A study was carried out between January 1999 and January 2000 on some skin diseases in horses belonging to Smoush club, Alexandria. Governorate contained information on 153 horses. The results of the epidemiological survey were recorded, the main clinical signs observed are described and the various therapeutic approaches and control...
methods are analyzed. The study showed that 12 horses (7.8%) were affected with sweet itch (culicoides hypersensitivity) with higher incidence rate in English than in Arabian breeds. The number of horses affected with sweet itch rose with increasing age. Mange was recorded in 14 horses (9.2%) of all horses included in this study. No breed, season or age difference was observed in the occurrence of mange in horses. Psoroptes mange was the most common cause of mange in horses (7) cases. Ringworm was recorded in 6 horses (3.9%), five of them were young foals and one case was observed in 13 years old mare. Acne-boil was recorded in 22 horses (14.4%), all of them were in summer and spring. Bacterial isolates were identified from the lesions; 41 bacterial isolates were identified where Corynebacterium avium (pseudotuberculosis) was the most common isolate (19) followed by Staphylococcus aureus (5 isolates). Microscopic examination was done for total and differential leukocyte count. Eosinophilia was observed in sweet itch and mange infestation. Biochemical serum analysis for total protein, albumin, globulin and A/G ratio revealed hypoproteinemia and hypoalbuminemia in case of mange. Significant increase in globulin in horses with acne-boil was observed.

Key words: Epidemiological study, Skin diseases, Horse.

INTRODUCTION

The skin, the largest organ in the body, is the anatomical and physiologic barrier between animal and environment. It provides protection from physical, chemical and microbiologic injury.

Dermatoses caused by ectoparasites are the most common skin disorders of large animals. Animal suffering through annoyance, irritation, pruritus, disfigurement, secondary infection and myiasis (Scott, 1988). A syndrome characterized by mane and tail rubbing has been recognized in horses throughout the world and named summer itch, sweet itch, summer eczema or culicoides hypersensitivity. Affected horses have allergic reaction to the bite of culicoides insects (Kurolaki et al., 1994). Culicoides hypersensitivity while not life-threatening, can be debilitating economically to the owner. Often the discomfort and the disfigurement associated with the disease prevent the animal from being used for show or riding. Affected horses are sold for less than their worth. The possible hereditary implications can cause financial losses by removing valuable animals from breeding program. These factors
coupled with the cost of topical and systemic therapy are discouraging. Also mange is a devastating pruritic disease of animals including horse caused by mite *Otodectes* (Pascoe and Knottenbelt, 1999).

Dermatophytosis is a disease caused often by infection of horse skin and hair follicles with dermatophytes belonging to fungi (Schmidt, 1996). Although it is not fatal, it has long been known as an important factor in the health maintenance of horse (Conege, 1990). Once dermatophytes develop, it can spread widely by direct contagion due to contact with other horses or by indirect transmission via harness (Shimozawa et al., 1997).

Bacteria are a major cause of skin diseases in horses, (Scott, 1988). Identification of bacteria from skin lesions may provide important information to the cause of cutaneous infection. The presence of normal skin flora may confuse interpretation of these studies. It is essential to remember that damaged skin provides a medium for proliferation of many bacteria. Only by correlation the clinical appearance of the lesion with the bacteriologic data can one reach the proper decision concerning the presence of bacterial disease (Hungerford, 1990).

The study was designed to:

1. To quantify the types of skin affections encountered in horses with special reference to the epidemiological pattern of summer eczema, mange, ringworm and acne in horses including breed season and age influence.
2. To demonstrate the clinical signs, therapeutic trials and prognostic features of these skin diseases in horses.
3. To clarify the bacteriological causes of dermatosis in horse.
4. To determine the changes in total and differential leukocyte count as well as total serum protein, albumin and globulin in horses affected with some skin diseases.

**MATERIAL and METHODS**

Animals:
The record of horses with a diagnosis of sweet itch, ringworm, acne boil and mange presented in Somaia club, Alexandria Governorate, Egypt between January 1999 and January 2000 were reviewed. The total number of horses during this year was 133. Diagnosis was based on history, clinical signs, bacteriological examination and microscopic examination for dermatophytes and mites. Methods of treatment were recorded in each case.
Skin scraping for mite and dermatophytes examination:
The scraping was performed with No. 10 scalp blade. Before
the skin is scraped, the blade was dipped in a drop of mineral oil. The
skin was scraped until a small amount of capillary blood oozes from the
area. Scraping materials were added to a drop of 10% potassium hydroxide
solution. A coverslip was added and the slide was gently heated until
clarification. Then the slide was microscopically examined by 10X (low
power) magnification as described by (Handrix, 1998) for mites and by
10X40 magnification as described by Schmidt (1996) for detection of
dermatophyte spores.

