Republic of Iraq Ministry of Higher Education Scientific Research& Qadissiyah -University of AI College of Veterinary Medicine



## Morphometric study of sebaceous gland and hair follicles in ox skin

A Research

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Certificate of Department

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Morphometric study of sebaceous gland in cattle

Was prepared under supervision at the College of veterinary Medicine \University of AI-Qadissiya

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### بسم الله الرحمن الرحيم

وَكَذَلِكَ مَكَّنَّا لِيُوسُفَ فِي الأَرْضِ يَتَبَوَّأُ مِنْهَا حَيْثُ يَشَاء نُصِيبُ بِرَحْمَتِنَا مَن نَّشَاء وَلاَ نُضِيعُ أَجْرَ الْمُحْسِنِينَ<sup>{56</sup>}

صدق الله العظيم

صدق الله العظيم

سورة يوسف الاية56

### الاهداء

**إلى** إلى من جرع الكأس فارغا ليسقيني قطرة حب الى من كلت انامله ليقدم لنا لحظة سعادة إلى من حصد الاشواك عن دربي ليمهد لي طريق العلم إلى القلب الكبير (والدي العزيز)

إلى من ارضعتني الحب والحنان إلى رمز الحب وبلسم الشفاء إلى القلب الناصع بالبياض (والدتي الحبيبة) إلى الطاهرة الرقيقة والنفوس البريئة إلى رياحين حياتي (اخواتي) إلى الروح التي سكنت روحي (زوجي) الان تفتح الاشرعة وترفع المرساة لتنطلق السفينة في عرض بحر واسع مظلم

الان تفتح الاسرعة وترقع المرساة لتنطلق السفينة في عرص بحر واسع مطلم هو بحر الحياة وفي هذه الظلمة لا يضيء الا قنديل الذكريات ذكريات الاخوة البعيدة الى الذين احببتهم واحبوني (اصدقائي)

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والى كل من علمني حرفا اصبح سنا برقه يضىء الطريق امامي .



The skin consider as a protective layer, its play important role to regulate the body tempreture ,production of vit.D and the moisture of the body organis (1), the skin contain several chemical compounds which are very neccessory for production of energy and the metabolic rate of lipids ,charbohydrates and protein ,(2) ,the skin consist of two essential layers epidermis and dermis , the moer delicate layer is epidermis which is contact with outer enviroment , and its consist of stratifical squamous epithelium , their clls passing into several steps of proliforation, migralion , differentiation and cornifcation to reach the superficial layer that become keratinized cells (3) another researches refer to variation in the thickness of epidermis layer according to the different species of animals(4) the dermis comprised the loose irregular tissue which contain network of collagen elastic and reticular fibers, it consist of two layers , papillary and reticular layer which is the more deeper layer and its thicker than papillary layer (5) the reticular layer contain skin appendags (Hair follicles , sebaceous glands , sweat glands and arrector pili muscle.) (6)



Histologically skin consists of two principle tissue layers the outer epidermis and the deeper dermis .A hypodermis is situate under the dermis layer . it is composed of subcutaneous adipose tissue , the extent of which varies throughout the body and among individuals . Anatomist generally refer to the hypodermis as the superficial fascia (5,6)

Skin is subclassified into two basic types, thin skin and thick skin. Thin skin is the predominant type of skin that covering the human body. It has a relatively thin epidermis and generally contains hair follicles. Sebaceous gland ,and sweat gland(7). Thick skin is only found in two primary locations, the palms of the hand and the sole of the feet , areas of the body that are routinely subjected to extensive abrasion. Thick skin has a significantly thicker epidermis than thin skin , it contains sweat glands, but lacks hair follicles and Sebaceous gland(8)

the thickness of the skin is differ from one region to another of the animal body, it,s consider as a thick skin in dorsal and lateral surfaces of the limbs while in ventral surfaces it becom thin skin (9) anothr study in the skin of black goat region is thickest than ather studied sites and the mean thickness 2.4UM (10) but in Iranian sheep the thickness 2.6UM

