

## OCULAR TUMORS IN CATTLE: A RETROSPECTIVE STUDY OF 27 CASES (2010-2020 YEARS)

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**Abstract.** In this retrospective study was aimed to be determined the incidence of ocular tumors in 21534 cattle brought to Animal Hospital of Firat University Faculty of Veterinary Medicine between 2010 and 2020 years. Ocular tumor was detected in 27 cattle. Distribution of the tumor according to race, age and location was detected. Tumor cases have been found to be more common in the Simmental race in recent years and the age distribution is the most common between the ages of 5-6. Locations of the tumors were found to be in the eyelid and bulbar conjunctiva. After total extirpation of the tumors, histo-pathological examinations revealed that the tumor was ocular squamous cell carcinoma. Its incidence among cattle was found to be 0.125%.

**Keywords:** Eye, tumor, cattle.

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### 1. Introduction

Tumor refers to the newly developing, uncontrollable and abnormally growing tissue formations in the body (Erer, 2005; Demirkan, 2016). Turkish Language Association defines tumor as “lump formed in tissues and tends to grow with excessive proliferation of cells” (Demirkan, 2016).

Many studies have been conducted on the classification of tumors by different researchers, but no definitive classification is available yet. Today, the classification of tumors is made according to the tissue they originate from, their behavior and morphological characteristics (Demirkan, 2016; Moulton, 1990).

Among the five sensory organs, the eye is an important organ that has undertaken the sense of sight. At the same time, it is unprotected and highly sensitive against external factors (Han, 2019).

Although the eye is a formation where various and metastatic tumors are encountered, the prevalence of only a few tumors that develop here is high. Ocular squamous cell carcinoma which is the malignant tumor of epidermal cells mostly develops from limbus, third eyelid or eyelids of cattle, horses, cats and dogs. They are the common neoplasms that lead to significant economic losses in domestic animals (Moulton, 1990; Hazirolu, 2001). It is reported to be more common among Hereford race of cattle, Saanen and Ankara goats and also be encountered in Indian cows (Hazirolu, 2001).

Number of tumor cases gradually increases in domestic animals recently. Oncogenic viruses, nutritional disorders, genetic factors, physical and chemical agents, and hormone disorders are seen to play a role in the etio-pathogenesis of the tumors seen in different locations of animal bodies (Yüksel, 2005; Goldschmidt, 1992).

Extra-ocular neoplasms may develop in any of eyelids, special or supportive tissues of conjunctiva or orbita (Jones, 1983). Malignancies of the third eyelid (membrane nictitans) and orbital are common in cattle worldwide (Blowey, 1991). Squamous cell carcinoma (SCC) of the eyelid or conjunctiva is less common in horses and dogs and is common in cattle and other species (Jones, 1983). SCC is seen especially in white-headed cattle such as Hereford and in other breeds with little pigmentation around the eyes (Blowey, 1991). The disease is associated with ultraviolet light. Common areas for SCC include the lower palpebra, the third eyelid and the corneo-scleral junction of the orbital (Meuten, 2002). Bovine ocular squamous cell carcinomas of the orbital or circum-ocular structures have been described in a variety of bovine breeds, including bovine species from various continents and countries (Carlton, 2002).

In this study was aimed to determine the incidence of ocular tumor cases in cattle brought to the Animal Hospital of Firat University Faculty of Veterinary Medicine between 2010 and 2020 and which are common in recent years.

