



## **Prevalence of injuries and the bacteria in skin of ruminants in Kirkuk, Iraq**

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### **Abstract**

A total of 240 sheep, goat and cattle at various ages were examined for skin injuries from September 2011 to February 2012. According to the data the percentage of injuries in sheep was 36.36, 32.23 and 30.57% in sheep, goat and cattle respectively. The percentage of injuries was 64.4% in 2-3 years old animals and 35.5% in one year old animals. The body region most affected in almost ruminant was legs (36.7%) and limb (33%) followed by the neck and brisket (10.3%), abdomen (14.8%) and teat and udder (4.9%). Sample were taken from injuries revealed *Salmonella*, *Shigella*, *E. coli*, *Pseudomonas Proteus*, *Staphylococcus*, *Listeria*, *Brucella*, *Clostridium* and *Streptococcus*.

**Key words:** Ruminants; body injuries; skin; pathogenic bacteria

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### **Introduction**

Skin damage and pathological condition in domestic ruminants reduce market and economic value of the animals (Chaudhry et al., 2011). The quality of skin is related to the extent of damage caused by the improper cure and handling as well as inappropriate managements (Rodriguez et al., 1993). Wounded skins are graded low and the extent of injuries is directly proportional to the economic loss and poor quality of leather produced. Animals mostly become infected at shearing time and probably via shearing out wounds. This suggests that the skin damage pave the way of bacteria (Quteria et al., 1994).

The main signs considered as indicators of body injuries include external presence of active wounds, ulceration, swelling, scars and localized hairless and skin hyperkeratosis. The ruminants body regions on which injuries usually occur include the neck, brisket, carpal joint, ribcage, tuber coxae, ischium, hock joint, teats and udder (Bugby et al., 1990; Wechsler et al., 2000). The housing factors that predisposed to various body injuries are sharp edges on cubicle poles, timber, the feeding bunks, neck rids and concrete floors. Over stocking in some of the small holder unit may also be the cause of predisposing factor injuries. Huxley and Whay (2006) and Kiellad et al. (2009) added that the

skin lesions occur on area where there are protrusions when animal lie down and these lesions can range from small area of hair loss to open wounds and swelling.

An increase of income of 30% can be realized in leather industry by controlling skin disease and avoiding flaying cuts, large number of parasites, fungal, bacterial and viral infections. The skin damage magnitude depends upon the duration of condition and severity of the disease (Chaudhry et al., 2011). Scratches are linear wounds caused by nails, thorns and other sharp pointed objects that can occur at the farm during transportation of animals or at abattoir. These scratches are mostly observed in the female ruminants because they have more nutritional deficiencies during gestation and lactation periods (Rodriguez et al., 1993; Chaudhry et al, 2011; Aleri et al., 2011).

The objective of this study was to examine the skin injuries observed in domestic ruminants in Kirkuk city, according to animal species, age, sex and various body regions. The isolation and identification of the bacteria from these injuries were recorded.

### **Materials and Methods**

The study was conducted in the domestic ruminants in Kirkuk city during September 2011 to

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February 2012. The ruminants were rams, ewes, lambs, bucks, does, bulls, cows and calves. A total of 242 injured animals were included in the study, in which 88 were sheep (27 lambs and 61 adult), 78 goats (29 kids and 49 adults) and 77 cattle (30 calves and 46 adult). The adult animals (156 animals) were also classified according to sex as 71 males (31, 24 and 16 were rams, bucks and bulls respectively) and 85 females (30 ewes, 25 does and 30 cows). The study also examined the incidence of injuries at the various body regions like legs, limbs, neck and brisket, abdomen and teat and udder.

The skin injured animals were grouped according to species (sheep, goats and cattle), age (less than 1 year and more than 2- 3years). The adult animals were further grouped according to sex (males and females). The skin injuries were grouped according to the site of injury (legs, limbs, head, abdomen and teat and udder). The isolated bacteria species were grouped into gram positive and gram negative bacteria and were represented as a ratio of number of cases of the bacteria species to the number of injured animals.

Different bacteria species isolated according to the suitable microbiological methods. The bacteria species examined were *Salmonella* spp (Bhatia et al., 1979), *Listeria monocytogenes* (Pagotto et al., 2001), *Campylobacter* spp (Marjaana et al., 2007), *Shigella* spp (Uyttendaele et al., 2001), *Brucella abortus* (King et al., 1954 and Al-obaidi et al., 2009), *Pseudomonas* (King et al., 1954, Gilligan et al., 1995), *Streptococcus* spp. (John, et al., 1982), *E. coli*, *Clostridia* spp and *Staph.* Spp (McCance and Harigan, 1976). The incidences of skin injuries in the studied animal groups were described statistically as percentages.