Bacteriological examination:
Samples from skin were incubated in nutrient broth overnight at
37°C. The centrifuged broth sediment were cultivated on nutrient agar,
blood agar and McConkey agar plates. Incubation was done at 37°C for
48 hours and suspected colonies were identified according to the
procedures described by Cruikshank et al. (1975) depending on culture
character, hemolysis, bacterial morphology and biochemical reactions.

Blood samples:
Blood with anticoagulant was collected for total leukocytic count
and for preparing blood films stained with Giemsa stain for differential
leukocytic count using the four field meander system (Coles, 1980).
Blood samples without anticoagulant were collected for obtaining clear
non hemolytic serum for determination of total protein, albumin and
globulin spectrophotometry using chemical kits supplied by (Bio-
analytic, Florida, USA) after the method of Heney and Webster (1964).

Statistical analysis:
The results obtained were statistically analyzed according to
Snedecor and Cochran (1980).

Treatment trials:
Horses proved to be affected with skin diseases were treated as
shown in Table (1).

RESULTS
The diagnosis of sweet itch was made from observation of the
characteristic clinical symptoms (itching and consequent rubbing
resulting in broken hair, localized hair loss, thickening of the skin with
ulceration and superficial secondary infection), together with known
exposure to Culicoides sp. and exclusion of ectoparasites such as lice or
mite mite. Fig. (1) shows animal suffering from sweet itch in mane
(a) and tail (b).
Table (2) shows that 12 horses, (7.8%) were affected with Sweet itch. 8 cases started in summer, one in autumn and 3 in spring. There were significantly higher prevalence of the disease in English breeds (9 cases) compared with Arabic one (3 cases). The age distribution of horses suffering from sweet itch was analyzed relative to that of the corresponding healthy individuals. The mean age of horses suffering from allergic dermatitis was significantly greater (10.5, 12 horses) than that of healthy individuals (6.3, 141 horse).

Mango was observed in 14 cases (9.2%) of which 7 cases were psoroptic mite, 2 cases were sarcoptic and 5 were chloroptic mite.

Animals showed pruritus, papules, crusts excoriations and alopecia. Animals affected with chloroptic mangle showed crusts on the lower part of legs with stumping and rubbing the allotted areas in walls and fences. Some animals showed minimal clinical signs, i.e. increased scales only. Fig (2) shows horses suffering from mangle.

Diagnosis of ringworm was based on observation of clinical signs including circular areas of alopecia with scaling and crusting. No itching was observed. Diagnosis was confirmed by microscopic examination of skin scraping to observe the spores of fungi. Fig (3) shows horses affected with ringworm.

The incidence rate of ringworm in horse was 3.9% where 6 animals were affected with ringworm (Table 2). Five cases were recorded in foals and one case was observed in 13 years old mare.

Diagnosis of contagious acne-boil was based on clinical signs where animals showed painful papules and nodules. The nodules often ulcerate and drain a creamy greenish pus. The condition was most common on saddle area. (Fig 4)

Table (2) showed that 22 horses were affected with contagious acne (14.4% of total horses examined). English breeds (18 cases) were more affected than Arabic horses (4 cases). All cases started to occur in summer and spring (Table 2). Bacteria isolated from cases of folliculitis and furunculosis are shown in Table (5) where 41 isolates were identified as in most cases mixed infections were observed. Corynebacterium antrum was isolated from 5 cases, staphylococcus aureus was isolated from 5 cases, streptococcus sp from 4 cases, staphylococcus hyicus from 2 cases.

The results of total and differential leukocyte count in control and diseased groups are summarized in table (4) and biochemical serum analysis of proteins are summarized in Table (5).
A reasonable relief of pruritus and skin lesions was observed after treatment of cases of sweet itch, but the condition started to return again a few days after treatment ceased.

Horses suffering from ringworm responded favorably to treatment with disappearance of itching and healing of skin lesions and the general health condition of the animals improved. No live mites were found in skin scrapings from any of the horses at follow-up examination. Clinical signs resolved with no history of relapse in the 4 months following treatment.