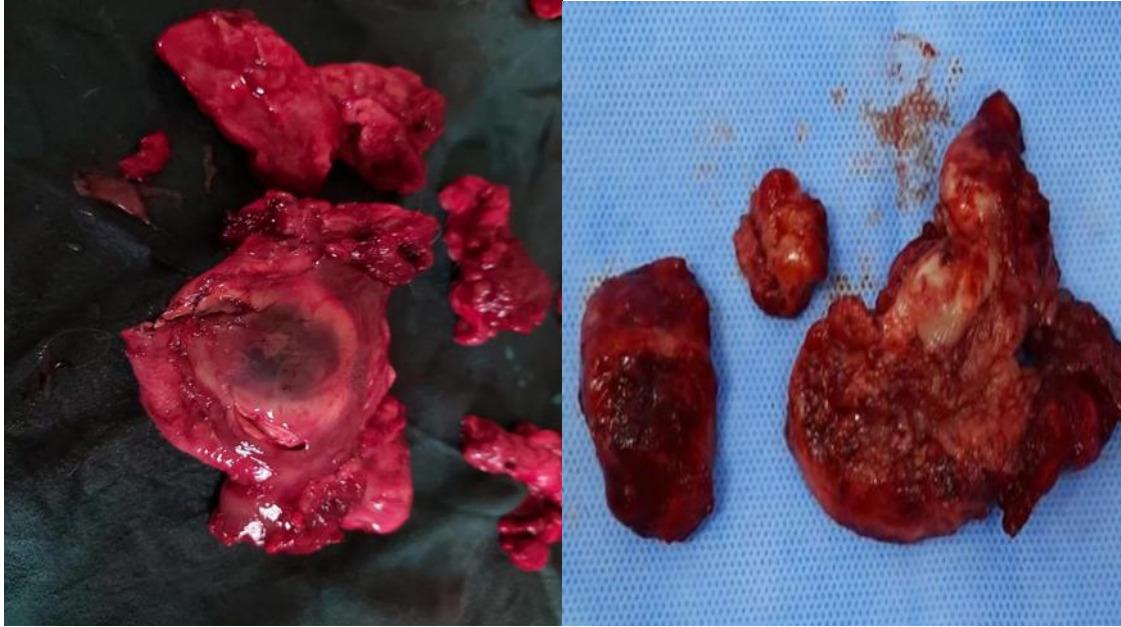
## 2. Material and Method

The material of the study consisted of 27 cattle of different ages and breeds with ocular tumors out of 21534 cattle brought to the Firat University Faculty of Veterinary Medicine Animal Hospital between 2010 and 2020 years. In the anamnesis, it was determined as a common view that it started with mild redness in various parts of the eye and turned into a gradually growing mass. The tumors were removed surgically in 27 cases which were detected to have tumors as the result of examinations (Figure 1.2). For all surgical interventions, 0.1 mg/kg of xylazin hydrochloride (Rompun, Bayer, Turkey) was administered via intra-muscular route for sedation. For local excision, local infiltration anesthesia was achieved by injection of lidocaine HCl 2% (Adoka's, Sanovel, Turkey) in the floor of the third eyelid. The eyelid was grasped with forceps and pulled outward and excised from the base of the posterior tumor mass using blunt-tipped curved scissors. Bleeding was controlled by tamping with sterile hydrophilic gauze soaked in adrenaline. In the post-operative period, bacitracin 2500 U.I. and neomycin sulfate 25 mg (Thiocilline® İbrahim Hayri, Turkey) containing eye ointment was applied for 5 days (Figure 1).