The epidermis is a keratinizing stratified squamous epithelium. the epidermis contain principal cell type .is the keratinocyte, so named because the cell is specialized to produce large amounts of the protein keratin. the epidermis; keratinocytes Originating from highly mitotic basal layer of are pushed to the surface of epidermis synthesizing and eventually filling with keratin, emerging at the apical layer as a relatively tough, contagious the keratinocytes go through this As (13). layer of dead, keratin-filled cells they undergo subtle, subcellular structure changes which result in ,process the production of histologically-distinct epidermal layers, called strata. thin epidermal strata. These four strata, from base to surface skin consists of four., the stratum, (germinativum stratum) surface, are the stratum basal ,the stratum spinosum ,granulosum lucidum and corneum (11,12,13,14)

superficial papillary layer and the deeper reticular layer. The more the papillary layer is a relatively thin layer of loss connective tissue that lies immediately beneath the epidermis. It not only binds the epidermis two deeper tissue , but also supports the microcirculation and nerve supply of the epidermis . the reticular layer of the dermis id a relatively thick layer of dens irregular connective tissue . The thickness of the reticular layer varies among the different skin regions. It also support the large blood vessels and nerves that supply the microcirculation and nerve supply penetrating the upper papillary layer(15).

all mammals have epidermal derivatives like hair follicles, sebaceous gland and sweat, they called skin appendayes persent in dermis layer of skin, the hair is keratinized structure the free part of it called hair shaft while portion of hair folliclas fount in dermis layer named hair root (16) classified by many authes into primary and secondary hair follicles, the primary follicles are larger than secondary follicles, and it associated with sebacous and sweat gland and arrector pili muscle(17,18,19,20)

The sebuceous gland classfied as a simple nched alveolar gland ,it associated the hair follicales and it oped into hair root by piloscbuceous cunul sebuceous gland consist of several layers of sebocytes which(21) surrounding the lumen of the gland with basal cells (cuboidal or sequamous cells) ,it ast as stem cells(21), sebaceous glands consider as holocrine gland that mean,hydrolysis the sebocytes when it releas their secretion the type of sebaceaus glands is branched in the study of cow skin they noticed compound acinar gland, the sebum act as anti fungal and anti bacterial and thermal in sulation and play important role in formation of vitamin D and considal as water proof layer many researches refer to the type and shepe of sebaceous glands like in one humped camel , sebaceaus gland is smaller in size in axillary region , but it increase in

size in inguinal region(22)



المواد وطرق العمز Materials and Methods

### **Materials and method**

Ten adult 0x aged 1-1.5 years were clinically healthy used for histological and morphometric study, the samples were collected from AL-Qadisiyah abattoir during autumn season from fourth differnt anatomical sites (,neck,back ,flank and tail) , after the animals were sloughter ,we prepared the samples by removinig the hair of skin gentally by special cream for (5-10) minute. Specimen of the skin was taken and fixed in 10% formalin . than washing for two hour and dehydration by ascending series of ethanol 70% , 80% ,90% ,100% in which two times 1-2 hour . cleaning by using xylene twice time for half hour and embedding in paraffin wax two time for two hour after that blocks sectioned by rotary microtome with 5-6 micrometer in thickness and staining with harris hematoxylin and eosin stain (H&E) and the ( mean and standared error ) of the diameter of primary and secondary hair follicles and the depth of them in two dermis layer and also the length and width of sebaceous gland (23,24,25)



# Results

### Results

The present study revealed that the skin of ox comprise two important layers. The outer layer known as (epidermis) and the inner layer called (dermis) The skin appendages hair follicles, sebaceous glands, sweat gland present in dermis layer fig (1).

Histological examination of skin samples exposed existing of compound hair follicles in the region which has abundant hair fibers like in neck and middle dorsum area. They have(mono) arrangement of primary hair follicles and (Trio) arrangement of secondary hair follicles fig(2) moreover we observed the( Dio) arrangement of the primary follicles with group of secondary follicles and besides

In the existing study we noticed in low density hair follicles sites like in tail(Mono) arrangement of primary follicles. Generally all studied area revealed the primary follicles bigger than secondary follicles and the sebaceous and sweat glands accompanying with primary hair follicles ,while only sebaceous glands seen with secondary folliocles fig(2).

The histological section exposed the hair follicles are tubular invaginations of epidermis, the developers down growths of the epidermis into the dermis. Hair is made up of columns of dead keratinized cells In the middle of hair follicles there is hair fiber

consist layers of

keratinized

The external layer called cuticle it consist of one layer of highly keratinized cells Middle layer contain keratinized cells the long axis of them are parallel with the root of follicle and has elongated nucleus while the third internal layer comprise cuboidal or flat cells with round nucleus and existing of pores between cells

There are two root sheath surrounding the hair fiber are (internal and external) the internal sheath contain three layers of keratinized cells (Henle's )layer consist of one layer of keratinized cells while (Huxley's) layer has 1-3 Layers of keratinized cells hold (Trichohyaline granules) and the last layer termed inner cuticle layer contain one layer of cells fig.(3), these cells distingrates that the duct of sebaceous gland enter into the hair fiber

