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Original Article
Livestock Diseases

Cutaneous diseases diagnosed in cattle in southern Brazil from 2000 to 2022[1]

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ABSTRACT.- Venancio F.R., Alberti T.A., Engelmann T.M., Sallis E.S.V. & Schild A.L. 2024. **Cutaneous diseases diagnosed in cattle in southern Brazil.** *Pesquisa Veterinária Brasileira 44:e07458, 2024*. Laboratório Regional de Diagnóstico, Faculdade de Veterinária, Universidade Federal de Pelotas, Campus Universitário s/n, Pelotas, RS 96010-900, Brazil. E-mail: alschild@terra.com.br

A retrospective study of skin diseases diagnosed in cattle from 2000 to 2022 was performed at the "Laboratório Regional de Diagnóstico" of the "Faculdade de Veterinária" of the "Universidade Federal de Pelotas" (LRD-UFPel) to determine the main skin diseases that affect cattle in southern Brazil. Information regarding epidemiological data, lesions and diagnosis was collected. The diseases were grouped into infectious/inflammatory, toxic, nonneoplastic proliferative and neoplastic. The macroscopic aspects, distribution, histopathology, and evolution of the lesions were obtained in the protocols, and the original diagnosis was preserved. The main skin diseases diagnosed during this period occurred during outbreaks. They were infectious, with an emphasis on dermatophilosis, papillomatosis and dermatophytosis, followed by hepatogenous photosensitization, which was included in the group of toxic diseases. Among the neoplasms, squamous cell carcinoma stood out, occurring in isolated cases, reflecting an irrelevant cause of economic losses.

INDEX TERMS: Cattle, dermatophilosis, dermatophytosis, dermatopathies, epidemiology, photosensitization, papillomatosis.

RESUMO.- [Doenças de pele diagnosticadas em bovinos na região sul do Rio Grande do Sul.] Foi realizado um estudo retrospectivo das enfermidades de pele diagnosticadas no Laboratório Regional de Diagnóstico da Faculdade de Veterinária da Universidade Federal de Pelotas (LRD-UFPel), no período de 2000 a 2022, com o objetivo de determinar as principais dermatopatias que afetam bovinos na região sul do RS. Foram coletadas informações referentes aos dados epidemiológicos, lesões observadas e diagnóstico. As enfermidades foram agrupadas em infecciosas/inflamatórias, tóxicas, proliferativas não neoplásicas e neoplásicas. Os aspectos macroscópicos, distribuição, histopatologia e evolução das lesões foram obtidos nos protocolos e o diagnóstico original foi preservado. Conclui-se que as principais enfermidades cutâneas diagnosticadas no período ocorreram em surtos e eram infecciosas, destacando-se a dermatofilose, a papilomatose e a dermatofitose, seguidas pela fotossensibilização hepatógena incluída no grupo das enfermidades tóxicas. Dentre as neoplasias destacou-se o carcinoma celular escamoso que ocorreu em casos isolados, refletindo um prejuízo irrelevante.

TERMOS DE INDEXAÇÃO: Bovinos, dermatofilose, dermatofitose, dermatopatias, epidemiologia, fotossensibilização, papilomatose.

INTRODUCTION

In ruminants, skin diseases are responsible for intense discomfort. They can manifest as pruritic, alopecic, nodular or crusted lesions resulting from primary involvement of the skin or secondary damage to other systems (Scott 2018). Most of these diseases occur in different species of ruminants and may present variations in the severity of the lesions and the

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evolution of clinical signs, causing variable economic losses (Macêdo et al. 2008, Faccini et al. 2022).

Among Brazilian states, Rio Grande do Sul (RS) is currently the 7th largest cattle producer in the country (IBGE 2017). The meat and milk production chain in the State of Rio Grande do Sul has great economic-social importance and power for regional integration, with the possibility of increasing added value from its byproducts (IBGE 2017). For these reasons, the health of livestock is fundamental and includes skin diseases, as these, in most cases, despite not being causes of death, lead to considerable economic losses due to the costs of veterinarians, medication and labor. Furthermore, there are important losses in terms of the performance of affected animals in the production of milk, meat and other derivatives.