## Results

In this study, we found that skin injuries were high in older animals as shown in Table 1. Incidence of injuries were high in female animals compared to male, while in sheep the injuries were high compared to goat and cattle as shown in Table 2. As given in Table 3, the incidence of injuries was low in teat and udder in all the animals. *Salmonella* was low in kids while *Shigella* was low in bulls. Similarly, *Pseudomonas* was low in cows while *Proteus* was low in bull, cows and ewes (Table 4). As shown in Table 5, *Staphylococcus* was high in kids while *Listeria* was low in bucks, does and kids. Similarly, *Brucella* was high in cows and *Clostridium* was high in does, cows and calf. *Streptococcus* was low in bucks, does and kids.

## Discussion

Wounds of various size and shape were observed in all of the ruminants under study and the recorded

**Table 1: Incidence of skin injuries in the examined ruminants according to age**

Animal	2-3 years	Less than 1 years	Total
Sheep	61(69.3)	27(30.6)	88(36.36)
Goat	49(62.8)	29(37.1)	78(32.2)
Cattle	46(60.2)	30(39.4)	76(31.4)
Total	156(64.4)	86(35.5)	242

Values in parenthesis are their percentages

**Table 2: Incidence of skin injuries in the examined ruminants according to sex**

Animal	Male	Female	Total
Sheep	39(44.3)	49 (55.6)	88(36.3)
Goat	32(41.0)	46(58.9)	78(32.2)
Cattle	27 (35.5)	49(64.4)	76(31.4)
Total	98(40.4)	144(59.5)	242

Values in parenthesis are their percentages

data revealed higher percentages of skin injuries in sheep than goat and cattle. Chaudhry et al. (2011) recorded skin damage at 33.88% in domestic ruminants and suggested the prevalence of various skin damages due to malnutrition in sheep, goats and cattle. They also showed that the damage in goats was highly significant compared to that in sheep and cattle. According to age, the percentage of skin injuries was higher in older compared to young animals. This may be due to the age factor (Chaudhry et al., 2011). The injured female ruminants were 54.4% whereas injured male ruminants were 45.5% of the total. For injured cattle, the cows were 12.3% while bulls were 6.6%. Chaudhry et al. (2011) suggested that the female animals have more nutrient deficiencies during gestation and lactation periods which lead to thin skin and make them prone to injury.

According to the site of injury on the body, high percentage was observed on legs and limbs and this finding agreed with those of Kiellad et al. (2009). They found that the prevalence of wounds of all kinds on the skin of hock was high, however, that on the knee was much higher. They suggested that the cow had to put both knees on floor at almost the same time when lying down or standing up, the cow also lied down with both of their front legs touching the underlying surface. Rodriguez et al. (1993) noted that the main risk factor for the high percentage of injuries on legs was the narrow walk alleys with high stocking densities that caused the cow to be squeezed particularly at the feeding trough and the skin probably was bruised by the bounding cubicle poles and the side of feeding trough. Injuries of the neck and brisket recorded in the present study were 10.3% and this was in agreement with Rodriguez et al. (1993). They attributed the injury to the protruding sharp edges and nails in the narrow cubicles, thus giving these areas of body high prevalence of injuries and the cubicle size vary from unit to unit to the extent that variations can also be found within the same smallholder units. Aleri et al.

**Table 3: Incidence of skin injuries in the examined ruminants according to the site in the body regions**

Animal	Legs	Limbs	Head	Abdomen	Teat and udder	Total
Ram	13(41.9)	11(35.4)	2(6.4)	5(16.1)	–	31(12.8)
Ewe	10(33.3)	8(26.6)	3(10)	4(13.3)	5(16.6)	30(12.3)
Lamb	11(40.7)	7(25.9)	3(11.1)	6(22.2)	–	27(11.1)
Buck	9(37.5)	9(37.5)	4(16.6)	2(8.3)	–	24(9.9)
Doe	8(32)	11(44)	1(4)	5(20)	–	25(10.3)
Kid	11(37.9)	9(31)	3(10.3)	3(10.3)	3(10.3)	29(11.9)
Bull	4(25.0)	6(37.5)	3(18.7)	3(18.7)	–	16(6.6)
Cow	9(30.0)	8(26.6)	4(13.3)	5(16.6)	4(13.3)	30(12.3)
Calf	14(46.6)	11(36.6)	2(6.6)	3(10)	–	30(12.3)
Total	89(36.7)	80(33)	25(10.3)	36(14.8)	12(4.9)	242