The efficiency of treatment of cases of ringworm with weeklyin was found to be highly effective with complete clinical recovery with the appearance of hairs by 32 days after the commencement of therapy. Dermatophytes could not be isolated up to the 5th week after treatment. Horses treated with herbal drug showed less clinical improvement and dermatophytes were recovered from 2 out of 3 cases at third-week post treatment and the lesions extended to another areas of the body. Three horses were retreated with weeklyin.

A marked improvement was observed in horses affected with acne boil after treatment with complete healing of the lesions 10 days after treatment.

DISCUSSION

Sweet itch is a seasonal recurrent chronic dermatitis of horse caused by hypersensitivity to eulicodes biting and it is a well documented entity occurring throughout the world (Littlewood, 1998). The dermatitis usually localized to the mane, tail and withers and it is associated with urticaaria, intense pruritus and self excoration which may result in open wound and secondary infection (Brosstrom et al., 1987). The pathogenesis of the eulicodes hypersensitivity is complex. The saliva of the biting flies contains many proteins that could be antigenic leading to immediate hypersensitivity (Type I hypersensitivity) (Marti et al., 1992; Turataki et al., 1994).

The present study was undertaken to establish the incidence of sweet itch among horses. Out of 153 horse, 12 (7.8%) were affected with sweet itch (Table 2). Data collected in other countries have revealed a high incidence in various breeds (16.6%) in horses in Sweden (Brosstrom et al., 1987); of 391 horses, 17.6% in Norway (Stefanus and Larsen, 1991); in Germany, 20% were affected (Unterl, 1984); disease prevalence of 26% of horses surveyed in British Colombia, Canada.
The results of this survey confirmed a high incidence of sweet itch in English horses compared to Arabic horses. The association between high prevalence of allergic dermatitis and certain breeds and certain geographical areas has been described in numerous reports (Reid, 1953; Bevins, 1964; McCaig, 1973 and Unkel 1984). However, Anderson et al. (1988) could not find breed susceptibility in a survey in Canada. It was suggested that there is a hereditary influence in the pathogenesis of sweet itch (Bostrom et al., 1987). Marti et al. (1992) suggested that dermal hypersensitivity due to insect bites in horses is influenced by genetic factors related to major histocompatibility complex (MHC), therefore it was suggested that insect bite dermal hypersensitivity is a multifactorial diseases including hereditary and environmental factors in its pathogenesis.

The present study showed that the number of horses affected with sweet itch increased with the age of horse. This agrees with earlier reports (Braverman et al., 1983; Unkel, 1984 and Bostrom et al., 1987) who reported that the allergic dermatitis usually appears during the third or fourth grazing season. Previous reports stated also that horses develop the diseases between 2-4 years (McCaig, 1973; Braverman et al., 1983) or as early as 18 months (Bale and Quinn, 1978) but the condition has also been observed in horses less than one year of age (Anderson et al., 1981). Stefani and Larsen (1991) suggested that the increase of incidence of summer eczema in older horses is not due to age itself, but to other factors predisposing for the onset and development of the allergy in animals need certain period of sensitization by the exposure to the biting culicoides to develop the disease (Bostrom et al., 1987 and Stefani and Larsen, 1991).

In this study, cases of sweet itch were treated with systemic antipruritic agent (Prodesf 2X), with application of local anti-inflammatory cream as advised by (Fodor, 1987 and Scott, 1988). The pruritis stopped and the lesions healed again with regrowth of hair, but unfortunately, the condition returned again in most cases due to difficulty in insect control when treatment stopped, and its ability to pass through mosquito mesh screens. In previous reports, treatment by hyposensitization has been attempted in horses with hypersensitivity (Rozenkrantz and Griffin, 1986; Fodor, 1986). Aqueous whole insect antigens were used to inject horses subcutaneously for several times with different doses but few horses appeared to respond. In another
therapeutic approach, Hassachair, (1991) used 10% salicylic acid free solution in 32 horses with sweet itch. In 80% of patients the condition improved and in 40% of cases the exema healed completely. Also, benzyl benzoate solution was also used topically twice daily with reasonable control of the disease (Littelwood, 1999).

