Role of Polyherbal formulation in modulating rumen biochemical and growth performance parameters in Calves
A Kolte, K Ravikanth, D Rekhe, S Maini

Citation

Abstract
The present study was conducted at Department of Veterinary Clinical Medicine, Ethics and Jurisprudence, PGIVAS, Akola, Livestock Instructional Farm, with an objective to study the comparative efficacy of the herbal rumen ecology modulator Ruchamax and AV/RMF/16 (supplied by Ayurvet Limited, Baddi, India) on rumen biochemical and growth related parameter in calves. Total twenty one healthy calves were selected randomly divided into three treatments (T1, T2 and T3) comprised of seven calves in each group (n=7). T1 served as control, T2 calves treated with AV/RMF/17@ 1.5 kg/ tone of feed for 45 days and T3 calves treated with Ruchamax @1 kg/ tone of feed for 45 days. The rumen biochemical, body weight gain and feed conversion ratio parameters were done on 0, 15th, 30th and 45th day of post treatment. It was observed that supplementation of polyherbal formulation significantly improved rumen liquor profile, physical properties of rumen liquor and rumen biochemical parameters. However, growth performance data revealed significantly better efficacy of AV/RMF/17 than Ruchamax.

INTRODUCTION
India possesses 300 million cattle's population, contributes 13.8 per cent world population and producing more than 90 million tones of dairy products a year (Basic Animal Husbandry Statistic -2008). Ruminant digestion rumen ecology plays an important role in the fermentation process. Ruminal microflora plays important role in digestion of nutrients to produce volatile fatty acids & microbial proteins. Role of rumen microflora in digestion of nutrients in vital, so interactions of the normal microbial flora with the host can be manipulated to improve the efficiency of nutrient utilization in ruminant's animal. In Cow calves primary indigestion mostly arising from change in feed, over feeding and faulty feeding and feeding of stale and moldy feeds or accidental intake of large carbohydrate loss in production and even death in calf (Gnanapraksam, 1970). The common feature of digestive disturbances are increasing peristaltic movement of intestine and hyper secretion resulting in poor absorption of nutrient, dehydration and heavy loss of production (Pande, 2002). Rumen function modulator optimizes the population and activity of ruminal micro flora (both protozoa & bacteria). For efficient cellulose break down and digestion, it also facilitated maintenance of normal rumino-reticular and intestinal movement for proper maceration as well as the mixing and passage of ingesta and normal expulsions of gases. “Ruchamax” is one of the preparation uses as appetite stimulant and effective in restoration of ruminal micro flora and ruminal dysfunction (Pradhan and Biswas, 1994). It also facilitated optimal absorption and utilization of nutrients and thus improves feed conversion ratio, productivity and body weight gain. Current study was designed to evaluate the efficacy of herbal rumen ecology modulator that is Ruchamax and AV/RMF/17 (coded new formulation supplied by Ayurvet ltd. Baddi, India) on the rumen function in calves.

MATERIALS & METHOD
A study was conducted at Department of Veterinary Clinical Medicine, Ethics and Jurisprudence, PGIVAS, Akola, Livestock Instructional Farm, with an objective to study the efficacy of digestive tonic & appetizer Ruchamax and polyherbal rumen function modulator AV/RMF/16 (new coded formulation supplied by Ayurvet Limited, Baddi, India) on rumen biochemical and growth related parameter in cow calves of Gaolao breed. Total twenty one healthy calves were selected randomly divided into three treatments (T1, T2 and T3) comprised of seven calves in each group (n=7). T1 served as control, T2 calves treated with AV/RMF/17@ 1.5 kg/ tone of feed for 45 days and T3 calves treated with Ruchamax @1 kg/ tone of feed for 45 days. The physical examination of rumen liquor was done weekly on 0, 7th, 14th, 21st, 28th, 35th, 42nd and 45th day of post treatment.
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liquor biochemical, body weight gain and feed conversion ratio parameters were done on 0, 15th, 30th and 45th day post treatment. Physical examination of rumen liquor was done by the method described by Chakrabarti (2006). Biochemical examination of rumen liquor like pH, total titrable acidity (TTA) (Chakrabarti 2006), total volatile fatty acid (TVFA) (mEq/dl) (Barnett & Reid 1957) and lactic acid (mg/dl) (Barker & Summerson 1941) was performed. Growth related parameters like total feed intake, feed conversion ratio (FCR) and body weight gain were also studied. The scientific data collected during the experiment was analyzed statistically by factorial completely randomized design (CRD) according to the method described by Snedecor and Cochran (1994).

