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A Review on the Major Ectoparasites of Equines

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Abstract

Equines, including horses, mules and donkeys, play a significant role in agriculture, transportation, and recreation worldwide. Their health and well-being are paramount, not only for their welfare but also for the economic interests of their owners and the broader equine industry. Ectoparasites, which are organisms that live on the exterior of their host, pose major health risks to equines by causing direct damage, transmitting diseases, and leading to considerable economic losses. Ectoparasites, including lice (*Bovicola* and *Haematopinus* spp.), mites (*Sarcoptes* and *Psoroptes* spp.), flies (such as mosquitoes and stable flies), and ticks (notably *Ixodes* and *Dermacentor* spp.) have significant impact on equine health. The importance of integrated pest management strategies, which include chemical control, biological control, and environmental management, is emphasized as a holistic approach to minimizing the burden of ectoparasites in equine populations. Furthermore, the development of resistance to conventional antiparasitic treatments necessitates the exploration of alternative therapeutic options and preventive measures. By increasing awareness and understanding of these ectoparasites, equine practitioners and owners can implement effective strategies to enhance equine health and productivity. Therefore, this review aims to provide a comprehensive overview of the most significant ectoparasites affecting equines, detailing their life cycles, paths of transmission, clinical impacts, and approaches to control and management.

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Introduction

Horses (*Equus ferus caballus*), donkeys (*Equus africanus asinus*), mules, zebras (*Equus zebra*), and other animals with similar characteristics are classified as "equine" [1]. There are an estimated number of 59 million horses, 43.4 million donkeys and 11 million mules in the world [2]. According to Central Statistical Authority [3] survey report, Ethiopia's horse, donkey and mule population is estimated to be 2.16 million, 8.4 million and 0.41 million, respectively.

Equines, especially in developing countries have a diversified role in the livelihood and health of human being. They are mainly used for pulling carts, public transport, for ploughing, threshing and ambulatory service for sick humans and animals [4]. Although equines are often described as hardy and resistant animals, they do suffer from a number of health problems [5]. Among which the most common entities leading to ill health, suffering and early demise and finally death are infectious diseases and parasitism, which resulted in considerably reduced animals work output, reproductive performance and most of all their longevity [5, 6].

The ectoparasites such as ticks, lice, flies, and mange mites are a major problem in equines. These parasitic infestations are found at alarming and noxious level and have been considered highly responsible for substantial economic losses [7]. The characteristic symptoms are local inflammation, itchiness, loss of hair, loss of body weight, dull body coat, anemia and damage to the skin, exudation of serum and crust formation due to accumulation of serum exudate. Death takes place in neglected and untreated animals [7]. All equine species of all ages are affected without age or breed susceptibility [8]; however, the effects of these parasites are greatly evident in young and malnourished equines [9]. Ectoparsites could also act as carriers of some microorganisms such as bacteria, protozoans, rickettsia, viruses and fungi and these microbes could cause gastrointestinal infections and diseases [9, 10]. Therefore, this review aims to synthesize current knowledge on the major ectoparasites of equines, focusing on key themes including their biology, developmental life cycles, pathogenic effects on equine health, transmission dynamics, and integrated management approaches.

Ectoparasites Of Equines

The ectoparasites which cause major problem in equine are mites, flies, midges, ticks and lice. These parasites cause damage by inflammation, neoplastic reactions, restlessness, itching and loss of hair, loss of body condition, dull body coat, anemia, dermatitis, and they can transmit several viral, bacterial, and parasitic agents [11, 12]. The main problems associated with these ectoparasites are described below [13].

Flies

There are several 'types' of fly which can prove a torment to horses during spring and summer months. Biting flies can pierce the horse's skin and feed on its blood while nuisance flies lay secretions in and around the horse's eye, mouth, nose and other sensitive areas. Aside from the threat of an allergic reaction and the annoyance, flies can carry diseases, which they can spread from horse to horse [13].

A very common type of fly is the Horsefly (approximately 8-10 mm), which typically comes out in June and July, especially around woodlands. They tend to bite the horse's underside, legs, neck and withers and can cause painful lumps. Horse flies will also bite humans [13, 14]. Black flies are another common pest and are small in size (approximately 2-5 mm). These breed in rapidly moving water and are most noticeable at dawn and dusk. These flies commonly feed around the face, particularly inside the ears, where they trigger allergic skin reactions to their saliva, and distract the horse (**Figure 1**). They also feed on the horse's neck and underside [12].