Out of 153 horse examined in this study, 14 were affected with mange (incidence rate 9.2%). The diagnosis was made by clinical features and confirmed by microscopic examination of skin scraping. There were no apparent age, breed or sex predilection. The main clinical signs observed were pruritus, papules, crusts, excoriation and alopecia. The lesions started at different areas of the body including head, neck and hindquarters (Fig 2).

Microscopic examination of the skin scrapings showed that 7 cases (50%) were affected with psoroptic mange. Many previous reports showed that *Psoroptic* *equi* causes body mange in equines (Fadok and Mullowney, 1981; Kral and Schwartzman, 1964; Priddle, 1967 and Soudry, 1982). *Psoroptic* *caniculi* causes ear mange in horses (Montali, 1976; Pascoe, 1980 and Fadok, 1984), but no case of ear mange was observed in this study.

Sarcoptic mange was detected in 2 cases (14.3%) although sarcoptic mange is generally considered to be rare in horse (Scott, 1988; Flood and Radoshit, 1989). Chromatoplastic mange was seen in 2 cases (15.7%) in fetlock area. Although chromatoplastic mange in horse is often localized to the fetlock, pastern and tail as described by Arundell, (1978), Thormett, (1973) and Wood, (1970). However, Boveena, (1978) described widespread lesion of this type of mange. Dermatologic mange was not detected in this study but it has been reported in horses in previous reports with clinical signs of asymptomatic alopecia and scaling over face, neck, shoulders and forelimb.

Animals were treated with Ivermectin by injection although there are no available published trials of its injection effect in horses. The drug was injected intramuscularly as it causes severe inflammation when injected subcutaneously.

In previous studies sarcoptic mange in horse was treated with 2% lime sulfer at least two treatments at a 14 day interval (Loomis, 1983). Ivermectine 200mg/Kg given orally (repeated in two weeks) was used in chromatoplastic mange in horses (Fadok, 1987). Littelwood et al., 1995 used oral Ivermectine at a dose of 0.1 mg/Kg daily for five days for the
treatment of chorionic mange in horses. Significant reduction in the number of mites was observed but no complete elimination. Selenium sulfide has recently been shown to be a safe and effective treatment for chorionic mange (Curtis, 1999).

Superficial mycosis have high prevalence in domestic animals including equine (Schmidt, 1996). The disease is known as ringworm or dermatophytosis. Trichophyton equinum, Trichophyton verrucosum, Microsporum equinum, Microsporum canis, and Microsporum gypseum have been reported as causal fungi of dermatophytosis among horses (Compeau, 1990; Shimizu 1991 and Shimozawa, 1997). Trichophyton equinum was reported to be the most common cause of ringworm in horses (Schmidt, 1996).

In this study, ringworm was observed in (3.9%) of animals included in this study. This ratio is lower than that observed by Moretti et al. (1988) who found that 9% of 200 horses was infected by dermatophytosis. There were no breed or seasonal effect on the occurrence of ringworm in horses, which agree with Petrovic (1978) who found no particular seasonal occurrence of the disease. He also found that either sex or breed nor coat colour affected the occurrence of ringworm in horses. However, Pascoe, 1979 and Scott, 1988 reported a higher incidence of ringworm in hot humid climate than in a cold dry climate.

Animals affected with ringworm in this study showed discrete circular areas of alopecia with severe crustling and scaling. In addition to these findings, other studies reported also suppuration and ulceration or multifocal to generalized scaling without alopecia (Stannard, 1976).

In this study different therapeutic approaches were used including Wolkain which is a tubeflacin counterirritant with mild blistering properties. Medicinal plants were also used which may not give good therapeutic effect. Best results obtained with Warkain which may be due to its high content of iodine which is known to be antifungal. Topical solution of 1-3% thalbanol was currently reported to be beneficial in equine dermatophytosis (Blank and Rebek, 1965). Marden et al. (1979). Noted that Miconazole was found to be very effective in localized infection.

Folliculitis is inflammation of hair follicles. When inflammatory process breaks through the hair follicles and extends into surrounding dermis and subcutis, the process is called furunculosis. When multiple areas of furunculosis evolve, the resultant focal areas of induration and fistulous tracts is called carbuncle (boils) (Scott, 1988). The condition is
caused mainly by *Staphylococcus* spp and *Corynebacterium* spp (Pascoe, 1984; Scott and Manning, 1980). The condition is recorded under variety of names including contagious acne-boil, Canadian horse pox, acne, heat rash, summer rash, summer scab, sweating eczema of saddle, saddle scab and saddle boil (Hopes, 1976; Pascoe, 1973 and Mallowoney and Padok, 1984).

