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Effect of Polyherbal Formulations on Blood Haematological Constituents and Immunity in Non-Descript Goats

Research Article

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ABSTRACT

A 90 day study was conducted on twenty four indigenous non-descript goats allocated into four groups. They were fed *ad libitum* basal complete feed constituted rice straw: rhea (60:40) grass hay and concentrate mixture @ 250/animal/day. Basal complete feed contain 11.07% DCP and 54.21% TDN. Groups were control (T_0) basal diet without polyherbal supplementation, treatment 1 (T_1) diet with Ruchamax @ 10 g/day/animal, treatment 2 (T_2) diet with AV/DAC/16 @ 10 g/day/animal and treatment 3 (T_0) diet with AV/RMF/17 @ 10 g/day/animal. The experiment was designed to investigate the efficacy of polyherbal formulations on blood haematological constituents and immunological response in goats. Total erythrocyte count, haemoglobin, mean corpuscular haemoglobin and PCV were significantly ($P<0.05$) higher in T_3 and T_1 than T_2 and T_0. HA titer was found to be significantly higher in AV/RMF/17 and Ruchamax though they did not differ significantly from each other.

KEY WORDS AV/RMF/17, non-descript goats, Ruchamax.

INTRODUCTION

Polyherbal preparations, originally used in the traditional system of medicine, are now being investigated and effectively tried in a variety of pathophysiological states (Shah *et al.* 1997). Polyherbal therapies are synergistic, potentiative and agonistic / antagonistic pharmacological agents within themselves that work together in a dynamic way to produce therapeutic efficacy with minimum side effects (Tiwari and Rao, 2002). They are naturally safe with pharmacologically active principles (Mabeku *et al.* 2007). One of the main approaches in using Polyherbal therapies is to increase the body's natural resistance to disease / stress causing agents rather than directly neutralizing the agent itself. This has been achieved by using extracts of various plant materials known as Rasayana (Rejuvenation) (Pallabi *et al.* 1998) Ruchamax, AV/DAC/16 and AV/RMF/17 (Table1) are the various preparations available in the market by Ayur Vet Ltd. India and these are used as appetite stimulant, growth promoters, immunomodulator and effective in restoration of ruminal micro flora and ruminal dysfunction (Pradhan and Biswas, 1994; Hadiya *et al.* 2009). *Azadirachta indica* of Ruchamax contains azadirachtin, which has main role in energy production and protein synthesis; it also helps to improve overall growth performance and efficient nutrient utilization in animals (Ahmad *et. al.* 2009). *Terminalia chebula* is rich in Vitamin C and mineral nutrients. It is used as tonic and in blood purification. *Phyllanthus amarus* is used in traditional systems of medicine for diabetes, jaundice, bronchial infections and liver diseases. It possesses anti-hepatotoxic activity (Reddy *et al.* 1993). In addition to balanced nutrition, supplementation of growth promoters, liver tonics and immunomodulators it is also have importance to accelerate growth, increase body im-

munity and towards persistent physiological status in animals.

Table 1 Polyherbal composition and their active principles

Herbs	Active components
Active principles of Ruchamax	
Emblica officinalis	tannin, gallic acid, vitamin C
Terminalia chebula	tannin, chebulic acid
Nigella sativa	nigellidine, saponin
Azadirachta indica	Azadirachtin
Trigonella foenum graecum	steroidal, saponin, trigonelline, mucilage
Active principles of AV/DAC/16	
Phyllanthus emblica	emblicanin A, B, hydrolysable tannin
Woodfordia fruticosa	woodfordin oenthrin A
Zingiber officinale	gingirol
Trychyspermum ammi	thymol
Active principles of AV/RMF/17	
Terminalia belerica	tannins, saponin, beta sitosterol, gallic acid, ellagic acid, ethylgallate, gallolyl glucose and chebulic acid.
Corriandrum sativum	volatile oil
Andrographis paniculata	andrographolide
Allium sativum	amino acids (L-lysine)

The proposed study is therefore aimed at evaluating the effects of polyherbal products on certain blood biochemical parameters and immunity in goats.

