

NUTRITIONAL STRATEGY FOR MANAGEMENT OF GASTRO-INTESTINAL PARASITISM IN RUMINANTS

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Introduction

For improvement in the ruminant productive and reproductive performance there are two major obstacles (i) inadequate nutrition and (ii) parasitism. Gastrointestinal nematodes are main threats for health and production of cattle in extensive production systems. They cause considerable losses in the production in the whole world, mainly in young animals and periparturent females. Economic losses are related to a decrease in fertility, in food intake and in weight gain but also to the lower milk production, to more expensive treatments and control methods and to the death of severely parasitized animals. Under-nutrition in energy, protein and minerals/trace elements are direct or indirect predisposing factors that render the animals susceptible to parasitic infestation. Further, available feed resources are often low in quality, fibrous and deficient in components which affects efficient rumen function.

Since a long time, the chemical anthelmintics are being used to control the parasitism. The irrational usage of these drugs leads to the development of drug resistant parasites. Not only India but the world is also facing the challenge of the drug resistance. To provide the animal products free from such chemical residues an alternative parasite control approaches should be practised. Good managerial practices like grazing management, nutritional management, biological control, genetic control and vaccination could help to reduce the losses caused by the GI parasites. Instead of chemical drugs some alternative therapies should be practised to tackle the GI parasites in the herd. The organic farmers must be aware of such non pharmacological practices which includes the use of vaccines, resistant genotypes breeding, biological control, alternative hosts grazing, regular faeces removal, pasture rotation policy, feed supplementation to

improve the body condition or alternative forages utilization that have anti-parasitical effects. Observation, testing and monitoring of animals is crucial to determining progress and success of the managerial practices to fight against parasite. Larger and older animal is easier to handle than the small and young animals.

There is inverse relationship between the nutritional plan of animal and the parasitic load of animal. The nutritional management of the herd is very important to fight against the parasitic infections in the farm.

Nutritional Management

Effect of Parasites on Animal Nutrient Status

There is a complex relationship between the nutritional status of animal and the parasitemia, however without any doubt, the parasites increase the susceptibility to get animal infected because of altered nutritional availability. The alteration in animal metabolism is highly determined by the (i) parasitic and (ii) host factors. Parasitic factors include the number and level of larval challenge, and worm species. The host factors like age, nutritional, physiological and immune status influences the level of parasitemia. The physiological responses of parasites in ruminants that influence the nutritional status could be attributes as; the infected animal become selective in their diet and reduces feed intake. The nutrient absorption efficiency is greatly reduced which further depends on the species of parasite and its location in the GI tract. To repair the damage in the GI tract caused by the parasite and to develop and express the local cell mediated responses, amino acids get sequestered. This leads to an imbalance of nutrients between the liver and peripheral tissues which ultimately repress the feed intake and animal become selective to concentrate diet containing high protein. The digestion and absorption of dietary nutrients in the intestine is greatly influenced by the GI parasites, which ultimately suppress the animal's immune system. The immunocompromised animal is susceptible to get infected easily. Due to the parasitemia there is decrease in non-ammonia nitrogen absorption and on other side increased secretion and reduced reabsorption of amino acid (threonine in mucus, cysteine in leukotrienes etc.) occurs. All these leads to protein deficiency in the animal. To maintain the tissue integrity and normal homeostasis there is increase in the protein demand of the animal and resulted in the reduction in growth rate for the same food supply. The animal

productive efficiency is highly reduced because of feeding host's blood and food, GI damage, sequestration of amino acids, reducing digestion, enhancing nitrogen losses etc.

Nutritional Exploitation can Increase Host Immunity to Gastrointestinal Parasite

By providing optimum nutrition the immunity against various parasite can be acquired. The plan of nutrition could enhance the host immunity by following ways

- Decreased establishment of incoming larvae and reduction in worm number
- Rejection of established worms
- Reduction in faecal egg count
- Increase in body weight/growth rate of animals
- Reduced severity of infection and drench frequency

Host acquired immunity against the GI parasite is very crucial that helps the host to reject the incoming larvae, expel the adult worms and decreasing fecundity of parasite. The acquired immunity is directly depending on the plan of nutrition especially the protein, iron, and trace elements content of the ration as these nutrients are majorly depleted by the parasites from host circulation. The under-feed animals, pregnant animal is more prone to get parasitic infestation. As the young animals cannot get sufficient protein from the pasture, they are more susceptible than the adult animal. The acquired immunity against the invading parasites is depend on the T-cell function, which is badly affected by protein-energy deficiency. However the feeding of increased amount of digestible protein could not be elicited the host resistance against parasite at early stage of infection, rather it is more beneficial to supplement the protein at latter stage of infection for optimum immunity against the parasite. The nutritional factors that can boosts the host immunity against the parasites could be an integral managerial component to fight against the parasitemia. The nutritional management should be in such a way that a higher emphasis on acquisition of immunity be given rather than growth in young animals. Whereas in adult animal, the reproductive performance should be on high priority. The increased dietary

intake of metabolizable protein and energy and high-quality pasture can directly promote the host resistance to worm infestation.

The high protein diet suppresses the faecal egg count, thus helping in the less pasture contamination and subsequent re-infection. The animals which are fed on good amount of crude protein are capable to mount the protective immunity in comparison to the low plane of nutrition. It was reported that the animals that are reared on additional protein supplementation, were able to maintain growth rate. It was suggested that if the availability of amino acids is high enough, the animal can maintain its productive performance even in the parasitic challenge. If the animals are fed on additional high quality of protein, it not only affects the growth of parasite but also helps to produce more antiparasitic IgA which ultimately represses the parasitic growth. In the parasitic infection the nitrogen deficiency is the most crucial. Provision of non-protein nitrogen (NPN) such as urea in the diet can compensate for the deficiency and stimulate feed intake, enhance ruminal digestion, elevate ammonia-nitrogen level in rumen leading to increased ruminal microbial protein synthesis and availability to the intestine

The nutritional management of young, adult, pregnant as well as diseased animals is very crucial for the optimum productive and reproductive performances. By adopting a good nutritional management practice in the farm, the farmers can reduce the chances of parasitic infestation in their herd.