

Effect of Polyherbal Formulations on Ruminant digestion in Goat

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Abstract

Rumen ecology plays vital role in the digestion, absorption and assimilation of ingesta in cattle. Digestive disorders in cattle directly affects the economics of dairy farm due to impact on production, hence the present study was planned to evaluate efficacy of herbal rumen ecology modulator AV/RMF/17 and Ruchamax on rumen liquor profile in goats. Total healthy twenty-one female goats were selected and divided randomly into three equal groups. Group (T1) was untreated control while, group T2 & T3 were supplemented with herbal Rumen modulator (AV/RMF/17) and Ruchamax (M/s Ayurved Ltd. Baddi, HP) @ 1.5 kg/ tone of feed and 1 kg/ tone of feed for 45 days respectively. Physical, biochemical examination of rumen liquor and growth parameters were evaluated. Among physical properties colour, consistency and odour recorded on 0 day observed which was observed to be greenish brown with watery consistency while odour was slightly amonical, which changes to greenish brown with viscous consistency and aromatic odour in T2 and T3 group within 7th day post treatment. Biochemical examination of rumen liquor reveals significantly decreased pH, TTA, TVFA and lactic acid in control group which were significantly increased in T2 and T3 groups in post treatment period as compared to control. Growth parameters viz. body weight gain, feed consumption and FCR were also improved as compared to untreated control. From overall observation indicated that animal treated with AV/RMF/17 and Ruchamax therapies showed better results on physical, biochemical examination of rumen liquor and improvement in performance parameters indicates normalization of rumen microflora.

Key words: AV/RMF/17, Ruchamax, Goat, Rumen liquor, Microbial, FCR

Introduction

Small ruminants occupy an important economic and ecological niche in agricultural systems throughout the developing countries (Devendra, 2005). As goat is known to be selective feeder among ruminants. Numerous factors plays vital role in digestion of the feed in goat governed from microflora population upto management practices followed. Digestion of the feed consumed is one of the most important factors for the productivity of small ruminants. If the voluntary intake is too low the rate of production will be depressed, resulting in requirements for maintenance becoming a very large proportion of the metabolizable energy consumed and so giving a poor efficiency of food conversion ratio (Forbes, 1995).

The physiology of digestion of ruminants is unique among domestic animals in that bacterial enzymes play an integral part in absorption, assimilation and metabolism. Actual digestion of feed is aided by the microbial population in the rumen i.e.

microflora. Cellulose and related compounds found in hays and roughages consumed by cattle and sheep is dependent upon enzymes elaborated by microorganisms living within the digestive tract. During the past several years digestion experiments have been under way at this laboratory in an attempt to determine fundamental concepts regarding rumen microorganisms and the digestion of roughages fed to cattle. Indigestion in caprines leads to economic losses in terms of milk yield and body weight. Hence the present study was performed to evaluate the efficacy of polyherbal formulations AV/RMF/17 and Ruchamax in terms of physical and biochemical rumen liquor parameters in addition to growth parameters in goats.

Materials and Methods

Twenty-one female healthy goats were selected randomly from Livestock Instructional Farm, Dr. PDKV Akola were divided into three equal groups seven animals in each group. Group (T1) was untreated

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Table-1. Biochemical profile of rumen liquor different groups of female goats at pre and post treatment of AV/RMF/17 and Ruchamax