MATERIALS AND METHODS

The study was carried out in the Department of Animal Nutrition, College of Veterinary Science and Animal Husbandry, Anjora, Durg (C.G.). Twenty four indigenous non-descript adult male goats of Chhattisgarh region of India having identical weights of around 15 kg each were housed in a well-ventilated goat shed with facilities for individual feeding under hygienic and uniform management conditions. All goats were sprayed with Butox (Deltalmethrin, Hoeschst Rousse, Vet India) @ 3 mL/L of water at weekly interval for three weeks before the start of experiment to control the ectoparasites. A 90 day study was conducted with the goats distributed into four groups having six replicates respectively. They were fed *ad libitum* basal complete feed constituted rice straw: rhea (60:40) grass hay and concentrate mixture @ 250/animal/day. Basal complete feed contain 11.07% DCP and 54.21% TDN as per the locally available feeds to meet the requirements in adult indigenous goats. Polyherbal products were supplemented in the diets from 0-21 days; 30-51 days and 60-81 days. Groups were T_0 control (basal diet without herbal supplement), T_1 (basal diet with Ruchamax (@ 10 g/day/animal) (*supplied by M/S Ayurvet ltd., Baddi*), T_2 (basal diet with AV/DAC/16 @ 10 g/day/animal) (*new polyherbal formulation supplied by M/S Ayurvet ltd., Baddi*) and T_3 (basal diet with AV/RMF/17 @ 10 g/day/animal) (*new polyherbal formulation supplied by M/S Ayurvet ltd., Baddi*). Rice straw: rhea leaves (60:40) was fed twice daily *ad libitum* along with concentrate mixture provided as per NRC (1981) that constituted: maize 30%, rice bran 24%, wheat bran 20%, soya deoiled cake 23%, minerals and vitamins (premix) 2% and common salt 1%. The blood samples were collected from all goats at 21st, 45th and 90th days. Approximately 6 mL of blood was collected aseptically from jugular vein using 18 gauge needle. Out of which 2 mL blood was taken in a glass vial containing ethylene diamine tetra acetate (EDTA) for haematological studies. Immediately after blood collection the tubes were gently rotated between palms in order to mix it with anticoagulant. Hemoglobin, packed cell volume (PCV) and total erythrocyte count (TEC) were performed as per the method described by Jain (1986). The humoral immunity for the goats was assessed in accordance to the method described by Hudson and Hay (1991). Data were subjected to one way ANOVA (CRD) for analysis of variance and the mean comparison was done by appropriate t test as per the standard procedure of Snedecor and Cochran (1994).

RESULTS AND DISCUSSION

The concentration of haemoglobin in various groups due to supplementation of polyherbal products is provided in Table 2. Haemoglobin levels varied from 8.77 g to 10.46 g per 100 mL. The significant difference ($P<0.001$) of Hb in group T_3 is reflected by higher gain in body weight in this group. The overall weight gain in T_3 and T_1 was increased by 20% and 15%, respectively, over the control ($P<0.05$). The digestibility coefficient was found to be increased by 14.19% over the control in AV/RMF/17 supplemented group (T_3). The control and AV/DAC/16 might have lost more energy in the form of CH_4 as compared to T_3 and T_1 due to more indigestibility of CF in these groups. The polyherbal products *viz*; Ruchamax and AV/RMF/17 might have created a favorable condition for nutrient fermentation and their absorption across the GIT by increasing the secretion of digestive enzymes and by providing the antimethanogenic activity which shift the high energy electrons available in the media for the synthesis of more propionic acid.

The Ruchamax supplemented groups did not perform on a par with that of AV/RMF/17 however AV/DAC/16 was closer to AV/RMF/17 in haemoglobin concentration. Bhatt *et al.* (2009) reported significant differences ($P<0.001$) in haemoglobin concentrations among groups in crossbred heifers when Ruchamax was supplemented with the diet. A marginal rise in haemoglobin concentration was also observed in sheep (infected with gastrointestinal parasites) fed condensed tannins (@ 5% of DM) either as leaves of Khejri (*Prosopis cineraria*) or as extract (acetone: water) of leaves compared

to diet having no condended tannins.

The packed cell volume was significantly higher in the polyherbal supplemented groups (T_1 to T_3) compared to the controls, though the values among treated groups did not differ from each other. Group T_3 and T_1 were numerically higher than T_2, with valyesranging from 31 to 31.72% in treated groups against 24.78% in the control group (Table 3). Bhatt *et al.* (2009) reported highly significant differences (P<0.001) in packed cell volume among groups in crossbred heifers when Ruchamax was supplemented in the diet. Whilst a marginal rise in PCV were observed in sheep fed condensed tannins (@ 5% of dry matter) either as leaves of Khejri (*Prosopis cineraria*) or as extract (acetone: water) of leaves compared to those offered diet having no condensed tannins.

