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Efficacy of different therapeutic regimens for simple indigestion in sheep

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Abstract

Simple indigestion is one of the common digestive abnormalities encountered in ruminants. The abnormality is characterised by reduced feed intake, dullness and depression, ruminal atony and decrease in milk production. The current study was undertaken to evaluate the efficacy of various therapeutic regimens for amelioration of simple indigestion in sheep. Animals with simple indigestion were randomly divided in 4 groups (n= 25 in each group) and treated with 4 different therapeutic regimens T1 (Probiotics alone), T2 (Probiotic + Prebiotics), T3 (Probiotics + Rumentorics) and T4 (Rumentorics alone). Therapeutic regimen in group T3 (Probiotics + Rumentorics) was most effective in which all animals recovered on 3rd day followed by Therapeutic regimen in group T2, followed by Therapeutic regimen in group T1 in which animals all animals recovered on day 4th and 5th. Therapeutic regimen 4 was found to be least effective since only 83.3% animals recovered on day 5. The study concluded that Probiotics and Rumentorics given together is the best Therapeutic regimen for treatment of simple indigestion. So it may be concluded in present study that Probiotics and Rumentorics have synergistic action when given together.

Keywords: Sheep, probiotics, rumentorics prebiotics, therapeutics and simple indigestion

Introduction

Probiotics are live microorganisms, generally (bacteria and yeasts) when ingested alive in a sufficient amount, have a positive effect on the gut microflora resulting in the improved health status (Anadon *et al.*, 2006) [1]. A variety of microbial species have been used as probiotics, including the species of *Bacillus*, *Bifidobacterium*, *Enterococcus*, *E. coli*, *Lactobacillus*, *Lactococcus*, *Streptococcus*, and variety of yeast species, and undefined mixed cultures (Simon *et al.*, 2001) [2]. *Lactobacillus*, *Bacillus*, *Enterococcus* and *Saccharomyces* have been used most extensively in livestock (Wallace and Newbold, 1992; Simon *et al.*, 2001) [3, 2]. Probiotics are used in animals in order to increase performance, such as average daily weight gain, feed conversion rate, and quality of animal products. Ripamonti and Stella (2009) [5] suggested the use of spore-forming bacteria such as *Bacillus coagulans* as probiotics for calves. Recent concept is to use combination of prebiotics and probiotics are known as symbiotics. Probiotics produce lactic acid and some fatty acids which help to decrease intestinal pH and form hydrogen peroxide, a bactericide. Probiotics decrease the production of toxic amines and ammonia. Probiotic organisms displace harmful pathogens through competitive antagonism by colonization and adhesion to intestinal cells. Probiotics initiate non-specific immune-stimulation (Peridgon *et al.*, 1995) [4].

Materials and Methods

For therapeutic study 100 sheep with simple indigestion were randomly divided into 4 groups of 25 animals in each group. Different treatment groups designed to ascertain the efficacy of various regimens is shown in Table-2. Case control model was adopted for assessing ameliorative potential of Rumentorics, Probiotics, Prebiotics and their combinations in animals suffering from simple indigestion. Four therapeutic regimes employing (T1-Probiotics), (T2-Probiotics and Prebiotics), (T3-Probiotics and Rumentorics) and (T4-Rumentoric alone) were adopted for the study as per the protocol given below. Sampling was performed before onset of treatment and thereafter on 1st, 2nd, 3rd, 4th and 5th day post treatment.

Therapeutic regimen-1 (T₁): Probiotic (Live *Lactobacillus* Spp., *Saccharomyces* Spp., *Bifidobacterium* Spp.) 1.5 billion spores/1g b.i.d × 5 days.

Therapeutic regimen-2 (T₂): Probiotic and prebiotic (Live *Lactobacillus* Spp., *Saccharomyces* Spp., *Bifidobacterium* Spp., Fructo Oligo Sacchride 100mg) 1.5 billion spores/1g b.i.d × 5 days.

Therapeutic regimen-3 (T₃): Probiotic (Live *Lactobacillus* Spp., *Saccharomyces* Spp., *Bifidobacterium* Spp.) 1.5 billion spores/1g b.i.d × 5 days + Rumenotoric (Antimony Potassium tartarate 2g, ferrous sulphate 2g, copper sulphate 50 mg, cobalt chloride 100 mg) @ 1 bolus b.i.d x 5 days.

Therapeutic regimen-4 (T₄): Rumenotoric (Antimony Potassium tartarate 2g, ferrous sulphate 2g, copper sulphate 50 mg, cobalt chloride 100 mg) @ 1 bolus b.i.d x 5 days.

The efficacy of therapeutic regimens was evaluated on the basis of clinical recovery of the animals and Rumen function tests.