**Figure 1.** Appearance of a tumor mass in a cattle brought to the clinic with complaints of vision loss and bleeding

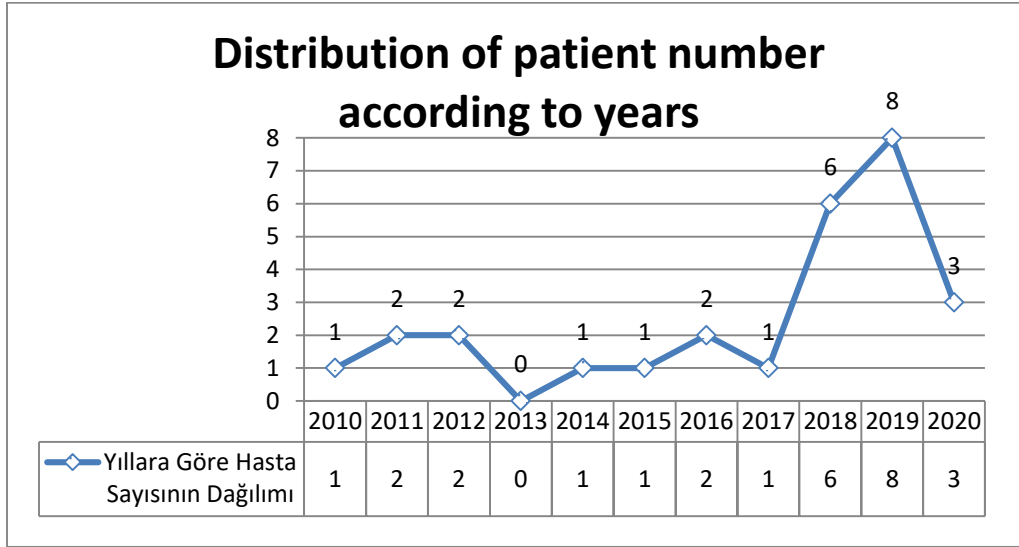
The removed tumor mass was fixed in 10% buffered formalin for histopathological examination. 5  $\mu$  thick sections taken from the paraffin blocks prepared after classical processes were stained with Hematoxylin-Eosin (H&E) and examined under a light microscope.



**Figure 2.** The masses removed with total extirpation

### 3. Results

In the recent anamnesis obtained from the owners of the animals brought to Firat University Animal Hospital, it was stated that the complaints started with red eye, there was a gradually enlarged mass lesion, pus and blood discharge from the eye and the animal could not see. In the examinations performed, hemorrhagic masses localized to various parts of the eye in the right or left eye and purulent masses were detected in infected patients (Figure 3). In the examinations of the records of the previous years, it was determined that in a period of ten years, 27 of the 21534 cattle had ocular tumor cases. It was observed that the cases have increased in recent years and especially in the simental race, followed by the Holstein and Montafon breeds (Table 2). The distribution of number of tumor cases according to years is shown in Table 1. The distribution of tumor cases by age is shown in Table 3, where tumor cases are especially seen in cattle at the age of 5-6. It was recorded that 5 cases were in the upper eyelid and 22 of them originated from the bulbar conjunctiva and completely surrounded bulbus oculi. Seventeen tumors were seen in the right eye and 10 tumoral formations were observed in the left eye.

**Table 1.** Patient distribution according to years between 2010 and 2020**Table 2.** Distribution of case number according to race

Distribution of cases according to race	
Simental	14
Montofon	3
Holstain	10

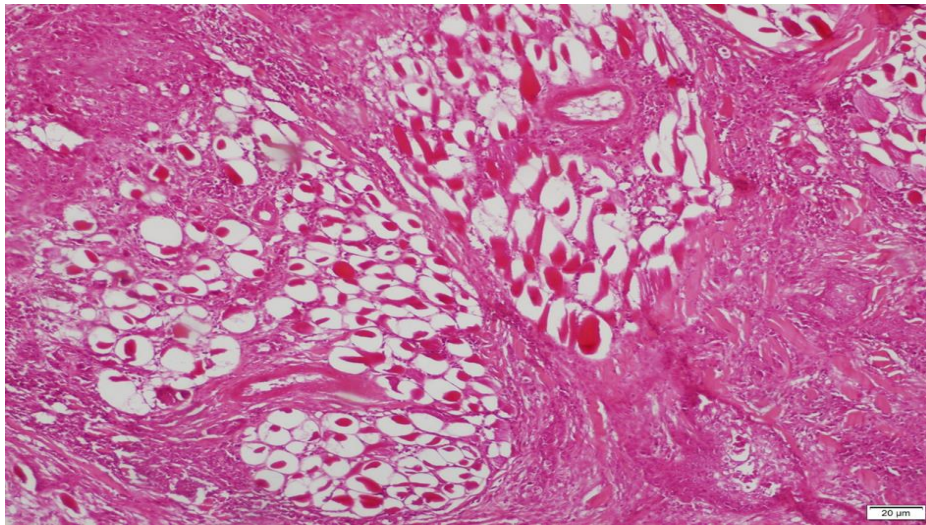
**Table 3:** Distribution of cases according to age