Interval/ Groups	'0' day	7th day	14th day	21st day	28th day	35th day	42nd day	45th day	Mean
TOTAL VOLATILE FATTY ACID (MEQ/DL)									
T1	5.63 ± 0.07	5.70 ± 0.07	6.21 ± 0.28	6.37 ± 0.37	5.81 ± 0.21	6.01 ± 0.26	6.06 ± 0.25	5.66 ± 0.06	5.93B ± 0.78
T2	5.60 ± 0.08	6.27 ± 0.03	7.81 ± 0.56	8.60 ± 0.40	6.79 ± 0.31	6.89 ± 0.20	7.00 ± 0.35	6.31 ± 0.04	6.91A ± 1.08
T3	5.64 ± 0.07	7.29 ± 0.34	6.53 ± 0.25	6.77 ± 0.32	7.00 ± 0.35	7.86 ± 0.54	6.37 ± 0.05	6.24 ± 0.03	6.71A ± 0.99
TOTAL TITRABLE ACIDITY (TTA)									
T1	9.56 ± 0.08	9.59 ± 0.05	9.49 ± 0.06	9.53 ± 0.05	9.54 ± 0.06	9.53 ± 0.05	9.51 ± 0.06	9.54 ± 0.10	9.54B ± 0.41
T2	9.60 ± 0.05	10.93 ± 0.24	11.00 ± 0.21	10.53 ± 0.12	10.71 ± 0.15	10.70 ± 0.13	11.07 ± 0.23	11.30 ± 0.25	10.73A ± 0.82
T3	9.44 ± 0.08	11.36 ± 0.23	10.89 ± 0.14	10.64 ± 0.15	10.67 ± 0.09	11.14 ± 0.21	11.26 ± 0.24	11.36 ± 0.24	10.84A ± 0.87
LACTIC ACID									
T1	3.46 ± 0.09	3.50 ± 0.08	3.51 ± 0.09	3.56 ± 0.11	3.51 ± 0.10	3.42 ± 0.08	3.48 ± 0.08	3.50 ± 0.07	3.49B ± 0.47
T2	3.57 ± 0.08	5.18 ± 0.02	5.17 ± 0.01	5.16 ± 0.01	5.20 ± 0.03	5.19 ± 0.02	5.18 ± 0.02	5.21 ± 0.02	4.98A ± 0.74
T3	3.97 ± 0.25	5.21 ± 0.02	5.24 ± 0.02	5.25 ± 0.02	5.17 ± 0.02	5.21 ± 0.05	5.21 ± 0.05	5.17 ± 0.02	5.05A ± 0.69

Similar superscript indicate non-significant difference, CD for treatment = 0.20, CD for period = 0.33, CD for interaction (A X B) = 0.57, ** - Significant at P<0.01

control while, group T2 & T3 were supplemented with herbal Rumen modulator (AV/RMF/17) and Ruchamax (M/s Ayurved Ltd. Baddi, HP) @ 1.5 kg/ tone of feed and 1 kg/ tone of feed for 45 days respectively. The physical and biochemical parameters of rumen liquor were done weekly on day 0, 7th, 14th, 21st, 28th, 35th, 42nd and 45th. Growth and performance parameters were recorded weekly. About 150 ml of rumen liquor was collected with the help of stomach tube and rumen fluid extraction pump. It was then strained first through plastic sieve and then through double layer muslin cloth for analysis of physical and biochemical changes in rumen liquor. Physical examination of rumen liquor viz. colour, consistency and odour performed as per method described by Chakrabarti, (2006). In biochemical examination of rumen liquor pH, total titrable acidity (TTA) as per Chakrabarti (2006), total volatile fatty acid (TVFA) (mEq/dl) as per Barnett and Reid, (1957) and lactic acid (mg/dl) as per Barker and Summerson, (1941) was performed.

Statistical Analysis

The collected data was analyzed statistically by using Factorial Completely Randomized Design as described by Snedecor and Cochran (1994).

Results and Discussion

The colour, consistency and odour in T1, T2 and T3 groups in female goats on 0 day was greenish brown with watery consistency, slightly viscous and odour was slightly amonical. In treatment groups T2 and T3 from 7th day to greenish brown with viscous consistency and aromatic odour and remain as it is up to 45th day post treatment. AV/RMF/17 and Ruchamax normalizes the physical properties of rumen liquor. Ruchamax & AV/RMF/17 proved have to vital role in restoration of normal colour, consistency and odour of rumen liquor Waghmare et al. (2009). Average rumen

liquor pH level in control group (T1) was 7.13 ± 0.28 while in T2 & T3 group 7.11 ± 0.04 and 7.12 ± 0.03 respectively (Table 1). Normal rumen liquor pH ranges between 6.3 to 7.0 (Chakrabarti, 2006). The decrease in the rumen liquor pH was due to production of lactic acid in rumen, as a result of increase in lactic acid fermenting bacteria and regeneration microflora. Correction of rumen pH and microflora regenerating activities of Ruchamax and AV/RMF/17 in calves was reported by Kolte et al. (2009).

Total volatile fatty acid (TVFA) (mEq/dl): Average total volatile fatty acid level in rumen liquor of control groups T1, T2 & T3 was 5.93 ± 0.78 , 6.91 ± 1.08 and 6.71 ± 0.99 mEq/dl respectively. Normal TVFA concentration ranges between 6-12 mEq/dl of rumen liquor Chakrabarti (2006). The post treatment values of T2 and T3 groups were higher than the value of control group (T1) indicates stomachic effect of AV/RMF/17 and Ruchamax ultimately improves ruminal fermentation. Variation in rumen liquor total volatile fatty acid due to treatment was statistically significant ($p < 0.05$) between control and treatment groups. Similar result was reported by Pal et al. (1994) and Phalphate (1994) and Desai (1998) respectively which might be due to regeneration of VFA producing bacteria by polyherbal formulations. Animal treated with polyherbal formulations viz. AV/RMF/17 and Ruchamax showed better and at par results on total volatile fatty acid than the control group.

