4.7% (30/638) of the cases. The mixed breed represented 23.8% (152/638) of the cases.

According to their aptitude, 51% (327/638) and 44% (279/638) of the cattle were raised for dairy and beef production, respectively. In addition, 2% (13/638) were classified as pets, and 3% (19/638) had no aptitude classification. The animals raised in an extensive system of production represented 55% (347/638) of the cases, and those raised in semi-intensive and intensive systems represented 20% (130/638) and 14% (89/638) of the cases, respectively. For 11% (72/638) of the cases, no system of production was reported. In general, admissions were distributed throughout the year, i.e., 21.0% (134/638) in summer, 28.5% (182/638) in spring, 27.3% (174/638) in winter, and 23.2% (148/638) in autumn months. Digestive diseases were the most prevalent diseases (30.3%, 193/638), followed by neurologic (19.1%, 122/638) and respiratory (10.5%, 67/638) diseases. The other diseases accounted for 42.2% (256/638) of the cases in this study (Table 1).

The main digestive diseases involved the intestines and prestomachs, representing 39.4% (76/193) and 24.3% (47/193) of the cases, respectively. A total of 16.1% (31/193) of the patients had peritoneal disease; abomasum diseases were diagnosed in 9.3% (21/193) of the cases, and 4.7% of the patients presented with mixed disturbances, where more than one organ was affected. In 2.1% of the patients, the organs affected were the esophagus, liver, and oral cavity, accounting for four cases per affected organ.

In the cattle affected with neurological diseases, 30.3% (37/122) of the lesions were located in the brain, 28.7% (35/122) were located in the spinal cord, 27.8% (34/122) were multifocal lesions, and 13.9% were located in the periphery. The main respiratory diseases were bronchopneumonia and pneumonia, which were diagnosed in 92.5% (62/67)

**Table 1. Classification of the diseases diagnosed in 638 clinical cases of cattle admitted to the Large Animal Hospital at FMVZ-Unesp Botucatu from 2010 to 2019, distribution according to the age of the animals\***

Disease	Newborn	Calf	Stirk	Young adult	Adult	UN**	Total
Digestive	1	70	34	42	43	3	193
Neurological	2	60	18	21	18	3	122
Respiratory	2	27	8	19	7	4	67
Skeletal-muscle	--	18	4	13	13	2	50
Haematopoietic	1	27	3	5	1	2	39
Genitourinary	--	13	4	9	9	1	36
Metabolic and nutritional	--	7	4	10	12	2	35
Neonatal	5	24	--	--	--	1	30
Cutaneous	--	8	1	4	4	--	17
Poisoning	--	6	3	6	1	--	16
Lymphatic	--	1	1	8	4	--	14
Cardiovascular	--	1	2	4	2	1	10
Other diseases	--	1	1	1	6	--	9
TOTAL	11	263	83	142	120	19	638

\* According to Lucena et al. (2010), \*\* UN = uninformed.

of the cases, of which 7.5% (5/67) of cases were classified as laryngitis (2 cases), pleurisy (2 cases), and metastatic carcinoma (1 case).

The other clinical cases were classified into the following categories: skeletal-muscle (7.8%, 50/638), hematopoietic (6.1%, 39/638), genitourinary (5.6%, 36/638), metabolic and nutritional (5.5%, 35/638), neonatal (4.7%, 30/638), cutaneous (2.6%, 17/638), poisoning (2.5%, 16/638), lymphatic (2.2%, 14/638), cardiovascular (1.6%, 10/638), and other diseases (1.4%, 9/638).

The time of hospitalization varied between one and 85 days, where 38% (243/638) of the patients were hospitalized for two to seven days, 37.1% (237/638) were hospitalized for only one day, 16.8% (107/638) were hospitalized between seven and 14 days, and 8% (51/638) were hospitalized for more than 15 days.

The patients who had been discharged represented 45.1% (288/638) of the cases, 25.5% (163/638) of the cases resulted in death, and 24% (153/638) of the patients were euthanized. A total of 5.3% (34/638) of the patients were referred to surgical or reproductive services.