Distribution of cases according to age										
	1	2	3	4	5	6	7	8	9	Total
Simental	-	-	1	-	6	6	1			14
Montofon	-	-	-	-	-	3				3
Holstain	-	-	-	1	6	1	2			10

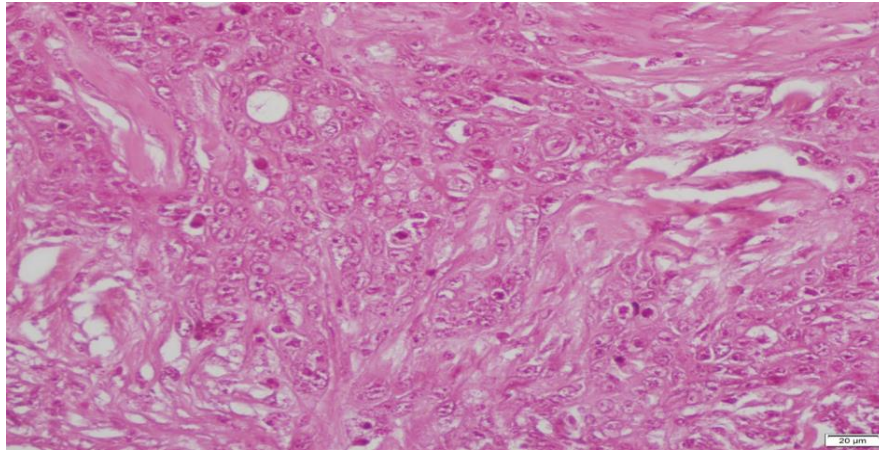
**Figure 3.** Post-operative appearance of the eye



On histo-pathological examination, tumor tissue was detected to extend to dermis and subcutis layer of the skin. Tumor cells created islands with different histological properties in these fields and also cordon-like structures composed of squamous cells in some fields. The cells in these fields were large, oval-shaped and their nuclei were usually in vesicular structure. In some fields, the cells appeared as islands that contain dense keratin. Tumor pearl tissue composed of stratified keratin tissue was encountered in tumor tissue (Figure 4). Tumor cells had pleomorphic appearance and atypical cells, mitosis (Figure 5) and giant cells were also encountered. Loss of polarity was observed in squamous tumor cells and also scarce vascular invasion findings.



**Figure 4.** Characteristic tumor pearl (H&E)



**Figure 5.** Atypical cells and mitosis (H&E)

#### 4. Discussion

Squamous cell carcinoma cases have an important place among the tumors encountered in domestic animals (Aksoy *et al.*, 2006; Wilcock, 1993). Ocular squamous cell carcinoma, which is a malignant tumor of epidermal cells, which is manifested by the differentiation of keratinocytes, is more common in cattle and horse, rarely in cats

and dogs (Yüksel, 2005; Aksoy *et al.*, 2006; Mara, 2005; Fischer *et al.*, 2002; Wilcock, 2002). In this study has been researched distribution by years of Squamous cell carcinoma cases in cattle, it has been observed that it has increased in recent years and has an important place in terms of adversely affecting animal welfare as well as causing significant economic losses. It was detected to become more common particularly among Simmental breed and Holstein breed of cattle.

In the USA, estimated incidence of the disease is 0,8-5 % for Hereford. In some herds in Australia, 10-20% of Hereford breed was observed to have ocular tumors. Its incidence is 0,04% in 35000 animals in Netherlands (Klein *et al.*, 1984). In this retrospective study, an incidence of 0,12% was detected in 21534 animals.