Midges and Sweet-itch

Sweet-itch is a common skin disease that affects many horses

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Figure 1: Flies and midges feeding on the face of a horse (Source: [13])

and ponies and at present there is no cure. Once a horse develops the allergy it will generally last for life, so it is the responsibility of every horse owner to be vigilant in order to aid early detection, and to take preventative measures to prevent unnecessary suffering [13]. Sweet-itch is caused by a reaction to the saliva of biting midges during the summer months. It causes horses to rub their manes, tails and sometimes their undersides too. In the United Kingdom, it is the antigens present in the saliva of the Culicoides midge and to a lesser extent, a member of the black fly family called Simulium equinum that horses are allergic too. The severity of the condition varies from horse to horse; some will only rub occasionally, while others will rub themselves bald, causing open sores [12, 13]. Treatment revolves around anti-inflammatory therapy which is often unsatisfactory and can have serious side effects if used long term. Preventative measures are therefore crucial to avoid the condition and limit the suffering which can arise from the intense and unrelenting itch [1, 14].

Lice

Lice are wingless, flattened insects, often specific to host and usually 2-4 mm long. The claws of the legs are adapted for clinging to and moving among hairs. Lice thrive where they can keep warm and are often found at the roots of the forelock and mane but they can be found anywhere on the body particularly if the coat is thick [13]. The symptoms of a lice infestation include: a dull, listless coat, patchy hair loss, matting of body hairs, mane and tail, itching and rubbing against posts and stable walls, biting at the skin, loss of condition in more severe cases, in heavy infestations anaemia may occur due to blood loss, and lice and eggs are visible on the surface of the skin and in the coat [13]. Lice are readily passed from one horse to another by physical contact, and can also be spread by the sharing of brushes and equipment between equines. Therefore, sharing of equipment is not recommended [12].

Ticks

Ticks are blood-sucking parasites that attach themselves to animals and people. As they feed, ticks can transmit a number of diseases. Skin wounds caused by ticks can lead to secondary bacterial infections and screwworm infestations. Severe tick infestations can lead to anemia and death [15]. Ticks are significant vectors of the causative agents of piroplasmosis (theileriosis and babesiosis) in horses [12]. The international movement of equines infected with the tick-transmitted blood parasites such as Theileria, Babesia, Anaplasma, and Cowdria species is widely restricted [15].

There are several studies reporting the tick infestations on equines in worldwide [12]. *Haemaphysalis parva; Hyalomma anatolicum; Hyalomma marginatum;* and *Rhipicephalus (Boophilus) annulatus* are known to infest equines [16]. Each species of tick has a favored feeding site on a host, although in dense infestations, ticks may attach themselves wherever they can find a feeding location. Some ticks feed chiefly on the head, neck, shoulders (**Figure 2** a & b), and pubic area. In other species, the favored sites may be ears, near the anus (**Figure 3**) and under the tail, or in nasal passages [15].

Direct contact with ticks frequently results in tick infestation. Animals that spend time outdoors, especially in wild areas, are more often affected. Thus, among horses, animals roaming in the wild or being ridden in wilderness areas are mostly likely to be infested, although any horse spending time outside can acquire ticks [17].

The definitive sign of tick infestation is the presence of a tick on the animal. Ticks that have been on an animal only a short time (an hour to a few days) appear flat. Ticks that have been on an animal for several hours or days appear much more rounded due to the blood they have consumed. Diagnosis is by appearance of tick bite marks on the animal and the presence of the offending pest [15]. Ticks should be removed as soon as possible to minimize disease and damage. To remove a tick correctly, use tweezers to carefully grasp the tick close to the skin and pull gently. Never try to remove a tick with your bare hands, as some tick borne diseases can be immediately transmitted through breaks in your skin or contact with mucous membranes. The use of hot matches to remove ticks should also be avoided. Infested horses should also be treated with insecticides that kill attached larvae, nymphs, and adults. Monitor the site(s) from which you have removed ticks. If a tick bite site turns red or swells, a call to the veterinarian is warranted [15].

If a horse is severely infested with ticks, it is recommended that you immediately contact your veterinarian regarding tick removal. Heavy infestations will not only severely damage the skin, but the

Figure 2: Tick infestations on the shoulder (a), and neck regions (b) of a horse (Source: [22, 23]).

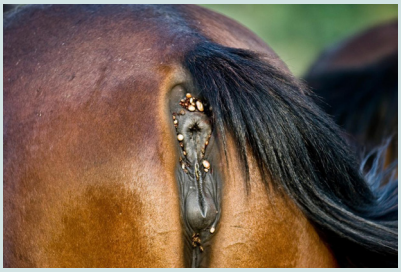

Figure 3: Heavy tick infestation on the caudal regions (in and around the rectum and vagina) of a horse (Source: [24])

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chances of anemia and other complications are high [18]. Keeping animals away from tick-prone areas is the most effective step you can take to control exposure. Most ticks live in particular microhabitats, such as tall grass or the borders between pastures and woodlands. Destruction of these microhabitats reduces the number of ticks. Removing tall grass and weeds from your property and keeping pastures mowed can help protect your horse. Insecticide treatment of vegetation can slightly reduce the risk of ticks. However, it is not recommended for wide use because of environmental pollution and the cost of treating large areas [15, 19].