The disease classification according to the age of the patients is described in Table 1. The digestive, neurological, and other diseases are described in Table 2, 3, and 4, respectively.

## DISCUSSION

The Large Animal Hospital at FMVZ-Unesp, Botucatu, treats diseases associated with the respiratory, digestive, nervous, urinary, cardiovascular, hematopoietic, and cutaneous tracts. Additionally, reproductive tract, orthopedic, surgical, and infectious diseases are treated by other sectors of the Veterinary Hospital. This dynamic justifies the number of referred cases and the number of infectious diseases in comparison to previous studies conducted in Brazil (Lucena et al. 2010, Camargo et al. 2014, Sprenger et al. 2015, Rondelli et al. 2017).

Approximately 75% of the cattle in this study were raised in an extensive or semi-intensive production system, with an aptitude for dairy. This characteristic was closely related to the prevalence of digestive, respiratory, and neurological diseases observed in this study, which contrasts with the

observations in studies with confined cattle, where respiratory, locomotor, and metabolic diseases were more prevalent due to the environment, animal population and diet offered to the animals (Gagea et al. 2006, Thomsen et al. 2012, Baptista et al. 2017).

The most prevalent diseases in our study were associated with the digestive tract; enteritis (65/193), peritonitis (25/193), and an abomasal ulcer (18/193) were the most commonly reported diseases. According to Marques et al. (2018), incorrect management techniques, inadequate diet, and late identification of clinical signs are predisposing factors for these diseases. In northern and northeastern Brazil, a high prevalence of digestive diseases in cattle has been observed (Burns et al. 2013, Marques et al. 2018). Marques et al. (2018) described that in the semiarid region, ruminoreticulum disturbances were more frequent, in contrast with our results, where cases of intestinal disturbances associated with enteritis occurred more frequently due to the number of calves admitted, representing 40% of the cattle and the main age affected.

In a study about mortality causes in cattle carried out in the southern region of Brazil, enteritis (miscellaneous causes) was the fourth main cause of death in cattle (Molossi et al. 2021). In the present study, most patients with enteritis (62%) were calves, and the main causative agent observed was *Eimeria* spp. (20%). This corroborates Reginato et al. (2020), who consider eimeriosis to be one of the most important diseases in calves raised in an extensive or semi-intensive production system and responsible for economic losses associated with the treatment and control of the infection and growth failure in affected animals.

The cases of peritonitis were associated with adult and young adult animals, whereas abomasal ulcers and enteritis primarily affected animals under 24 months of age. Clinically, these patients showed unspecific signs, as described by Francoz & Guard (2015), such as lethargy, anorexia, weight loss, dehydration, hypomotility of the digestive tract, and eventually recumbency.

Neurological diseases were the main cause of mortality in cattle, as observed in a study performed in the semiarid

**Table 2. Digestive diseases diagnosed in 193 clinical cases of cattle admitted to the Large Animal Hospital at FMVZ-Unesp Botucatu from 2010 to 2019**

Digestive disease	N	Digestive disease	N	Digestive disease	N
Intestinal	39.4%	Prestomach	24.4%	Peritoneum	16.0%
Enteritis	65	Simple indigestion	14	Peritonitis	25
Intestinal obstruction	3	Vagal indigestion	10	Mesothelioma	5
Intestinal abscess	1	Ruminal overload	5	Mesenteric abscess	1
Intussusception	1	Traumatic reticulopericarditis	5	Total	31
Necrohaemorrhagic colitis	1	Frothy bloat	4	Abomasum	9.0%
Malignant catarrhal fever	1	Ruminal lactic acidosis	3	Abomasal ulcer	13
Rectal prolapse	1	Free gas bloat	2	Abomasum rupture	3
Rupture of the colon	1	Traumatic reticuloperitonitis	2	Left displaced abomasum	2
Stenosis of the colon	1	Ruminal foreign body	1	Right displaced abomasum	1
Virus bovine diarrhoea	1	Omasal compaction	1	Abomasal impaction	2
Total	76	Total	47	Total	21
Mixed	4.7%	Oral cavity	2.1%	Oesophagus	2.1%
Abomasal ulceration/enteritis	3	Salivary gland carcinoma	1	Oesophageal obstruction	2
Abomasal ulceration/colibacillosis	1	Pharyngitis	1	Oesophageal rupture	1
Abomasal ulceration/peritonitis	1	Salivary gland hyperplasia	1	Oesophageal neoplasia	1
Abomasal impaction/enteritis	1	Squamous cell carcinoma	1	Total	4
Total	6	Total	4	Liver	2.1%
				Hepatitis	3
				Liver abscess	1
				Total	4
				TOTAL 193 (100%)	