RESULTS AND DISCUSSION

In physical examination of rumen liquor profile viz. colour, consistency and odour of rumen fluid were studied. The colour, consistency and odour in T₁, T₂ and T₃, groups in calves on '0' day was greenish brown with watery consistency, slightly viscous and odour was slightly ammoniac. It was slightly putrid in some cases, which changed in treatment groups (T₂ & T₃) to greenish brown with viscous consistency and aromatic odour from 7th day and remained up to 45th day post treatment. In normal healthy animal, rumen liquor was greenish brown in colour, viscous in consistency and aromatic in odour (Kelly, 1974 and Prasad, 1992). Ruchamax played an important role to restore normal colour, consistency and odour of rumen liquor (Lal et al., 1989, Pradhan, 1994, Phalphate, 1997, and Desai, 1998). The mean rumen liquor pH level in T₁, T₂ & T₃ group was 7.04 ± 0.82, 6.77 ± 0.48 & 6.77 ± 0.39 respectively (table1). A normal rumen liquor pH range of animals is between 6.3-7.0 (Chakrabarti, 1988 and Prasad, 1992). Ruchamax helped in normal restoration of ruminal pH (Singh et al., 1996). The decrease in rumen liquor pH might be due to production of lactic acid in rumen, as a result of increase in lactic acid fermenting bacteria and regeneration of normal ruminal microflora by AV/RFM/17. Similar microflora regenerating activity of Ruchamax was reported by Pal et al. (1994), Pradhan & Biswas (1994) and Phalphate (1997).

Figure 1
Table 1: Mean values of rumen liquor pH in different groups of cow calves at pre and post treatment

<table>
<thead>
<tr>
<th>Interval</th>
<th>T₁</th>
<th>T₂</th>
<th>T₃</th>
<th>Pooled Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>8 day</td>
<td>7.13 ± 0.04</td>
<td>7.14 ± 0.03</td>
<td>7.12 ± 0.03</td>
<td>7.13 ± 0.02</td>
</tr>
<tr>
<td>7th day</td>
<td>7.13 ± 0.02</td>
<td>6.94 ± 0.14</td>
<td>6.78 ± 0.03</td>
<td>6.95 ± 0.06</td>
</tr>
<tr>
<td>10th day</td>
<td>7.13 ± 0.02</td>
<td>6.71 ± 0.03</td>
<td>6.77 ± 0.02</td>
<td>6.83 ± 0.04</td>
</tr>
<tr>
<td>31st day</td>
<td>6.41 ± 0.72</td>
<td>6.74 ± 0.05</td>
<td>6.71 ± 0.03</td>
<td>6.63 ± 0.23</td>
</tr>
<tr>
<td>20th day</td>
<td>7.13 ± 0.01</td>
<td>6.57 ± 0.03</td>
<td>6.72 ± 0.02</td>
<td>6.90 ± 0.05</td>
</tr>
<tr>
<td>35th day</td>
<td>7.14 ± 0.02</td>
<td>6.66 ± 0.02</td>
<td>6.70 ± 0.01</td>
<td>6.83 ± 0.05</td>
</tr>
<tr>
<td>42nd day</td>
<td>7.13 ± 0.01</td>
<td>6.71 ± 0.02</td>
<td>6.69 ± 0.03</td>
<td>6.84 ± 0.05</td>
</tr>
<tr>
<td>45th day</td>
<td>7.13 ± 0.05</td>
<td>6.65 ± 0.02</td>
<td>6.66 ± 0.02</td>
<td>6.81 ± 0.05</td>
</tr>
</tbody>
</table>

The mean rumen liquor TTA level in T₁, T₂ & T₃ was 9.54 ± 0.42, 10.69 ± 0.79 & 10.7 8 ± 0.85 respectively (table 2). Normal rumen TTA ranges between 9-25 (Chakrabarti, 1988). TTA in treated groups observed to be increased on 7th day, suggesting the stomachic activity of polyherbal formulation that stimulates the population of propionate producing organism which enhances the TTA in rumen (Singh et al., 1996).

Figure 2
Table 2: Mean values of rumen liquor total titrable acidity in different groups of cow calves at pre and post treatment

<table>
<thead>
<tr>
<th>Interval</th>
<th>T₁</th>
<th>T₂</th>
<th>T₃</th>
<th>Pooled Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>5'6 day</td>
<td>9.56 ± 0.08</td>
<td>9.61 ± 0.03</td>
<td>9.43 ± 0.07</td>
<td>9.53 ± 0.01</td>
</tr>
<tr>
<td>7th day</td>
<td>9.59 ± 0.05</td>
<td>10.91 ± 0.25</td>
<td>11.36 ± 0.23</td>
<td>10.62 ± 0.20</td>
</tr>
<tr>
<td>14th day</td>
<td>9.49 ± 0.66</td>
<td>10.69 ± 0.21</td>
<td>10.89 ± 0.14</td>
<td>10.65 ± 0.17</td>
</tr>
<tr>
<td>21st day</td>
<td>9.56 ± 0.44</td>
<td>10.60 ± 0.14</td>
<td>10.60 ± 0.15</td>
<td>10.25 ± 0.13</td>
</tr>
<tr>
<td>30th day</td>
<td>9.54 ± 0.06</td>
<td>10.71 ± 0.15</td>
<td>10.66 ± 0.09</td>
<td>10.30 ± 0.13</td>
</tr>
<tr>
<td>35th day</td>
<td>9.50 ± 0.07</td>
<td>10.70 ± 0.13</td>
<td>10.85 ± 0.16</td>
<td>10.35 ± 0.15</td>
</tr>
<tr>
<td>42nd day</td>
<td>9.51 ± 0.68</td>
<td>11.07 ± 0.23</td>
<td>11.16 ± 0.22</td>
<td>10.58 ± 0.22</td>
</tr>
<tr>
<td>45th day</td>
<td>9.54 ± 0.09</td>
<td>10.97 ± 0.20</td>
<td>11.30 ± 0.22</td>
<td>10.60 ± 0.20</td>
</tr>
</tbody>
</table>

