

Applications of Herbs, Bioactive Forages, Diatomaceous Earth and Homeopathic Remedies against Internal Parasites of Livestock

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Abstract

Infestation with endoparasites is a major problem in ruminants causing server economic losses in livestock sector. The parasites of primary concern in the livestock worldwide are tapeworms, lungworms, liver flukes, and coccidia. Livestock producers mostly rely on anthelmintics to control internal parasites in animals. However, anthelmintic resistance has become a global problem threatening the productivity of ruminants. So, there is an increasing demand to avoid chemical intervention of deworming. Many alternative dewormers including Diatomaceous earth, *Cichorium intybus*, *Allium sativum*, *Onobrychis viciifolia* extracts and homeopathic products have successfully been used for parasitic control. The non-chemical dewormers offer very good control over internal parasites; however these are not advised to be used as an immediate cure option. This paper was aimed to provide information about the effective alternative dewormers against internal parasites, the physiological consequences of herbal administration including possible risks, side-effects and future applicability. On the other hand, the present review describes the simple, economical and convenient remedies to control internal parasites of livestock. These remedies also bear the potential to be included as routine feed additives. The advantages and limitations of these remedies are also briefly addressed in this review.

Keywords: Advantages; Alternative Dewormers; Endoparasites; Herbal Remedies; Limitations; Livestock

Introduction

Animal health problems are of great concern in the intensive farming system. Endoparasites are one of the major threats for livestock farming resulting in productivity loss [1,2]. Extensive application of chemical anthelmintics has resulted in resistant strains of endoparasites [3], affecting livestock. Increased resistance of parasites to modern anthelmintics has enforced the animal scientists to look for non-chemical alternatives. Also increased awareness of end users about drug residues has led to the development of organic farming systems. These remedies also have the potential to be involved as repetitive food additives. The benefits and restrictions of these mixtures are also briefly analyzed in this review This review summarizes the current scientific trends towards the use of simple, economical and convenient remedies to control internal parasites of livestock.

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Non-chemical alternatives

Bioactive forages

Bioactive forages refer to crops that contain secondary plant components, which are considered as beneficial for animal health. Many types of forage have a higher level of condensed tannins (CT) which has been widely investigated as an anti-parasitic compound in different studies. Condensed Tannins decrease the loss of nutritional proteins by building complexes with plant proteins and protecting them from ruminal degradation thereby increasing the amino acid flow towards duodenum [4]. This increase in protein nutrition decreases the parasitic infestation as reported in several studies conducted in sheep by Min and Hart, 2003. Condensed tannins also disturb the normal physiological functions of the parasites directly by reacting with the proteins present on the surface of the parasites [5]. The suggested level of CT for the beneficial effect in reducing fecal egg count is 45 to 55g of CT/kg of dry matter (DM) of the plant [4]. The idea is to integrate these bioactive forages into the diet of livestock provided it must not be overdosed and be non-toxic to animals [6]. Legumes can be more beneficial as bioactive forages because most of the temperate forage legumes have about 5% CT content while CT content of most grasses is under 1% [6]. These forages can be fed either as hay or silage. The forage can also be cultivated as strips or patches in paddocks and pastures as to provide free access to animals to eat these beneficial medicinal herbs. This is a more applicable and acceptable deworming strategy to be opted by the farmers. The disadvantage associated with the feeding of bioactive forages is reduced nutrient utilization and impaired animal performance [7].

Herbs

Several medicinal plants are considered beneficial for the animals due to plant secondary metabolites of medicinal importance. Condensed Tannins content of some tropical plants may reach up to 40% [6]. Some other herbs work by making the intestinal tract healthier which does not allow survival of endoparasites, as intestinal parasites have evolved to thrive in the unhealthy digestive tract. Some promising herbs investigated against intestinal parasites are discussed below.

Allium sativum (Garlic)

Allium sativum (*A. sativum*) is a perennial herb of 20 - 100 cm in height belonging to the Alliaceae family Masamha, *et al* [8]. In some countries, the boiled pulp of *A. sativum* is being used to reduce worm load in livestock. In a study conducted by Orr [9], *A. sativum* based herbal anthelmintic group showed zero percent infection rate with Strongyloides (threadworms) and 33% with Protostrongyloides (lungworms) as compared to chemical dewormer group having 29% and 50% infection rate for the respective nematodes in dairy goats. Masamha, *et al.* [8] reported the ability of *A. sativum* to reduce the fecal egg count of the two most prominent parasites, the Strongyles and Trichostrongylus species. The suggested dosages of *A. sativum* in small ruminants is 5 ml of *A. sativum* juice [3] or two bulbs of plant, twice daily [9]. *Allium sativum* has some adverse effects on animal health including loss of appetite, dizziness and muscle aches if consumed in large amounts [8].

Cichorium intybus (Chicory)

Chicory is a perennial herb of the Mediterranean climate. Chicory is mostly used as a feed additive in ruminants for weight gain; however, some *in vitro* studies have proved the strong anthelmintic activity of chicory [10]. Some studies have shown that feeding of chicory herb was effective against adult parasites but not against incoming larvae [11].

Onobrychis viciifolia (Sainfoin)

Sainfoin is a perennial herb belonging to the Fabaceae family. Some *in vitro* studies showed the inhibitory activity of Sainfoin extracts against *Teladorsagia circumcincta*, *Trychstrongylus colubriformis* and *Haemonchus contortus* nematodes [12,13]. Similar, results have also been confirmed in several *in vivo* studies. Thamsborg, *et al.* [6] observed expulsion of adult parasites as well as 50% reduced faecal egg count in infected animals after feeding sainfoin to young lambs. However, Paolini, *et al.* [12] and Athanasiadou, *et al.* [10] found no

significant effect of Sainfoin consumption on incoming third-stage larvae in small ruminants. So, it merely bears prophylactic activity against endoparasites.

Diatomaceous earth

Diatomaceous earth (DE) is powdered silica made from the remnants of fossilized marine or fresh water algae called diatoms. It is claimed to damage the cuticle of the nematodes and cause their death by dehydration [14]. There is little scientific data available on the effectiveness of DE against internal parasites. Variable results have been observed in different studies to control internal parasites in domestic animals after feeding DE as alternative dewormer [14-16]. Rahmann and Seip [3] claim that Diatomaceous earth acts as anthelmintic if consumed at 2% of the daily ration. However, continual ingestion of DE by animals can damage the intestinal tract resulting in malabsorption of nutrients [17].

Homeopathic remedies

There is little scientific evidence exist, supporting the effectiveness of homeopathy drugs against internal parasites affecting the livestock. Gibbons [18] reported effectiveness of the homeopathic drugs as alternative dewormers in animals. Homeopathic remedies do not actually act as vermicides but improve the resistance of livestock against certain internal parasites. The advantage of homeopathic remedies is that they do not require any fasting period before deworming; and laxative diet after the treatment. However, the application of homeopathic remedies requires detailed knowledge of the subject, to be practiced by the veterinarians after getting an additional homeopathic or electro-homeopathic qualification.

Conclusion

The research conducted on the application of alternatives dewormers has revealed the promising potential to be used as nonchemical dewormers. The present review describes the simple, economical and convenient remedies to control internal parasites of livestock. These remedies also bear the potential to be included as routine feed additives. Development of bioactive forage paddocks would be an effective and more applicable deworming strategy as compared to other methods discussed in this review. Furthermore, there is still a great need for more research and understanding in the areas of bioactive forages, herbs, DE and homeopathic deworming products.

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