These skin diseases can have different etiologies and among them are those related to nutritional problems (Hensel 2010), infectious agents (Motta et al. 2010, Foster 2012, Panziera et al. 2016, Soares et al. 2017, Bertagnolli et al. 2020, Pereira & Meirelles 2023a), neoplasms (Reis et al. 2017), those associated with allergic processes (Dutra 1998, Santos et al. 2021, Schild 2023) and those caused by the action of toxic agents (Knupp et al. 2016, Santos et al. 2017, Amado et al. 2018, Mendonça et al. 2021).

Several studies carried out throughout Brazil related to skin diseases in ruminants, and horses reveal that the prevalence of these diseases varies considerably according to the study region (Salles et al. 1992, Casagrande et al. 2008, Knupp et al. 2016, Reis et al. 2017, Amado et al. 2018). Therefore, retrospective and prospective studies of the different skin diseases that affect these animal species in different regions of the country are essential for determining their epidemiology, pathogenesis, pathology and prevalence and helping field veterinarians and rural producers control and prevent these diseases, reducing the losses they cause in livestock production (Lucena et al. 2010, Rondelli et al. 2017, Amado et al. 2018).

The objective of this study was to carry out a retrospective study on skin diseases that affect cattle in the region of influence of the "Laboratório Regional de Diagnóstico", "Faculdade de Veterinária" of the "Universidade Federal de Pelotas" (LRD-UFPel) over 22 years to determine under which epidemiological conditions they occur, in addition to describing the pathology and pathogenesis of these diseases, helping to prevent and control them and thus minimizing the losses caused to regional livestock farming.

MATERIALS AND METHODS

A retrospective study of skin diseases diagnosed at LRD-UFPel from 2000 to 2022 was carried out. Information regarding epidemiological data (species, breed, sex, age, distribution of lesions and time of year of occurrence) and diagnosis was collected from the LRD necropsy protocols. The diseases were grouped into inflammatory/infectious, toxic, nonneoplastic proliferative and neoplastic. The affected animals were classified as calves up to 12 months old, steers 13 to 24 months old, young adults aged 25 to 60 months, adults aged between 61 months and 10 years (beef and cow) or elderly individuals older than 10 years old. The macroscopic aspects, distribution, histopathology, and evolution of the lesions were obtained in the protocols, and the original diagnosis was preserved. When necessary, paraffin blocks were retrieved from the LRD-UFPel collection to perform special staining and immunohistochemistry (IHC) techniques to complement the characterization of the lesions and the diagnosis.

RESULTS

From January 2000 to December 2022, 4,067 materials/cadavers of the bovine species were received from the LRD-UFPel, 150 (3.7%) of which were diagnosed as having diseases of the integumentary system. During this period, 100 (66.6%) of the 150 materials were investigated via biopsy, 20 (13.3%) via autopsy, and 27 (18.0%) were other materials, such as skin scrapings, hair and swabs from skin lesions that were analyzed for bacterial and fungal culture.

Of the 150 cases/outbreaks, 102 (68.0%) were diagnosed in females, 39 (26.0%) in males, and nine (6.0%) did not have this information in the necropsy protocols. Regarding age, 19 (12.7%) materials were diagnosed in cattle up to 12 months old, 31 (20.7%) from 12 to 24 months, 25 (16.7) from 25 to 60 months, 47 (31.3%) from 61 months to 10 years, six (4.0%) older than 10 years, and 21 (14.0%) for whom age was not included in the necropsy protocols. Of the 150 diagnoses of skin diseases, 82 (54.7%) individuals had inflammatory or infectious lesions, 39 (26.0%) had neoplasms, 23 (15.3%) had skin diseases of toxic origin, and six (4.0%) had nonneoplastic proliferative skin diseases. The diagnoses of the 150 cases/outbreaks and a summary of the epidemiology are presented in Table 1.