In studies on eye tumors in cattle, it has been reported that cases are encountered the most squamous cell carcinoma (cancer eye) (Gharagozlou, 2007; Ceylan, 2012; Gelatt, 2005).

In a study conducted in Italy, it is indicated that all ocular and periocular tumors encountered in the Simmental race are squamous cell carcinomas (Pugliese *et al.*, 2014). In the present study, histopathological examinations of 27 cases believed that the integrity of the cell carcinoma.

It has been reported that ocular squamous cell carcinoma in cattle is frequently encountered in Hereford, Holstein and Simmental breeds and it is rarely seen in other breeds. It has been observed that it is encountered in Simmental, Holstein and Montofon breeds, not found in native breeds. Among these breeds, it has been determined that the most common breed is the Simmental breed (Radostits, 2000; Taş *et al.*, 2009).

In this study, eye tumors were found in Simmental, Holstein and Montofon breeds. It was determined that the most common among these breeds was the Simmental breed (51.85%).

In cattle, ocular squamous cell carcinoma is reported to occur mostly in the bulbar conjunctiva and cornea and less frequently in the eyelid conjunctivae and the third eyelid (Gharagozlou, 2007). Of the 27 animals that consist the study material, 5 of them were found to originate from the upper eyelid and 22 from the bulbar conjunctiva.

Ocular tumors may originate from any of conjunctiva and accessories, optic nerve or bulbus oculi in cattle. Squamous cell carcinoma is a malignant tumor-stratified squamous epithelial in spinosum cells arising from the stratum, one of the most important neoplasms of the eye (Aksoy *et al.*, 2006). Tumors that occur in bulbusoculi can originate from any tissue within the oculi. Squamous cell carcinoma is one of the most important neoplasms of the eye which the spinosum cells of the malignant tumor stratified squamous epithelium arising from the stratum (Aksoy *et al.*, 2006). In this study, it was noted that the locations of the masses in clinical examination and histopathological examination were in the upper eyelid (n:5) and in a manner surrounding the bulbus cavity originating from the bulbarconjunctiva (n:22). According to side, 17 tumors were mostly seen in the right eye, while 10 tumoral formations were formed in the left eye.

Ocular squamous cell carcinoma is typically ulcerative, firm, lobular, and a cauliflower appearance. If it progresses together with panophthalmia purulenta, the carcinoma may also be covered with a mucopurulent layer (Hendrix DVH.2005). The cases brought to the animal hospital were detected to be delayed cases and masses in a lobular structure and protrusion were detected in clinical examinations. In addition, the masses were hemorrhagic in most of the cases. Bleeding was considered to be due to

itching and friction. Some cases were found to be infected with dactyls and purulent discharge.

Generally, tumors are reported to be rare in animals under the age of three and almost never seen under the age of one. It is stated that ocular squamous cell carcinoma cases in cattle are generally observed at the age of five years or older (Radostits, 2000). When the age range of the cases was examined, no tumor cases were found in animals under the age of three in the study. Only one Simmental breed was found in one cattle at the age of three. However, other cases were frequently seen at the ages of five, six and seven. No case over seven years was encountered.

Among the causes of ocular squamous cell carcinoma, genetic factors, altitude, regional conditions, exposure to sunlight, lack of pigment in the conjunctiva and viral factors, especially bovine papilloma virus and bovine herpes virus type 1, can be considered (Aksoy *et al.*, 2006, Mara *et al.*, 2005). Data on the etiology could not be obtained in this study.

In conclusion, the cases of squamous cell carcinoma causing economic losses in cattle were observed to increase in recent years. All of the cases were delayed and had undergone total eye extirpation surgery. The animal's survival with one eye affects animal welfare negatively. For this reason, we believe that early diagnosis of the cases will prevent economic losses and increase animal welfare.

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