This study noticed the external root sheath cells connected with stratum Basale and st. Spin sum layer of epidermis Fig. (4) ,this sheath separated from dermis by glassy membrane .The terminal wide segment of wool follicle termed hair bulb surrounded The dermal papilla fig,(5),the diameter of primary follicles changed in different studied area, the higher diameter measured in tail region (65.2)  $\mu$ m Table(1),but the lesser diameter recorded in neck region (26.4) $\mu$ m T.(1)also the size of secondary follicles varied in fourth studied sites, greater diameter of it seen in neck region (8.9) $\mu$ m T.(1) ,while smaller one shown in flank region (1.5) $\mu$ m, T.(1)

all examined regions observed sebaceous glands, it's simple branched alveolar Glands which consist of small basal low cuboidal cells resting on basement membrane with dark nucleus, but the central cells has bigger size contain several layers of dark nucleus cells and light cytoplasm In all considered histological sections revealed sebaceous glands accompanied with primary and secondary hair follicles Fig.(6)

Sebaceous glands have variable size, so the larger sebaceous glands shown in flank area (12.3) $\mu$ m T.(2) and smaller sebaceous gland noticed in neck area (8.1)  $\mu$ m. T(2)

Tail	Flank	Back	Neak	Areas
				Diameter
5.4±65.2	3.9±35.2	5.1±59.04	3.4±26.4	Primary Follicle
1.9±8.9	1.3±3.5	1.6±6.2	1.9± 8.18	Secondary Follicle

#### Table 1

Explain the mean diameter(um) of the primary and secondary hair follicle in ox skin

Tail	Flank	Back	Neak	Areas
				Diameter
5±9.04	2.3±12.3	2.1±9.8	1.9±8	Sebaceous
				Gland

### Table (2)

Explain the mean diameter(um) of sebaceous gland in ox skin



# Discussion

### Discussion

the current study present two type of hair follicles (primary and secondary) with different arrangement (mono, dio and trio), but the most one is (mono) arrangement in the examinel regions and we noticed the low density of hair follicles in flank region spically (primary follicles) the same result seen in (26,27,28).

another researches (28,29,30,31) refer to simple type of hair follicles in (buffalo , sheep ,black goat)

in our study there are two type of hair follicles (primary and secondary) hair follicles and our result respected with (32,33) in local and austratian merino sheep

the revealed study showed variation in the diameter of primary follicles and secondary hair follicles in all studied regions, the primary follicle and we noticed the biggest one in .

(tail) so we agreement with (28,30) in Irania sheep and cattle also we observed the diameter of secondary follicle is differ from one region to another and the biggest one found in (tail), some researches like (31)in one humped camel refer to the effect of sex on the diameter of primary and secondary follicles in the skin of iranian. sheep(28), the diameter of follicles in female (2036.02)um while in male (2633.90) um. that mean the secondary follicles in male is large than in female, in most studies area

we noticed high density of hair follicles (neck, Back and tail), but in flank we noticed saw low density of hair follicle and the same observation noticed in (30,31) in cattle and one humped camel relativety sebaceous gland is another skin appendages present in the dermis layer of ox skin, the present in the dermis layer of the ox, it assocated with the upper third of the hair follicles and this result is similar with (22,32,33,34,)

our examination to the skin samples we noticed the glandular tissue is separated from the follicles by trabeculae of connective tissue like in neck region, we are respected with (31), on his study of one humped camel, the sebaceous gland is accompanied with primary and secondary hair follicles and its located between hair, follicles and arrector p.limuscle and the contraction of this muscle fibers lead to release of sebum material from sebaceous gland through the duct of the gland to the hair follicles and the same finding we seen it in (35)

in the study of sheep in most studied region , each hair follicles accompanied with pair of sebaceous gland and it agreement with (12)

in the current morphometric study we seen variation in the diameter of the gland in fourth regions , the larger gland found in (flank 12.3um) , in region while . the smaller one observed in (neck)

, also it respected with (18) (21)



### Conclusions

-Skin thickness varies in different anatomical areas of the animal's body1

2-The basic principes derived from studying the skin of cows apply to the skin of other types of ruminants 3-Differences in the histological structure and histology of the cow's skin correspond to the requirements of the function of the anatomical region of the skin and according to its interaction with the external environment

### Recommendations

- 1-Conducting a study of the skin in other animals
- 2- Conducting the study of cellular regulation of small ruminants skin
- 3- Conducting satisfactory histological studies and the impact on the national economy

4-Research the effect of age, sex and separation on the histological structure of the skin of cow

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