The cases of dermatophilosis occurred mainly in spring (10 cases); the others were distributed in summer and autumn,

Table 1. Skin diseases diagnosed in southern Brazil from 2000 to 2022 at the "Laboratório Regional de Diagnóstico" of the "Universidade Federal de Pelotas" (LRD-UFPel)

Infectious/inflammatory	Number	%
Dermatophilosis	22	26.8
Papillomatosis	17	20.7
Bacterial dermatitis	13	15.8
Dermatophytosis	12	14.6
Lechiguana	4	4.9
Pythiosis	4	4.9
Botryomycosis	3	3.6
Pododermatitis	3	3.6
Parasitic dermatitis	2	2.5
Viral udder dermatitis	1	1.3
Folliculitis	1	1.3
TOTAL	82	100%
Neoplasms		
Squamous cell carcinoma	31	79.5%
Fibrosarcoma	4	10.3%
Fibroma	2	5.1%
Melanoma	2	5.1%
TOTAL	39	100%
Toxic		
Hepatogenic photosensitization	15	65.3%
Dermatitis due to defatted rice bran	3	13%
Ramaria flavo-brunnescens	3	13%
Primary photosensitization	2	8.7%
TOTAL	23	100%
Others		
Acanthosis and hyperkeratosis	4	66.7%
Granulation tissue	2	33.3%
TOTAL	6	100%

with four cases each and three cases in winter. Most of the affected cattle were under 12 months of age (13 cases); in three cases, the cattle were older than 1.5 years. In seven cases, the lesions were widespread. In the remaining cases, the lesions were located on the hind limbs (3 cases), back (3 cases), face and neck (2 cases), and in one case, the lesion was observed at the insertion of the tail. In five cases, there was no information on the location of the lesions in the necropsy protocol. The lesions were characterized by hyperplastic dermatitis with disseminated crusted plaques, areas of alopecia and wrinkling of the skin (Fig.1). These injuries were similar in all cases, with greater or lesser distributions and severities.

Out of the 17 papillomatosis cases, seven had more than one affected animal on their farm, and 10 had individual cases. The distribution of the lesions varied: in five cases, the lesions were widespread, four were on the head and neck, three were on the limbs, and one was on the udder. In four cases, the location of the papilloma was not mentioned in the protocol. Most of the affected cattle were up to 24 months of age. Among the 17 cases, the disease affected between two and 17 animals, with a prevalence varying from 3.33% to 33.3%.

Dermatophytosis was diagnosed mainly in winter (six diagnoses), and the remaining cases were diagnosed in summer (three cases) or spring (two cases), while one case was diagnosed in autumn. Ten outbreaks of this disease and two individual cases were observed. The age of the affected cattle varied from one-month-old calves to adult cattle. The prevalence of this disease ranged from 5% to 100% of the animals in the affected herds.

During the period studied, four cases of proliferative fibrogranulomatous panniculitis (lechiguana) were diagnosed, all in municipalities in the LRD-UFPel influence region on properties with native forests. The affected animals were two to four years old, and the tumors were located in the mandibular region, the left lateral region of the thorax, the scapula region, and one patient. The lesion was observed in the region of the hind limb. In two cases, the tumors measured 35x28x11cm and 33x33x19cm. In two cases, biopsies were sent, and it was not possible to determine the size of the tumors.

Pythiosis was observed in four-year-old cattle aged one and a half years, all in the summer months; it affected the distal region of the limbs in two outbreaks and one individual case and the limbs and snout of the animals in another outbreak. In all four cases, the animals remained in low-lying and marshy areas. The lesions in all affected cattle were characterized by ulcerated and hemorrhagic areas (Fig.2) that resolved spontaneously.