**Table 3. Neurological diseases diagnosed in 122 clinical cases of cattle admitted to the Large Animal Hospital at FMVZ-Unesp Botucatu from 2010 to 2019**

Neurological disease	N	Neurological disease	N
Brain	29.5%	Spinal cord	28.7%
Encephalitis	14	Disco-spondylitis	8
Bacterial encephalitis	4	Myelitis	8
Cerebral babesiosis	4	Vertebral fracture	8
Polioencephalomalacia	3	Vertebral trauma	4
Cerebellar syndrome	3	Vertebral empyema	3
Cerebellar hypoplasia	2	Lumbosacral injury	1
Cerebral abscess	2	Lumbosacral mass	1
Cerebral syndrome	1	Perivertebral carcinoma	1
Encephalitis (BoHV)	1	Subluxation C3	1
Encephalitis ( <i>Trypanosoma</i> sp.)	1	Total	35
Enzootic bovine leukosis	1		
Meningitis	1		
Total	37		
Multifocal lesions	27%	Peripheral nervous system	13.9%
Rabies	29	Radial nerve paralysis	9
Encephalomyelitis	2	Botulism	5
Degenerative myeloencephalitis	1	Tetanus	2
Lymphoma	1	Sciatic nerve paralysis	1
Total	33	Total	17
		TOTAL 122 (100%)	

region of Brazil, Mato Grosso, and Mato Grosso do Sul; rabies was the principal disease responsible for the death of these animals (Galiza et al. 2010, Ribas et al. 2013, Rondelli et al. 2017). However, in other regions, such as Rio Grande do Sul, Tocantins, and Santa Catarina, plant intoxication was the main cause of mortality in cattle (Lucena et al. 2010, Burns et al. 2013, Camargo et al. 2014).

Rabies, a fatal zoonotic disease, was diagnosed in 23.7% (29/122) of the cases that presented with neurological signs, representing 4.5% (29/638) of total cases, consistent with previous reports in many regions of the country (Sanchez et al. 2000, Galiza et al. 2010, Rondelli et al. 2017, Terra et al. 2018, Molossi et al. 2021). Corroborating other studies (Terra et al. 2018, Molossi et al. 2021), in the present study, the age of the affected animals ranged from one month to 10 years old, the evolution of the disease ranged from one to nine days, and 62.1% and 37.9% of the animals were euthanized or died naturally. The clinical signs were associated with the paralytic form of the disease, including a decrease in consciousness level, blindness, sialorrhoea, involuntary movements, convulsions, paresis, ataxia, and lateral recumbency. In the Southern region of Brazil, the highest number of rabies outbreaks is observed in late summer and autumn, although the disease has occurred at all times of the year (Ladeira et al. 2013, Molossi et al. 2021). In the present study, fall was the season with the greatest number of these cases (55%), consistent with other studies (Lemos 2005, Ribas et al. 2013), which indicated that the possible seasonality observed in cases of rabies could be associated with the biological cycle of *Desmodus rotundus*,

the main reservoir of the virus in Brazil. Ladeira et al. (2013) attributed the increase in herbivore rabies outbreaks in Rio Grande do Sul, Brazil, to the decrease in animal vaccination and the lack of bat population control. These conditions are also observed in the midwestern region of São Paulo, where bats establish colonies under the numerous highways that cross the region. Additionally, environmental legislation prevents the effective control of bats.