Mange (Acariasis, Mange mites)

Mange is caused by microscopic mites that invade the skin of healthy animals [20]. All mites undergo a so-called metamorphosis, i.e. development to adults does not only require increasing the size, but also changing the shape. Due to the rather rigid exoskeleton, increasing the size is only possible through molting, i.e. getting rid of the old skin and producing a new and larger one. Mites (and most arthropods) go through four major development stages: egg, larva, nymph and adult. The passage from one stage to the next one requires one or more molts. The complete life cycle (i.e.) from eggs to eggs of the next generation lasts 1 to 4 weeks, depending on the species and the environmental conditions. i.e., it is rather short when compared with ticks [21].

The mites cause irritation of the skin and a hypersensitivity reaction, resulting in itching, hair loss, and inflammation. However, mange infestation is rare in equines. There are several types of mange that affect equines, including sarcoptic mange (equine scabies), psoroptic mange (mane mange), chorioptic mange (leg mange), demodectic mange (horse follicle mite), harvest mites (chiggers, trombiculids), and straw itch mites (forage mites) [20].

Sarcoptic mange (scabies, body mange): Although rare, sarcoptic mange is the most severe type of mange in equines. The first sign of mange is intense itching, caused by hypersensitivity to mite saliva and feces [21]. Anti-itch medications do not help. The animal will rub and chew on its skin, causing sores and bald patches to appear on the head, neck, flanks, and abdomen. The sores start as small bumps and blisters that later develop into crusts. Hair loss and crusting spreads and the skin becomes thickened. If untreated, the sores may spread over the entire body, leading to emaciation, weakness, and loss of appetite [20].

Diagnosing mange is sometimes difficult. If mange is suspected, your veterinarian will do a physical examination, including skin scrapings. However, the mites that cause mange are not always found in skin scrapings. If mites are not found, but the signs are highly suggestive of mange, a skin biopsy might be performed [21]. Sarcoptic mange is highly contagious. Treatment must be thorough and should include all horses and other animals that have been in contact with one another. Solutions like lime-sulfur solution applied by dip, spray, or sponge. Several treatments, applied 12 to 14 days apart, are often recommended. A group of drugs called macrocyclic lactones (e.g. Ivermectin) are effective against sarcoptic mange. These drugs are usually given by mouth in horses. Treatment for secondary infections may also be necessary [20, 21].

Psoroptic mange (mane mange): Psoroptic mange is rare in equines and, in fact, has been eradicated from horses in the United States. It produces lesions on thickly haired regions of the body, such as under the forelock and mane, at the base of the tail, under the chin, between the hind legs, and in the armpits. The mites can sometimes infect ears and may cause head shaking. The lesions start as small raised areas that soon lose hair and develop into thick crusts that bleed easily. Treatment is the same as for sarcoptic mange (see above) [20].

Chorioptic mange (Leg mange): Leg mange is the most common form of mange in equines and tends to occur in heavy (draft) breeds. Signs start as itching affecting the legs (most often the hind legs) around the foot and fetlock. Raised bumps are seen first, followed by hair loss, crusting, and thickening of the skin. The signs lessen in summer but return with cold weather. The disease persists without treatment, but usually clears when treated. Topical treatments recommended for other types of mange are usually effective [21].

Demodectic mange (horse follicle mite): Demodectic mange is rare in equines. These mites live in the hair follicles and oil glands or in the eyelids and muzzle. The signs of demodectic mange in horses can include patchy hair loss and scaling or skin lumps. Signs appear on the face, neck, shoulders, and forelimbs. There is no itching, so secondary infections do not occur. Treatment is not often done, and lesions can resolve without treatment. This condition may develop in horses with compromised immune systems due to an underlying disease or long term treatment with corticosteroids [20, 21].

Harvest mites (chiggers, trombiculids): Harvest mites usually live on other animals but can infest the skin of horses, especially during the late summer and fall. Signs consist of severely itchy bumps and hives. Specific treatment is not required. The itching can be controlled with medication. Repellents may help prevent infestation [20].

Straw itch mites (forage mites): Straw itch mites usually feed on organic material in straw and grain but can infest the skin of horses. Raised bumps and hives appear on the face and neck if horses are fed from a hay rack, and on the muzzle and legs if fed from the ground. Itching is variable and can be controlled with medication [20].

Conclusions and Recommendations

Ectoparasites represent a significant threat to equine health and welfare, as well as the economic viability of the equine industry. Understanding their biology, transmission, and effects is essential for effective control strategies. By employing integrated pest management approaches that incorporate chemical, biological, and environmental controls, equine practitioners and owners can mitigate the impact of these ectoparasites. Based on the above conclusions, the following points are forwarded as recommendations: comprehensive understanding and management strategies involving regular monitoring, sanitation, and targeted treatments are crucial in mitigating the negative impacts associated with these ectoparasites; research works should focus on the evolving resistance patterns to ectoparasiticides and the development of sustainable control strategies that prioritize animal welfare and minimize environmental impact; and continued education of equine owners and caretakers about the identification, prevention, and control of ectoparasites will be key to promoting the health and productivity of equines globally.

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