

# Preliminary Anatomical and Histological Study of Lacrimal Gland in Lori Sheep

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## Abstract

The lacrimal gland is an important part of lacrimal apparatus that plays an essential role in eye health. In this research, anatomical and histological structures of lacrimal glands of Lori sheep were evaluated. For this purpose, thirty healthy and mature Lori sheep were selected in slaughterhouse and then lacrimal glands removed. After anatomical and biometrical evaluation, lacrimal glands were fixed and processed for histological sectioning and then sections stained with H&E, Alcian blue and Periodic acid Schiff methods. The results showed that in this species the lacrimal gland lies in dorso-lateral aspect of orbit on the eyeball. The lacrimal gland is surrounded with a connective tissue containing adipose tissue. The gland shows an irregular-rounded to oval shape and pale brown in color. The mean weight, length, width and thickness of the gland were  $1.48 \pm 0.3$  gr,  $26.98 \pm 0.37$  mm,  $20.11 \pm 0.31$  mm and  $3.58 \pm 0.7$  mm, respectively. Histological examinations revealed that the lacrimal gland is lobulated and cells of parenchyme are mixed including serous and mucous cells. Intralobular, interlobular and excretion ducts of the gland are lined with cuboidal, stratified cuboidal and pseudo stratified columnar epithelium, correspondingly. In some ducts goblet cells are present among epithelial cells.

**Keywords:** Lacrimal gland; Lori sheep; Histology; Anatomy

## Introduction

The eye is a complex and highly developed organ which collects light from the surrounding environment, regulates its intensity through a diaphragm, focuses it through an adjustable lens to form an image on retina where this image is converted into a set of electrical signals transmitted to the brain. The eyes are protected in the skull by a bony box called the eye socket (orbit). The wall of this eyeball consists of three layers which have different tasks in the anterior and posterior halves of the organ [1]. One of accessory structures of the eye is the lacrimal apparatus which located superiorly and laterally to each eyeball. Each lacrimal apparatus consists of the lacrimal gland, canalicule, lacrimal sac and naso lacrimal duct [2]. The lacrimal glands are responsible for production of tears which flow over the conjunctiva [1]. The lacrimal gland is responsible for production and secretion of tears which clean and nourish the cornea and help to maintain its health. In many species, the main fraction of tears is produced by lacrimal glands. In cattle and wild buffalo, no difference is observed between left and right glands. Moreover, in these animals no sexual dimorphism is evident in the case of the lacrimal gland [3]. There are adequate researches documenting the anatomy and histology of lacrimal glands in human and some other mammals. In all investigated species, the lacrimal gland has presented more or less a similar histological structure and is a mixed gland consisting of tubulo-acinar units [4]. There is a lack of literature on the lacrimal gland in this breed of sheep, our research will contribute to the comparative anatomy and histology and help to understanding the structure of this gland. Moreover, many chemical components in the tear have been documented [5-9]. In current study, the anatomical and histological structure of these glands Lori sheep is scrutinized.

## Materials and Methods

In this study, 15 male and 15 female adult apparently healthy head (without any eye disease) of Lori sheep just after slaughter were selected in Khorramabad slaughterhouse. To dental condition, age of sheep were over than one years. Lacrimal glands were removed. The healthy samples were identified according morphological characters [10]. To

make sure the samples are really healthy the samples once again were carefully examined in the laboratory. Eyeballs were removed from orbits cutting off the skin and surrounding tissues. Extensive care was employed to avoid any damage to lacrimal glands. Then the glands were measured biometrically. During the biometric measurements, the weight and dimensions of the gland including the gland's length (the medio-lateral edge), width (the rostro-caudal edge) and thickness (the dorso-ventral edge) were recorded. Moreover, the thickness of the gland's medial part was measured. The measuring of weight and length was made by a scale and Vernire caliper with an accuracy of 0.01 g and 0.01 mm, respectively.

Following the measurements, a cannula with one-millimeter diameter was inserted into the lacrimal punctum and lacrimal sac. By flushing water into this punctum, the exit opening of the naso lacrimal duct was distinguished. Moreover, length of nasolacrimal duct was measured by inserting the cannula all the way through the duct. All data provided from these measurements were then analyzed by the germinal linear models procedure of SPSS software (version 11.5, SPSS Inc, Chicago, USA). Means were separated by Duncan's Multiple range test and significance was accepted at  $p < 0.05$ . Later the samples were fixed with formalin saline and then processed for preparing histological sections. Five to seven micrometer sections were cut using a rotary microtome and they were then stained by Hematoxylin and Eosin and Periodic Acid Schiff (PAS), Alcian Blue (pH 2.5) methods.

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