In this study, contagious acne was diagnosed clinically and bacteriologically in 22 horses (14.4%). The condition was most common in spring and summer which agreed with (Scott, 1988) who mentioned that 90% of cases began in spring and summer where this period coincides with higher temperature and humidity and increased insect population. There was also no breed influence of the incidence rate of acne, which was also reported by Scott (1988). The author mentioned that there is no apparent age, breed or sex predilection the incidence of acne in horses.

The clinical picture of acne in this study showed clinical popules and nodules (Fig 4a), which were often painful. The lesions tend to ulcerate and drain creamy greenish-white pus. Leaving ringworm like alopecia (Fig 4b).

The bacteriological examination of the skin lesion of acne showed that *Corynebacterium ovium* was the most frequently isolated bacteria (19 isolates) followed by *Staphylococcus aureus* (5 isolates), although previous studies reported that *staphylococcus aureus* is the most common cause of folliculitis and furunculosis in equines (Devriese et al., 1985 and Shimozawa, 1997).

*Staphylococcus aureus* was isolated from 3 cases in this study. In previous study *Staphylococcus aureus* was isolated from pastern folliculitis (Devriese et al., 1983) and from cases of dermatitis in horse (Devriese et al., 1985 and Shimozawa 1997).

Also streptococcal spp which was isolated in this report (4 isolates) was also isolated from cases of folliculitis and furunculosis in horses (Thomsett, 1979).

Other bacteria isolated as shown in table 2 may be bacterial contaminant of skin as there is no report of their role in skin diseases in equine.

The changes in total leukocytic count were not significant in cases of sweat itch, ringworm and acne boil. *Eosinophila* was observed in sweat itch and mange which agree with Baker and Quinn (1973); Baker (1983); Kleider and Lees (1984); Foster et al. (1995, 1997); Abdel-Salam, (1998) and MCELPIE et al. (1999), who found that horses
with insect hypersensitivity have peripheral eosinophilia. Eosinophils are attracted and activated by histamine and cytokines released in case of hypersensitivity (Tizard, 1992 and McElvive et al., 1999). The function of eosinophils is to suppress inflammation by destroying histamine released as it produce diamine oxidase which act as histaminase (Tizard, 1992). Also eosinophils are attracted to the area to phagocytose the allergic substances produced in culicoides hypersensitivity and mange (McElvive et al., 1999). The leukopenia and neutropenia observed in mange may agree with Abdel-Salam, (1998) who explained it as a reflection of suppressive effect of external parasitic infection with mange.

Animals affected with mange showed significant decrease in total serum protein and albumin (table 5). This hypoproteinaemia and hypoalbuminemia may be due to rapid breakdown of serum total protein resulting from continuous movement during rubbing of the skin lesions due to severe itching (Abdel-Salam, 1998).

Animals suffering from acne boils showed marked increase in globulin concentration in their serum. The increase in globulin in bacterial infections has been observed before (Coles, 1980; Abdel-Salam et al., 1995).

Finally, affection of the skin can be produced by myriad agents, including external irritants, allergens, trauma and bacterial, viral, fungal and parasitic infection. The most common signs are scratching, followed by skin lesions that progress from edema and erythema to papules, vesicles, pustules and crusting or scaling. Secondary infection may occur. Since palliative measures merely effect a cure, a thorough history should be taken, noting the progression and involvement of other animals and any prior treatment. Physical examination should define the area affected. Diagnostic tests such as skin scrapings for ectoparasites and skin culture for bacteria and fungi should be employed when indicated. Until the underlying cause is diagnosed, both topical and systemic therapy may be used. Improvement of stable hygiene and washing all affected gear, saddle, cloths and grooming equipment should be done.
REFERENCES


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Cited in Vet Bull, 1979, 4067.