The significant prevalence of cases of respiratory disease, pneumonia and bronchopneumonia (62/67) is related to the system of production since 52.2% (37/52) of bronchopneumonia cases involved animals raised in extensive or semi-intensive systems. Studies have shown that confined animals have a high incidence of respiratory diseases due to the environment and stressful conditions, which are responsible for losses in production and important mortality in these animals (Gagea et al. 2006, Rondelli et al. 2017).

As described previously (Assis-Brasil et al. 2013), pneumonia and bronchopneumonia primarily affect calves, and this was consistent in our study (26/62). Studies performed in the states of Minas Gerais and Rio Grande do Sul reported respiratory diseases as the main cause of death in calves (Assis-Brasil et al. 2013, Baptista et al. 2017); however, in our study, most of

the animals affected by respiratory diseases were discharged after treatment. In addition, no correlation was observed with the season, although, as described by Driemeier & Moojen (2007), many risk factors were observed in the anamnesis related to incorrect management techniques and poor sanitary control, failure of passive immune transfer (FPIT), and poor environmental hygiene, which may contribute to the occurrence of these diseases.

Patients who presented with diseases associated with the skeletal-muscle system accounted for 50 cases (7.8%), and 74% (37/50) of these patients were in permanent recumbency due to fractures of the limbs or pelvis, myositis, and ligament ruptures. Skeletal muscle and traumatic diseases are important causes of recumbency in cattle (Dahlberg 2012, Simões 2015). In a study performed in Canada, this diagnosis was observed in one-third of cattle in recumbency. In these cases, it is difficult to establish whether the lesion is the cause of the recumbency or is secondary to it (Dahlberg 2012), making it necessary to perform complementary exams associated with the animal's clinical history to identify the primary cause.

The hematopoietic system was affected in 6.1% (39/638) of the patients admitted, whereas bovine anaplasmosis and complex babesiosis disease were diagnosed in 79.5% (31/39)

**Table 4. Other diseases diagnosed in 323 cases of cattle admitted to the Large Animal Hospital at FMVZ-Unesp Botucatu from 2010 to 2019**

Disease	N	Disease	N	Disease	N	Disease	N
Respiratory	10.5% <sup>a</sup>	Haematopoietic	6.1%	Metabolic/nutritional	5.5%	Poisoning	2.5%
Pneumonia/bronchopneumonia	62	Anaplasmosis/babesiosis	31	Malnutrition	19	Organophosphate	4
Laryngitis	2	Trypanosomiasis	5	Hypocalcaemia	12	Arsenic	2
Metastatic carcinoma	1	Anaemia by tick infestation	2	Ketosis	2	Ivermectin	2
Pleurisy	2	Haemorrhage	1	Hypoglycaemia	1	Nitrate	2
Total	67	Total	39	Hypomagnesemia	1	Sodium	2
				Total	35	Carbamate	1
						Snakebite accident	1
Skeletal-muscle	7.8%	Genitourinary	5.6%	Neonatal	4.7%	Vinasse	1
Limb fracture	6	Omphalitis	8	Neonatal triad	15	Unknown cause	1
Myositis	6	Metritis	5	FPIT <sup>b</sup>	5	Total	16
Emphysematous carbuncle	5	Bovine enzootic haematuria	3	Immaturity/Prematurity	5		
Laminitis/hoof deformity	4	Urachal diverticulum rupture	3	Malformation	5	Lymphatic	2.2%
Ligament rupture	4	Bladder rupture	2	Total	30	Leukosis	13
Polyarthrititis	4	Leptospirosis	2			Lymphadenopathy	1
Pelvis fracture	3	Urolithiasis	2			Total	14
Traumatic myositis	3	Bladder neoplasia	1	Cutaneous	2.6%		
Muscle abscess	3	Cystitis	1	Photosensitivity	5	Cardiovascular	1.6%
Coxofemoral luxation	2	Hydropsy uteri	1	Dermatophylosis	4	Pericarditis	5
Septic Osteoarthritis	2	Penile adhesion	1	Dermatophytosis	2	Endocarditis	3
White muscle disease	2	Placentitis	1	Flegmão	2	Cardiac abscess	1
Epiphysitis	1	Pyometra	1	Dermatitis	1	Sepsis	1
Gas gangrene	1	Urethral rupture	1	Haematic cyst	1	Total	10
Maternal obstetrical paralysis	1	Uterine torsion	1	Otitis media	1		
Meniscus Tear	1	Vaginal laceration	1	Papilomatosis	1	Other diseases	1.4%
Lumbar vertebral fracture	1	Vaginal prolapse	1	Total	17	Senility	7
Rupture of <i>Peroneus tertius</i>	1	Vaginitis	1			Electrocution	1
Total	50	Total	36			Mastitis	1
						Total	9
						TOTAL 323 (100%)	