Of the 31 diagnoses of squamous cell carcinoma (SCC), 25 occurred in the Holstein breed, two in crossbred animals, two in the Bradford breed and two in which the animal's breed was not included in the necropsy protocol. Of the 31 SCC diagnoses, 16 occurred in the periocular region, 13 occurred in the perineal region, and in two cases, there was no information on the tumor's location in the protocol. Most of the affected cattle were older than six years, except for one that was two years old, another four years old and another five years old.

Seventeen photosensitization outbreaks were diagnosed during the study period; 15 were classified as hepatogenous photosensitization, and two were primary photosensitization. The two primary photosensitization outbreaks occurred in spring. Out of the 15 outbreaks of hepatogenic photosensitization, five

Fig.1. Dermatophilosis in cattle. Hind limb with plates of varying sizes covered by crusts. There are areas of alopecia and roughness of the skin.

Fig.2. Pythiosis in cattle. Ulcerated lesion with hemorrhage in the right supranasal region.

occurred in spring, five in autumn, four in summer and one in winter. Cases of hepatogenic photosensitization occurred in areas of native grassland, rice or soybean stubble, and ryegrass and oat pastures. The lesions were characterized by mucopurulent ocular discharge (Fig.3), peeling of the snout and ulceration of the ventral surface of the tongue in animals with dark skin. In animals with areas of white skin, the lesions extended across these areas with ulceration, dryness and detachment of the epidermis. Primary photosensitization occurred in two rice stubble plants, where *Polygonum* sp. was present in moderate amounts. The disease affects different categories from 10 months of age to adult animals. Morbidity during outbreaks ranged from 0.43% to 40%, and mortality ranged from 0.05% to 3.7%.

Three outbreaks of poisoning by *Ramaria flavo-brunnescens* were diagnosed during the study period. Morbidity ranged from 35% to 37%, and lethality ranged from 16% to 36%. The outbreaks occurred between April and May in cattle in eucalyptus reforestation areas. Skin lesions were characterized by loss of long tail hair and loosening of the horns, in addition to other lesions that affected the oral mucosa, esophagus, and rumen papillae.

Dermatitis due to the consumption of defatted rice bran (DRB) was diagnosed on three occasions. The prevalence of rot was 6%, 44.4% and 50% in the animals in native fields and began to receive defatted rice bran mixed with feed in different proportions. The affected cattle were between four months and three years old. In one of the outbreaks, DRB, including soybean hulls, soybean bran, wheat bran and ground corn, represented 0.08% of the feed administered. In the other outbreaks, the composition and quantity of DRB administered to cattle were not included in the protocols. The lesions began to appear eight days, 20 days and 30-40 days after the three outbreaks, respectively. They were generally characterized by proliferative dermatitis that began in the pastern region, accompanied by the formation of crusts and cracks in the skin (Fig.4). The lesions regressed within a few days after bran was removed from the diet in all the outbreaks.

The number of patients diagnosed with other skin diseases was insignificant, and the illnesses all manifested as individual cases.

DISCUSSION

The 150 cases of diseases of the integumentary system diagnosed in cattle from 2000 to 2022 in the LRD-UFPel represented 3.7% of all performed diagnoses. These findings demonstrated that these diseases are important in the region, mainly because the most common were infectious and inflammatory diseases, representing more than half of the cases of skin diseases (54.7%). In Brazil, there is little information on the prevalence of skin diseases in cattle, with reports of only specific diseases and isolated outbreaks (Gabriel et al. 2008, Leal et al. 2017, Reis et al. 2017, Soares et al. 2017, Mendonça et al. 2021).

In the present study, dermatophilosis was the main skin disease affecting cattle, occurring mainly in the spring and representing 15% of all skin cases received at LRD-UFPel during the study period. This fact is probably related to the climate since humid days occur with frequent rains interspersed with sunny periods in the LRD-UFPel region of influence during this season of the year. Dermatophilosis commonly occurs in hot tropical and subtropical regions with a long rainy season (Pereira & Meirelles 2023a). It has been mentioned that dermatophilosis is associated with climate factors and other stressful factors, such as weaning, lack of food and inadequate management, which can also predispose animals to the development of this disease (Pereira & Lemos 2023). In the present study, most affected animals were young and were subjected to management, such as weaning, vaccinations and deworming, which may have contributed to the emergence of outbreaks.