<table>
<thead>
<tr>
<th>Disease</th>
<th>Drug used</th>
<th>No of horses</th>
<th>Method of application</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sweel itch</td>
<td>Profen 2X</td>
<td>12</td>
<td>Profen 2X was given by intramuscular twice at a dose of 20 mg/kg b.w. for 3 days. Horses</td>
</tr>
<tr>
<td></td>
<td>Residents</td>
<td></td>
<td>was applied topically after cleaning of the lesion with sterile water.</td>
</tr>
<tr>
<td>Mare</td>
<td>Profen²</td>
<td>9</td>
<td>Intramuscular injection of Profen 1mg/kg b.w. every 24 hrs for one day.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Palpating the affected leg with compression twice daily for 5 successive days after</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>cleaning of the lesion and removal of crust.</td>
</tr>
<tr>
<td>Ringworm</td>
<td>Workadin²</td>
<td>3</td>
<td>Affected area was cleaned thoroughly with water and sponge then application of</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Workadin for 5 successive days.</td>
</tr>
<tr>
<td>Herdull</td>
<td></td>
<td>3</td>
<td>Aqueila Anthra was used for cleaning the infected areas of the body before the</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>application of the herbal drug for 3 successive days.</td>
</tr>
<tr>
<td>Acre-bail</td>
<td>Steptopredinic²</td>
<td>22</td>
<td>Two kindly of steptopredinic were injected intramuscularly daily for 3 days with</td>
</tr>
<tr>
<td></td>
<td>Beclometacin²</td>
<td></td>
<td>washing of the area by betadine antiseptic daily.</td>
</tr>
</tbody>
</table>

1. Profen 2X Im contain 2 mg naproxen sodium in an aqueous suspension (Eli Lilly, Inc. - Elan Belgium).
2. Residents each 100g contains: betamethasone 100 mg (Egyptian International pharmaceutical industries Co. A.R.E.).
3. Profen each ml contains 10 mg naproxen sodium (Merck & Co Inc., Whitehouse Station, N.J., USA).
4. Workadin (Merck, chloroquine 3%, Tetracycline 45,5%, Cephalin 10%, indomethacin 2%, polyvinyl alcohol 45%, water to 100%).
5. Aqueila Anthra is derived from the Triticum spelta (Black) and Cucumber powder 3% and oil of Citral (Chemical Industries Development, A.R.E.).
6. Steptopredinic (Pneumonia, pycnolda 20,000 IU, pycnolda G sodium, 40,000 IU and streptomycin 2 grain (Chemical Industries Development, A.R.E.).
7. Beclometacin each ml contains 10% beclometasone (Becton Dickinson for chemical 5 pharmaceutical industries A.R.E.).
Table 3: Prevalence of sweet itch, mange, ringworm and acne-boil in horses relative to season.

<table>
<thead>
<tr>
<th>Disease</th>
<th>Summer</th>
<th>Autumn</th>
<th>Winter</th>
<th>Spring</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sweet itch</td>
<td>8</td>
<td>7</td>
<td>5</td>
<td>6</td>
<td>24</td>
</tr>
<tr>
<td>Mange</td>
<td>4</td>
<td>5</td>
<td>4</td>
<td>2</td>
<td>15</td>
</tr>
<tr>
<td>Ringworm</td>
<td>5</td>
<td>6</td>
<td>6</td>
<td>0</td>
<td>17</td>
</tr>
<tr>
<td>Acne</td>
<td>10</td>
<td>9</td>
<td>8</td>
<td>6</td>
<td>33</td>
</tr>
</tbody>
</table>

The case was recorded at the start of the disease.

Table 3: Isolation of bacteria from the skin lesions of horses suspected of acne-boil.

<table>
<thead>
<tr>
<th>Bacteria</th>
<th>No of isolates</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corynebacterium casei</td>
<td>19</td>
<td>46.54</td>
</tr>
<tr>
<td>Corynebacterium kelii</td>
<td>2</td>
<td>04.87</td>
</tr>
<tr>
<td>Corynebacterium auris</td>
<td>1</td>
<td>02.44</td>
</tr>
<tr>
<td>Staphylococcus aureus</td>
<td>5</td>
<td>12.20</td>
</tr>
<tr>
<td>Staphylococcus hyicus</td>
<td>2</td>
<td>04.87</td>
</tr>
<tr>
<td>Streptococcus zooepidemicus</td>
<td>2</td>
<td>04.87</td>
</tr>
<tr>
<td>Streptococcus pyogenes</td>
<td>1</td>
<td>02.44</td>
</tr>
<tr>
<td>Escherichia coli</td>
<td>1</td>
<td>02.44</td>
</tr>
<tr>
<td>Proteus aerogenes</td>
<td>1</td>
<td>02.44</td>
</tr>
<tr>
<td>Streptococcus equi</td>
<td>5</td>
<td>07.52</td>
</tr>
<tr>
<td>Total</td>
<td>44</td>
<td>100</td>
</tr>
</tbody>
</table>
Table 4: Total and differential leukocyte count in clinically normal horses and horses affected with sweet itch, mange, ringworm and acne-bull