Total titrable acidity (TTA): Total titrable acidity in treatment groups (T2 and T3) observed increased from day 7th, might be due to increase in total protozoa in rumen, resulting to activate normal acidic function required to stimulate rumen function. Normal rumen total titrable acidity ranges between 9 to 25 (Chakrabarti 2006). It indicated that stomachic action of some ingredient in AV/RMF/17 and Ruchamax

Table-2. Average Body Weight Gain (kg) and Feed Conversion Ratio (FCR) in different groups at pre & post treatment of AV/RMF/17 and Ruchamax

Interval	0 day	15th day	30th day	45th day	Pooled Mean
Body Weight Gain (kg)					
T1	--	1.21 ± 0.07	1.18 ± 0.15	1.07 ± 0.05	1.15B ± 0.51
T2	--	1.61 ± 0.05	1.32 ± 0.05	1.64 ± 0.09	1.52A ± 0.47
T3	--	1.43 ± 0.05	1.61 ± 0.12	1.36 ± 0.05	1.46A ± 0.48
Feed Conversion Ratio (FCR)					
T1	--	2.81 ± 0.15	3.49 ± 0.37	4.51 ± 0.18	3.60A ± 0.97
T2	--	1.98 ± 0.07	2.84 ± 0.11	2.94 ± 0.18	2.58B ± 0.74
T3	--	2.23 ± 0.08	2.40 ± 0.15	3.54 ± 0.13	2.73B ± 0.82

stimulated the population of propionate producing microbes Singh et al. (1996) that enhances increase in total titrable acidity in rumen of treated animals. Overall observation indicated that the animal treated with AV/RMF/17 and Ruchamax showed better and at par result on total titrable acidity than the control group.

Lactic Acid: Mean rumen liquor lactic acid concentration in groups T1, T2 & T3 was 3.49±0.47, 4.98±0.74 and 5.05±0.69 mg/dl respectively. Normal rumen liquor lactic acid concentration ranges between 4.50 to 8.50 mg/dl of rumen liquor Randhawa et al. (1989) and Basak et al. (1993). The post treatment value of T2 and T3 groups was higher than control group (T1) indicating increase in lactic acid which might be due to faster and complete fermentation of starch by amylolytic bacteria in the engorged animal, which leads to production in large amount of lactic acid in rumen Lal et al. (1989), Basak et al. (1993) and Desai (1998). Increased TTA and TVFA due to improvement in microbial digestion of rumen by a stomachic action of AV/RMF/17 and Ruchamax given to the animal in T2 and T3 groups resulting into more production of lactic acid this finding was confirmed by Kolte et al. 2009.

Growth Parameters: Body weight (kg): The mean body weight (kg) in T1, T2 and T3 groups was 14.34 ± 1.19, 15.10 ± 1.34 and 14.93 ± 1.33 kg respectively (Table 2). Animal treated with Ruchamax observed significantly increased weight gain as compared to control group on 15th day. The increase in weight gain was 11.25 - 11.38% in Ruchamax which was 12.55%

AV/RMF/17 as compared to the control group. This increase in weight gains might be brought by the efficacy of Ruchamax and AV/RMF/17, which acted as stomachic and correct the ruminal abnormalities, there by stimulating digestive activities observed by Kolte et al. (2009).

Feed conversion ratio: The feed conversion ratio of the goats in groups T1, T2 and T3 was 3.60 ± 0.97, 2.58 ± 0.74 and 2.73 ± 0.82 respectively (Table 2). The post treatment efficacy of AV/RMF/17 observed more pronounce in T2 than T3 group treated with Ruchamax on day 45th. Polyherbal formulation Ruchamax as an appetite stimulant and digestive tonic and was effective in correcting and optimizing the digestion in bovines (Pradhan and Biswas 1994).

Feed intake (kg): It was observed that variation in feed intake due to treatment was statistically significant between control and treatment group and within the period was found significant increased on 7th day post treatment which remain non significant up to 45th day post treatment period (Table 3). Ruchamax as an appetite stimulant digestive tonic containing 21 herbs and minerals, correct and optimize digestion in bovines. Ruchamax feeding has been found increased feed intake (Kolte et al. 2009). Rohilla & Bujarbaruah (1997) and Kamra et al. (2008) have been reported that Ruchamax is a good appetizer, stomachic and digestive tonic.

References

- Allardice, P. (1993): A - Z of Companion Planting.