The second most common infectious/inflammatory disease was papillomatosis. This disease is associated with different subgroups of the papillomavirus, totaling 29 distinct types involved in its etiology (Schuch 2023). On the other hand, the presence of the virus in the southern region of Rio Grande do Sul is evidenced by the significant number of cases of equine sarcoid diagnosed in the same period (Venancio et al. 2022), which is greater than the number of cases of bovine papillomatosis. This can be explained by the fact that bovine papillomatosis is a self-limiting disease (Goldschmidt & Hendrick 2002, Schuch 2023) and is easily

Fig.3. Hepatogenic photosensitization in cattle. Mucopurulent ocular discharge and scaling of the periocular area.

Fig.4. Dermatitis due to defatted rice bran in cattle. Proliferative lesion with crusts and cracks in the skin of the pastern region in cattle.

recognized by veterinarians, owners and rural workers. This apparently influences the reduced number of samples sent to the laboratory for diagnosis. According to data from the "Laboratório de Virologia", "Faculdade de Veterinária", UFPel, from 2013 to 2023, 38 papillomas were received directly to produce vaccines (Paulo C. Rodrigues 2023, unpublished data), which confirms this hypothesis. Notably, several individual cases were diagnosed, which is not expected for an infectious disease. This, however, must be considered with caution since, in many cases, epidemiological information arrives at the laboratory incomplete and can lead to errors in its evaluation.

Dermatophytosis was observed with a random distribution affecting different regions of the bovine body. The regions of the head and neck that spread to the trunk, limbs and tail are the regions most frequently affected by this disease (Pereira & Meirelles 2023b); however, in the present study, the lesions were also observed in the ventral and lateral regions of the chest and perineum. The highest frequency of the disease occurred in spring and summer when the temperature and humidity were more suitable for the development of the fungus. The disease occurs mainly in tropical and temperate regions with hot and humid climates (Pereira & Meirelles 2023b). On the other hand, these authors mention that outbreaks in the Rio Grande do Sul occur more frequently in the autumn and winter months, which was not confirmed in the cases diagnosed in the LRD.

The low number of lechiguana (paniculitis) cases observed from 2000 to 2022 in the region where the disease was first diagnosed and studied since 1986 (Almeida 1986, Ribeiro et al. 1989, Riet-Correa et al. 1992, Pereira et al. 2000, Ladeira et al. 1996, 2010) is apparent because this disease has become well known by professionals in the field and because treatment with antibiotics allows the affected animals to recover completely, despite the size of the tumors and the intense proliferation of fibrous tissue that characterizes the lesion. All the patients diagnosed in the present study came from farms where there were areas of native forest, which favors the presence of *Dermatobia hominis*, which is involved in the transmission of *Mannheimia granulomatis*, the bacteria responsible for the etiology of the disease (Ladeira et al. 2010). The lesion is characterized by a pronounced increase in volume, mainly in the anterior regions of the body, such as the shoulders and neck, and can occasionally be observed in the jaw (Ladeira et al. 2010).

In the present study, pythiosis was diagnosed in the study region on four occasions. In two outbreaks, the prevalence ranged from 22.4% (Grecco et al. 2009) to 4.0% (Eliza Simone V. Sallis, unpublished data). This seems to demonstrate that despite not causing deaths and resolving spontaneously, the disease can cause some damage due to the relatively high prevalence of some outbreaks, costs associated with treating secondary infections or transferring animals to other areas with a decreased possibility of *Pythium insidiosum* infection, increasing the need for additional work.

Regarding bacterial dermatitis histologically, in most cases, the lesions were characterized by pyogranulomatous or suppurative inflammation with bacterial colonies. The fact that most of the materials in these cases were already formalized did not allow the identification of the agents, which demonstrates the need to use fresh materials for bacterial culture.