The erythrocyte counts did not differ significantly amongst groups on 21st day of trial but were found to be highly significantly different (P<0.01) on 45th and 90th day (Table 3 and 4). Values ranged from 8.40 million per cu mm in control to 12.07 million per cumm in T_3. There was a significant increase in the value of erythrocytes by 43.70% in T_3 compared to the control. The number of erythrocytes reflected the concentration of haemoglobin that was found to be significantly higher in T_3. Bhatt *et al.* (2009) reported no significant difference for total erythrocyte count among groups in crossbred heifers, fed diet with Ruchamax. The values of mean corpuscular haemoglobin and mean corpuscular volume have been presented in table 5 and 6 respectively. The overall value of mean corpuscular haemoglobin was significantly higher in T_1 and T_3 as compared to the control group and T_2.

Table 2 Hemoglobin (g/100 mL) in goats maintained on the respective diets supplemented with polyherbal products

Period (Days)	Group				SEM
	T_0	T_1	T_2	T_3	
	Control	Ruchamax (@ 10 g/d)	AV/DAC/16 (@ 10 g/d)	AV/RMF/17 (@ 10 g/d)	
21	8.48^{b}	8.32^{b}	8.78^{b}	10.67^{a}	0.28
45	9.22	8.58	9.17	9.92	0.41
90	8.60^{a}	8.58^{a}	10.28^{b}	10.80^{b}	0.59
Average	8.77^{ab}	8.50^{a}	9.41^{b}	10.46^{c}	0.22

The means within the same row with at least one common letter, do not have significant difference (P>0.01).
SEM: standard error of means.

Table 3 Packed cell volume (%) in goats maintained on the respective diets supplemented with polyherbal products

Period (Days)	Group				SEM
	T_0	T_1	T_2	T_3	
	Control	Ruchamax (@ 10 g/d)	AV/DAC/16 (@ 10 g/d)	AV/RMF/17 (@ 10 g/d)	
21	22.37^{a}	29.00^{b}	28.50^{b}	28.50^{b}	0.86
45	24.33^{a}	31.50^{b}	31.33^{b}	31.00^{b}	0.95
90	25.83^{a}	34.50^{b}	33.17^{b}	35.67^{b}	0.91
Average	24.18^{a}	31.67^{b}	31.00^{b}	31.72^{b}	0.74

The means within the same row with at least one common letter, do not have significant difference (P>0.01).
SEM: standard error of means.

Table 4 Erythrocyte counts (million/cu mm) in goats maintained on the respective diets supplemented with polyherbal products

Period (Days)	Group				SEM
	T_0	T_1	T_2	T_3	
	Control	Ruchamax (@ 10 g/d)	AV/DAC/16 (@ 10 g/d)	AV/RMF/17 (@ 10 g/day)	
21	8.61	10.53	11.83	12.16	0.92
45	8.41^{a}	9.36^{a}	10.09^{a}	12.22^{b}	0.67
90	8.18^{a}	10.51^{b}	11.61^{b}	11.84^{b}	0.63
Average	8.40^{a}	10.13^{b}	11.18^{bc}	12.07^{c}	0.43

The means within the same row with at least one common letter, do not have significant difference (P>0.01).
SEM: standard error of means.

Table 5 Mean corpuscular hemoglobin concentration (pg) in goats maintained on the respective diets supplemented with polyherbal products

Period (Days)	Group				SEM
	T_0	T_1	T_2	T_3	
	Control	Ruchamax (@ 10 g/d)	AV/DAC/16 (@ 10 g/d)	AV/RMF/17 (@ 10 g/d)	
21	24.00^{a}	30.52^{b}	29.83^{b}	30.00^{b}	1.23
45	24.83	30.50	29.50	30.00	1.62
90	29.67	29.33	31.00	31.17	1.33
Average	26.17^{a}	30.12^{b}	29.94^{b}	30.39^{b}	0.83

The means within the same row with at least one common letter, do not have significant difference (P>0.01).
SEM: standard error of means.

However mean corpuscular haemoglobin showed no significant difference on 45th and 90th day of feeding trial, though overall values differed significantly among groups and were found to be higher in T_3. No significant difference could be noticed among To, T1 and T_2. The values of mean corpuscular haemoglobin also did not differ among T_3, T_0 and T_2.

The HA (haemagglutination) titre was found significantly higher in T_3 as compared to T_2 however it was at par with that of T_0 and T_1. The higher values of HA (haemagglutination) titre reflect a better immune response in group T_1 and T_3 potentially due to the dietary supplementation of Ruchamax and AV/RMF/17 polyherbal products, respectively (Table 7).