Table 3. Average feed intake (kg) in different groups at pre & post treatment of AV/RMF/17 & Ruchamax

Interval/ Group	T1	T2	T3	Pooled Mean
7th day	3.03 ± 0.04	2.92 ± 0.02	2.92 ± 0.03	2.96f ± 0.02
14th day	3.36 ± 0.03	3.15 ± 0.03	3.17 ± 0.04	3.23e ± 0.03
21st day	3.50 ± 0.01	3.44 ± 0.03	3.44 ± 0.03	3.46d ± 0.01
28th day	3.80 ± 0.01	3.72 ± 0.03	3.75 ± 0.02	3.76c ± 0.01
35th day	4.17 ± 0.02	4.12 ± 0.03	4.12 ± 0.04	4.14b ± 0.02
42nd day	4.74 ± 0.02	4.69 ± 0.01	4.73 ± 0.02	4.72a ± 0.01
45th day	4.78 ± 0.02	4.73 ± 0.01	4.77 ± 0.01	4.76a ± 0.01
Pooled mean	3.91B ± 0.80	3.83A ± 0.82	3.84A ± 0.83	

- Cassell Publishers Ltd.
2. Barker, S. B. and W. H. Summerson (1941): The calorimetric determination of lactic acid in biological material. *J. Biol. Chem.* 138: 535-554.
 3. Barker, S. B. and W. H. Summerson (1941): The calorimetric determination of lactic acid in biological material. *J. Biol. Chem.* 138: 535-554.
 4. Barnett, A. J. G. and R. L. Reid (1957): Studies on the production of volatile fatty acids from grass by rumen liquor in an artificial rumen. *J. Agric. Sci.* 48: 315-321.
 5. Barnett, A. J. G. and R. L. Reid (1957): Studies on the production of volatile fatty acids from grass by rumen liquor in an artificial rumen. *J. Agric. Sci.* 48: 315-321.
 6. Chakrabarti, A. (2006): Textbook of clinical Veterinary Medicine. Third Edn. Kalyani Publishers, Ludhiana (India).
 7. Desai, V. G. (1998): Evaluation of Ruchamax in experimentally induced acid indigestion in calves (Clinical and Rumen liquor profile studies) M.V.Sc. Thesis submitted to Dr. PDKV, Akola, Maharashtra.
 8. Devendra, C. (2005): Small Ruminants in Asia: Contribution to food security, poverty alleviation and opportunities for productivity enhancement. In: Ledin, I. (Ed.), Proceeding of international workshop on small ruminant production and development in South East Asia. MEKARN, Nong Lam, HCMC, Vietnam. pp. 19-32.
 9. Forbes, J.M. (1995): Voluntary food intake and diet selection in farm animals. CAB International, Wallingford, UK, 539 pp.
 10. Kamra, D. N., et.al.(2008): Effect of plant extracts on met-hanogenesis and microbial profile of the rumen of buffalo: a brief overview *Australian Journal of Experimental Agriculture* 48(2): 175-178.
 11. Kolte, A.Y., Ravikanth, K., Rekhe, D.S. and Maini S. (2009): Role of polyherbal formulation in modulating rumen biochemical and growth performance parameters in calves. *The Internet Journal of Veterinary Medicine*, Vol. 6(2).
 12. Pal, B., B. Prasad, S. K. Sharma and D. R. Wadhawa (1994): Efficacy of a herbal formulation in simple rumen indigestion in calves. *Indian J. Vet. Med.* 14(2): 62.63.
 13. Phalphate, P. B. (1994): Clinical efficacy of Ruchamax in treatment of anorexia in goats. M.V.Sc. Thesis submitted to Konkan Agricultural University, Dapoli., Mumbai.
 14. Rohilla P. P. and K. M. Bujarbaruah (1997): Effect of Minovit- Forte and Ruchamax Feeding on growth of pigs. *Indian Vet. Med. J.* 21(3): 238-242.
 15. Rosenberger, G. (1979): Clinical Examination of Cattle. Third Edn. Verlag Paul Parey, Berlin and Hamburg.
 16. Singh, N., et.al.(1996): Effect of some treatment on ruminal environment and milk production in clinical cases of indigestion in buffaloes, *Indian Vet Med. J* 20 (2): 115-118.
 17. Snedecor, G. W. and W. G. Cochran (1994):. Statistical methods. Sixth edn. The Iowa State University Press, Amos Iowa, U.S.A.
 18. Waghmare, S.G., et.al.(2009): Polyherbal formulation and rumen ecology in calves. *Veterinary Practioner*, Vol. 10 (2): 174-178.

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