Statistical Analysis

The data generated from various experiments shall be analyzed as per standard methods of Snedecor and Cochran (1994)

Results

Therapeutic efficacy of all the regimens was evaluated on the basis of clinical recovery from the disease signs with normalization of rumen function tests. The results of treatment in various groups are shown in table 2. From the table it is evident that with Therapeutic regimen T₁, 0%, 16.66%, 50%, 83.33% and 100 % animals recovered on day 1st, 2nd, 3rd, 4th and 5th respectively. Similarly with Therapeutic regimen T₂, 0%, 16.66%, 50% and 100 % animals recovered on day 1st, 2nd and 3rd and 4th respectively. With Therapeutic regimen T₃, 16%, 50% and 100% animals recovered on day 1st, 2nd and 3rd respectively. With Therapeutic regimen T₄ there was no recovery till 3rd day, 50% recovery was seen on 4th day and 83.33 % recovery was seen on day 5th. From the Table 2, it is also evident that Therapeutic regimen T₃ is most effective since all animals recovered on day 3, followed by Therapeutic regimen 3 with which all animals recovered on day 4, followed by Therapeutic regimen 1 in which all the animals recovered on day 5 while as least effective was Therapeutic regimen 4, in which only 83.33% of recovered on day 5.

Discussion

Present study revealed that Therapeutic regimen 3 (Probiotic + Rumenotoric) was most effective since all animals recovered on day 3, followed by Therapeutic regimen 2 (Probiotic + Prebiotic) with which all animals recovered on day 4, followed by Therapeutic regimen 1(Probiotic only) with which all the animals recovered on day 5. While as least effective was Therapeutic regimen 4 (Rumenotoric only). Probiotics (*Saccharomyces cerevisiae*) increase production of growth stimulating factors in the rumen, stabilization of rumen pH, and reduction of the lactic acid production in the rumen (Anadon *et al.*, 2006) [1]. Probiotics increases the population of the useful bacteria in the rumen (Anadon *et al.*, 2006) [1]. *Saccharomyces* confers beneficial effects on cellulolysis and productive trait of the host animal (Anadon *et al.*, 2006) [1]. Prebiotics (Fructo Oligo Sacchride) encourage the growth of the beneficial bacteria in the gastrointestinal tract of the ruminants (Simon *et al.*, 2001) [2]. Feeding FOS helps in the proliferation of these probiotic bacteria which inhibit growth of more harmful bacteria. It can be postulated that prebiotics provide a substrate for the growth of probiotics. Rumenotorics (Antimony Potassium Tartarate, Ferrous sulphate, copper and cobalt) act as co-factors required for vitamin B₁₂ synthesis and acts as substrate for growth of rumen microbes, restoration of deranged rumen function and subsequent revival of appetite (Peridgon *et al.*, 1995) [4].

The combination of the probiotics and the rumenotorics was found to be most successful therapeutic regimen as the rumenotorics might have augmented the growth of both the probiotics as well as the normal beneficial ruminal microbes/ (cellulolytic bacteria), better than the prebiotics alone. In ruminants probably because of the ruminal bacterial action some amount of prebiotics may have been digested in the rumen as such some amount of them remained unavailable to the probiotic or beneficial ruminal micro organisms. Rumenotorics (Antimony Potassium tartarate, ferrous sulphate, copper sulphate, cobalt chloride) on the other hand are metallic elements and were thus completely indigestible even by the ruminal enzymes. Rumenotorics act as cofactors in the enzymatic reactions catalysed the by ruminal micro organisms and probiotics and as favoured the growth of those micro organisms and thus helped in the restoration of the normal ruminal flora and appetite.

The combination of probiotics and prebiotics was seen to be more efficacious and it may be suggested that combination has synergistic action on growth of the beneficial bacterial species in the rumen, stabilization of conditions in rumen and utilization of feed components by rumen flora. The results of present study can provide a guide to veterinary clinician for amelioration of rumen disorders and can used by clinician for early recovery in ruminal disorders.

Table 1: Therapeutic trail design in sheep with clinical simple indigestion

Group	No. of Animals	Treatment	Dose	Route	Duration
T ₁	25	Probiotic	1 g b.i.d	Oral	5 days
T ₂	25	Probiotic + Prebiotic	1 g b.i.d	Oral	5 days
T ₃	25	Probiotic + Rumenotoric	1 g b.i.d	Oral	5days
T ₄	25	Rumenotoric only	1 boli b.i.d	Oral	5 days

Table 2: Therapeutic efficacy of various regimens in simple indigestion of sheep

Group	Treatment	N	Therapeutic efficac (% Recovery)				
			Day 1	Day 2	Day 3	Day 4	Day 5
T ₁	Probiotic	25	(0)	(16.66)	(50)	(83.33)	(100)
T ₂	Probiotic + Prebiotic	25	(0)	(16.66)	(50)	(100)	(100)
T ₃	Probiotic + Rumenotoric	25	(16.66)	(50)	(100)	(100)	(100)
T ₄	Ruenotoric	25	0	(0)	(0)	(50)	(83.33)

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