Values in parenthesis are their percentages

**Table 4: Isolation of gram negative bacteria from injuries in examined ruminants (as ratio of total animals to the isolated cases)**

Animal	<i>Salmonella</i>	<i>Shigella</i>	<i>E. coli</i>	<i>Pseudomonas</i>	<i>Proteus</i>
Ram	16/31 (51.6)	10/31 (32.2)	31/31 (100.0)	24/31 (77.4)	19/31 (61.2)
Ewe	17/30 (56.6)	8/30 (26.6)	30/30 (100.0)	18/30 (60)b	15/30 (50)
Lamb	16/27 (59.2)	7/27 (25.9)	26/27 (96.2)	22/27 (81.4)	17/27 (62.9)
Buck	11/24 (45.8)	6/24 (25.0)	24/24 (100.0)	20/24 (83.3)	18/24 (75)
Doe	13/25 (52)	8/25 (32)	25/25 (100.0)	22/25 (88)	18/25 (72)
Kid	11/29 (37.9)	6/29 (20.6)	26/29 (89.6)	24/29 (82.7)	17/29 (58.6)
Bull	9/16 (56.2)	0/16 (0.0)	12/16 (75)	8/16 (50)	9/16 (56.2)
Cow	16/30 (53.3)	2/30 (6.6)	26/30 (86.6)	11/30 (36.6)	15/30 (50)
Calf	19/30 (63.3)	7/30 (23.3)	30/30 (100.0)	13/30 (43.3)	19/30 (63.3)

Values in parenthesis are their percentages

**Table 5: Isolation of gram positive bacteria from injuries in examined ruminants (as ratio of total animals to the isolated cases)**

Animal	<i>Staphylococcus</i>	<i>Listeria</i>	<i>Brucella</i>	<i>Clostridium</i>	<i>Streptococcus</i>
Ram	27/31 (87)	6/31 (19.3)	3/31 (9.6)	21/31 (67.7)	23/31 (74.1)
Ewe	27/30 (90)	8/30 (26.6)	2/30 (6.6)	19/30 (63.3)	23/30 (76.6)
Lamb	26/27 (96.2)	7/27 (25.9)	2/27 (7.4)	20/27 (74.0)	21/27 (77.7)
Buck	22/24 (91.6)	1/24 (4.1)	0/24 (0.0)	17/24 (70.8)	16/24 (66.6)
Doe	21/25 (84)	1/25 (4.0)	0/25 (0.0)	20/25 (80)	15/25 (60.0)
Kid	22/29 (75.8)	0/29 (0.0)	0/29 (0.0)	18/29 (62)	19/29 (65.5)
Bull	16/16 (100.0)	2/16 (12.5)	1/16 (6.2)	10/16 (62.5)	13/16 (81.2)
Cow	29/30 (96.6)	6/30 (20)	9/30 (30.0)	27/30 (90.0)	24/30 (80.0)
Calf	28/30 (93.3)	5/30 (16.6)	3/30 (10.0)	26/30 (86.6)	23/30 (76.6)

Values in parenthesis are their percentages

(2011) recorded relatively moderate frequencies of injuries. They noted that too high and sharp edges of feeding troughs were the main predisposing factors of injuries of the brisket. Incidences of injuries of abdomen and teat and udder were 14.8% and 4.9%, respectively. In the same context, Rodriguez et al. (1993) found high percentage of injuries of these regions and they attributed this to the fact that ruminants lay on bare concrete floors, which in most cases were rough and pot-holed, hence the occurrence of these injuries. They also recorded the risk of housing factor and poor welfare. Aleri et al. (2011) found the lowest prevalence of injuries to occur on the teat and udder area. Skin injuries without medical management may be infected by many pathogenic bacteria. Among the isolated gram negative bacteria, the mostly prevalent bacteria were *E. coli* and *Pseudomonas*

followed by *Proteus* and *Salmonella*, while the lowest prevalence of the isolated gram negative bacteria was *Shigella*. The higher gram positive isolation bacteria were *Clostridium* and *Staphylococcus*, while lowest ratio of isolation was for *Brucella*, *Listeria* and *Streptococcus*.

From this study, it was concluded that all the domestic ruminant can suffered from injuries at different parts of body specially at age 2-3 years and female are more affected. Moreover, they may be infected Gram negative and Gram positive bacteria and this may cause unhealthy conditions and economic losses.

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