<table>
<thead>
<tr>
<th>Groups</th>
<th>No of animals</th>
<th>WBCs $\times 10^{-3}$/ul</th>
<th>Neutro %</th>
<th>Lympho %</th>
<th>Eosin %</th>
<th>Basophile %</th>
<th>Mono %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Healthy</td>
<td>15</td>
<td>88.73$^{a}$</td>
<td>59.67$^{a}$</td>
<td>33.33$^{a}$</td>
<td>2.02$^{a}$</td>
<td>0.14$^{a}$</td>
<td>0.09$^{a}$</td>
</tr>
<tr>
<td>Sweet itch</td>
<td>15</td>
<td>88.73$^{a}$</td>
<td>59.67$^{a}$</td>
<td>33.33$^{a}$</td>
<td>2.02$^{a}$</td>
<td>0.14$^{a}$</td>
<td>0.09$^{a}$</td>
</tr>
<tr>
<td>Mange</td>
<td>14</td>
<td>95.00$^{a}$</td>
<td>51.80$^{a}$</td>
<td>30.60$^{a}$</td>
<td>13.00$^{a}$</td>
<td>0.50$^{a}$</td>
<td>0.00$^{a}$</td>
</tr>
<tr>
<td>Ringworm</td>
<td>6</td>
<td>98.00$^{b}$</td>
<td>57.85$^{b}$</td>
<td>31.75$^{b}$</td>
<td>7.50$^{b}$</td>
<td>1.50$^{b}$</td>
<td>0.00$^{b}$</td>
</tr>
<tr>
<td>Acne-Bull</td>
<td>22</td>
<td>98.00$^{b}$</td>
<td>57.85$^{b}$</td>
<td>31.75$^{b}$</td>
<td>7.50$^{b}$</td>
<td>1.50$^{b}$</td>
<td>0.00$^{b}$</td>
</tr>
</tbody>
</table>

*Values within the same column with different superscripts are significantly different (P < 0.05).

Table 5: The average total protein, albumen, globulina and albumen/globulina ratio in clinically normal horses and horses affected with sweet itch, mange, ringworm and acne-bull

<table>
<thead>
<tr>
<th>Groups</th>
<th>No of animals</th>
<th>Total protein (g/l)</th>
<th>Albumen (g/l)</th>
<th>Globulina (g/l)</th>
<th>A/G ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Healthy</td>
<td>15</td>
<td>79.74$^{a}$</td>
<td>26.34$^{a}$</td>
<td>20.20$^{a}$</td>
<td>0.88$^{a}$</td>
</tr>
<tr>
<td>Sweet itch</td>
<td>15</td>
<td>79.74$^{a}$</td>
<td>26.34$^{a}$</td>
<td>20.20$^{a}$</td>
<td>0.88$^{a}$</td>
</tr>
<tr>
<td>Mange</td>
<td>14</td>
<td>84.84$^{a}$</td>
<td>26.80$^{a}$</td>
<td>20.20$^{a}$</td>
<td>0.88$^{a}$</td>
</tr>
<tr>
<td>Ringworm</td>
<td>6</td>
<td>90.25$^{b}$</td>
<td>28.37$^{b}$</td>
<td>24.28$^{b}$</td>
<td>0.84$^{b}$</td>
</tr>
<tr>
<td>Acne-Bull</td>
<td>22</td>
<td>90.25$^{b}$</td>
<td>28.37$^{b}$</td>
<td>24.28$^{b}$</td>
<td>0.84$^{b}$</td>
</tr>
</tbody>
</table>

*Values within the same column with different superscripts are significantly different (P < 0.05).
Fig (1) Culicoides hypersensitivity in horses with localization of the lesion in mane (A) and tail (B).

Fig (2) Mange in horse: (A) alopecia, papules and crusts in perineal region, (B) areas of crust and alopecia in head and neck.
Fig. (3) Lesions of dermatophytosis (ringworm) in the brisket and base of the neck (A) and in the hind quarters (B).

Fig. (4) Lesions of acne bullae in the form of multiple papules (A) in the healing stage with areas of alopecia (ringworm-like) (B) in the girth and chest wall.