Table 6 Mean corpuscular volume (fl) in goats maintained on the respective diets supplemented with polyherbal products

Period (Days)	Group				SEM
	T_0	T_1	T_2	T_3	
	Control	Ruchamax (@ 10 g/d)	AV/DAC/16 (@ 10 g/d)	AV/RMF/17 (@ 10 g/d)	
21	21.05	18.33	22.57	23.17	1.32
45	20.35	20.30	20.07	21.85	0.94
90	20.00	20.30	20.07	21.85	0.91
Average	20.47^{ab}	19.64^{a}	20.90^{ab}	22.29^{b}	0.62

The means within the same row with at least one common letter, do not have significant difference (P>0.01).
SEM: standard error of means.

Table 7 HA titer (log2) in goats maintained on the respective diets supplemented with polyherbal products

Period (Days)	Group				SEM
	T_0	T_1	T_2	T_3	
	Control	Ruchamax (@ 10 g/d)	AV/DAC/16 (@ 10 g/d)	AV/RMF/17 (@ 10 g/d)	
HI titre	3.35^{ab}	3.93^{b}	3.05^{a}	4.20^{b}	0.23

The means within the same row with at least one common letter, do not have significant difference (P>0.01).
SEM: standard error of means.

This is in agreement with previous work (Phalphate *et al.* 1997) conducted in anorectic goats whose appetite was restored via Ruchamax supplementation.

CONCLUSION

In the current study, the effect of dietary supplementation of polyherbal products in the basal diet, fed to goats, was studied and the following conclusions were drawn:

Total erythrocyte count, Hb, MCH and PCV were significantly ($P<0.05$) higher in T_3 and T_1 than T_2 and T0.

HA titer was found significantly higher in AV/RMF/17 and Ruchamax though they did not differ significantly from each other.

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REFERENCES

Ahmad A.H., Rekhe D.S., Ravikanth K. and Maini S. (2009). Acute toxicity study of Vilocym Premix (herbal growth promoter for livestock) in Wistar Albino Rat. *Vet. World.* **2(3),** 100-102.

Bhatt N. and Singh M. (2009). Effect of herbal preparations on haematological and blood biochemical constituents of cross-bred heifers. *Int. J. Agric. Biol*. **11(6),** 721-726.

Hadiya K., Maini S., Rekhe D.S. and Ravikanth K. (2009). Accelerated growth programme with polyherbal formulations for dairy calves. *Vet. World*. **2(2),** 62-64.

Hudson L. and Hay F.C. (1991). Practical Immunology. Blackwell Scientific Publications. 3rd Ed. London.

Jain N.C. (1986). Haematological techniques. Pp. 20-86 in Schalms Veterinary Haematology 4th Ed. D.J. Wesis and K.J. Wardorop. Lea and Febinger, Philadelphia.

Mabeku L.B.K., Beng V.P., Kouam J., Essame O. and Etoa F.X. (2007). Toxicological evaluation of ethyl acetate extract of *Cylicodiscus gabunensis* stem bark (*Mimosaceae*). *J. Ethnopharmacol*. **111,** 598-606.

NRC. (1994). Nutrient Requirements of Poultry, 9th Rev. Ed. National Academy Press, Washington, DC.

Pallabi D.E., Dasgupta S.C. and Gomes A. (1998). Immunopotentiating activity of Immu-21: a polyherbal product. *Indian J. Pharmacol*. **30,** 163-168.

Phalphale P.B., Bhalerao D.P. and Jagdish S. (1997). Clinical efficacy of Ruchamax in the treatement of anorexia in goats. *Indian Vet. J*. **74,** 598-600.

Pradhan N.R. and Biswas U. (1994). Studies on the efficacy of Ruchamax against indigestion in cattle. *Indian Vet. Med. J.* **18(4),** 268-272.

Reddy A.B., Murthy V.N., Venkateshwarlu V., Kokate C.K. and Rambhau D. (1993). Antihepatotoxic activity of Phyllanthus niruri, Tinospora cordifolia and Ricinus communis. *Indian Dru. Manuf. Asso.* **30,** 338-341.

Shah L.P., Patil S.P. and Patil J. (19970. Observations on clinical evaluationof indigenous herbal drugs in the treatement of mental illness. *Indian J. Pharmacol*. **29,** 347-349.

Snedecor G.W. and Cochran W.B. (1994). Statistical Methods. 8th Ed. Iowa State University Press, Ames, Iowa.

Tiwari A.K. and Rao J.M. (2002). Diabetic mellitus and multiple therapeutic approaches of phytochemicals: present status and future prospects. *Curr. Sci*. **83(1),** 30-37.