a Percentage refers to the total number of cases assessed (n=638), b failure of passive immune transference.

of these cases. In other regions of the country, a high prevalence of this disease has been reported (Almeida et al. 2006, Lucena et al. 2010, Camargo et al. 2014, Sprenger et al. 2015, Rondelli et al. 2017). Haemoprotzoan infections were the principal cause of death in cattle in the southern region (18.2%). This number of deaths may be explained by the predominance of cattle of European breeds (*Bos taurus taurus*) in that region (Molossi et al. 2021), as these breeds may be more susceptible to these agents than Zebu breeds (Garcia et al. 2022). As described by Gonçalves et al. (2011) and Rondelli et al. (2017), the disease primarily affects calves due to their lack of passive immunity and lower response capacity.

Omphalitis was the main disease associated with the genitourinary system, affecting eight patients (8/36), all of which were calves with ages ranging between 10 days and nine months. Infection of the navel and adjacent structures is common in calves. It is associated with environmental contamination and FPT, where lack of hygiene and negligent navel healing after birth are predisposing factors of umbilical infections (Reis et al. 2009, Rodrigues et al. 2010).

In our study, metabolic or nutritional disorders occurred more frequently than in other studies performed in Brazil (Lucena et al. 2010, Camargo et al. 2014, Sprenger et al. 2015, Rondelli et al. 2017, Borowsky et al. 2019). The prevalence of these disorders was 80% in females (28/35), and 97% of the affected animals were raised in extensive (26/35) or semi-intensive systems (4/35). Cases of malnutrition (19/35) and hypocalcemia (12/35) were the most prevalent. Animals with malnutrition showed progressive loss of weight, recumbency, apathy, and dehydration; only 14.3% (5/19) of patients were discharged, and the other patients died (8/19) or were euthanized (6/19).

Hypocalcaemia cases have similar epidemiology, as described by Goff (2015), with a higher prevalence in dairy females after birth (10/12). After treatment with calcium, only one cow did not show clinical improvement, resulting in its death. This disease occurs due to nutritional management failures during lactation, leading to an energetic imbalance and alterations in calcium regulation and concentration in the blood (Fecteau 2005, Goff 2015).

Neonatal diseases affected 4.7% of the animals (30/638), and 48.4% (15/31) were patients with neonatal hypothermia, hypoglycemia, and dehydration triad. The age of these patients varied from one to 10 days, and this manifestation was associated with a lack of care after birth, weak calves at birth, or FPIT. Observation of the birth and the calf in the first hours after birth allows for the recognition of affected animals and the institution of treatment, thereby improving the chances of recovery of these animals (House 2015).

The other categories of diseases in this study were cutaneous, poisoning, lymphatic, cardiovascular, and other diseases, which individually represented less than 3% of each of the cases and are not discussed in this study.

## CONCLUSION

This study summarizes the main diseases affecting cattle in the midwestern region of São Paulo state, aligning our findings with those of other studies in different regions of the country. This information may help veterinarians manage the most prevalent diseases and help prevent and control these diseases.

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