In the present study, SCC was the most common neoplasm, with a higher incidence than the others, accounting for 79.5% of cutaneous neoplasms diagnosed in cattle, corroborating what has been described in other regions of the RS and country (Reis et al. 2017, Rondelli et al. 2017). SCCs were observed mainly in the periocular and peri vulvar regions, as observed by Reis et al. (2017) in a survey of neoplasms diagnosed in cattle at SPV-UFRGS. The occurrence of SCC in these anatomical regions is related to skin depigmentation and greater exposure to solar ultraviolet radiation. Females were most affected, probably because they are more common on farms, and the Holstein is the breed most common in the dairy basin in southern Brazil.

In this study, 15 cases of hepatogenic photosensitization did not have an identified etiology; these cases involved pasture areas, such as ryegrass and oats, and native grassland or rice and soybean stubble. A study carried out on the LRD-UFPel from 1984 to 1997 did not identify the cause of the disease in 19 outbreaks but established the different types of fields where the disease occurred (Motta et al. 2000). The present paper demonstrated that the disease continues to occur in the same areas without identifying its etiology and with variable morbidity and mortality, more frequently in spring and autumn, in the same way as described by Motta et al. (2000). Hepatogenic photosensitization probably has a multifactorial etiology. For this reason, identification of this condition has not been possible. Climatic factors, in addition to the type of soil and vegetation, may be associated with the onset of the disease. In the southern region of Rio Grande do Sul, several plants cause hepatogenic photosensitization, including *Brachiaria decumbens, Enterolobium contortisiliquum, Lantana camara, Panicum* spp., and *Myoporum laetum* (Lemos & Pupin 2023). However, these hepatotoxic plants were not observed in the outbreaks described here. Primary photosensitization has been shown to be of little importance as a skin disease in cattle. However, the differential diagnosis between photosensitization cases must be considered. In general, the disease is discreet in these cases, and the cure is spontaneous if the cattle are placed in shady areas. In the region of this study, *Ammi majus* is the only plant known to cause primary photosensitization. It occurs in spring and invades cultivated areas (Méndez et al. 1991) but has not been identified in areas where the outbreaks described in this study have occurred.

The three outbreaks of poisoning by *Ramaria flavo-brunnescens* occurred in a municipality in the southern region of Rio Grande do Sul, where there is a large reforestation area with eucalyptus where cattle are grazed. Raising cattle in a silvopastoral system has increased the risk of this poisoning (Alves et al. 2014). However, outbreaks of this poisoning are not frequent since the poisoning is well-known by owners and professionals. In addition, this mushroom does not always occur in eucalyptus forests. The climate, soil and the type of forest planted may also determine the presence or absence of the mushroom in the area (Scheid et al. 2022).

Dermatitis caused by DRB affects cattle, and the prevalence reaches 50%. Despite the small number of outbreaks, this disease is important due to the number of animals affected and secondary infections that, in some cases, can lead to animal death (Schild & Venancio 2021).

Other skin diseases, such as *Vicia* spp. and poxvirus infection, were not diagnosed in the LRD-UFPel area of influence during the study period. However, they have been diagnosed in other regions of the RS and should be considered in the differential diagnosis of skin diseases in cattle (Barros et al. 2001, Sonne et al. 2011, Cargnelutti et al. 2012).

CONCLUSION

The results of this study allowed us to conclude that skin diseases of an infectious and/or inflammatory nature represented more than half of the cases of skin diseases diagnosed in cattle. Dermatophilosis, papillomatosis and dermatophytosis should be considered causes of economic losses for livestock in the region. Among the toxic causes, hepatogenic photosensitization of unknown causes occurs frequently in different pastures and native fields. Despite the significant number of squamous cell carcinoma (SCC) concerning other diagnoses, they are mostly isolated cases and are not a relevant cause of damage to livestock in the region.

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