The mean rumen liquor lactic acid level in T₁, T₂ & T₃ was 3.48 ± 0.46 mg/dl, T₂, 4.97 ± 0.75 mg/dl and 5.02 ± 0.71 mg/dl respectively (table 3). Rumen liquor lactic acid concentration in healthy animal ranges between 4.50 - 8.50 mg/dl of rumen liquor (Randhawa et al., 1989 and Basak et al., 1993). The post treatment value of T₂ and T₃ group was significantly higher as compared to control (T₁).
Administration of polyherbal digestive tonic, stomachic & rumen function modulator formulation might have accelerated the starch fermentation by modulating the amylolytic bacteria, that leads to increased in lactic acid in rumen as result there is increase of TTA & TVFA concentration was also evident. The results in present study are in concomitance with those reported by Lal et al., (1989); Basak et al., (1993) and Desai (1998).

**Figure 4**
Table 4: Mean values of rumen liquor total volatile fatty acid (mEq dl) in different groups of cow calves at pre and post treatment

<table>
<thead>
<tr>
<th>Groups</th>
<th>T1</th>
<th>T2</th>
<th>T3</th>
<th>Pooled Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>0th day</td>
<td>5.63 ± 0.07</td>
<td>6.89 ± 0.05</td>
<td>6.81 ± 0.05</td>
<td>6.84 ± 0.14</td>
</tr>
<tr>
<td>7th day</td>
<td>5.74 ± 0.06</td>
<td>6.27 ± 0.03</td>
<td>6.29 ± 0.05</td>
<td>6.18 ± 0.06</td>
</tr>
<tr>
<td>14th day</td>
<td>6.64 ± 0.04</td>
<td>6.25 ± 0.02</td>
<td>6.27 ± 0.04</td>
<td>6.05 ± 0.07</td>
</tr>
<tr>
<td>21st day</td>
<td>5.71 ± 0.04</td>
<td>6.43 ± 0.10</td>
<td>6.27 ± 0.03</td>
<td>6.14 ± 0.08</td>
</tr>
<tr>
<td>28th day</td>
<td>5.64 ± 0.04</td>
<td>6.36 ± 0.08</td>
<td>6.26 ± 0.02</td>
<td>6.09 ± 0.08</td>
</tr>
<tr>
<td>35th day</td>
<td>5.64 ± 0.04</td>
<td>6.50 ± 0.11</td>
<td>6.26 ± 0.02</td>
<td>6.13 ± 0.09</td>
</tr>
<tr>
<td>42nd day</td>
<td>5.71 ± 0.04</td>
<td>6.24 ± 0.02</td>
<td>6.29 ± 0.02</td>
<td>6.08 ± 0.06</td>
</tr>
<tr>
<td>45th day</td>
<td>5.69 ± 0.04</td>
<td>6.29 ± 0.03</td>
<td>6.21 ± 0.03</td>
<td>6.07 ± 0.06</td>
</tr>
</tbody>
</table>

Volatile fatty acids consider being major source of energy in ruminants and their production governed by microbial population in rumen (Singh et al., 1996). Present study revealed that mean rumen liquor TVFA level in T1, T2 & T3 group was 5.68 ± 0.36 mEq/dl, 6.40 ± 0.51 mEq/dl & 6.35 ± 0.48 mEq/dl respectively (table 4). Normal TVFA (total volatile fatty acid) concentration of rumen liquor ranges between 6-12 mEq/dl (Chakrabarti, 1988). TVFA values in treated group T2 & T3 was found to be significant (p<0.05) than untreated control (T1) indicating the efficacy of polyherbal formulation improving the rate of digestion. The level of Volatile fatty acid in case of indigestion remain significantly low, might be due to suppression of microbial fermentation in rumen (Pal et al., 1994). Polyherbal formulation might have indirectly played significant role in optimizing microbial fermentation. Similar results reported by Pal et al., (1994); Phalphate, (1997) and Desai (1998).
The animals treated with new polyherbal formulation showed significant (p<0.05) increase in body weight as compared to Ruchamax treated group & untreated control (T1). The mean feed conversion ratio (FCR) level in groups T1, T2 & T3 was 20.97 ± 1.92, 17.17 ± 1.46 & 18.65 ± 1.64 respectively. The post treatment values of T2 and T3 groups were lowered as compared to the value of control group (T1), indicating efficient nutrient utilization by the treated groups. Ruchamax as an appetite stimulant and digestive tonic, containing 21 herbs and minerals was highly effective in correcting and optimizing the digestion in bovines (Pradhan and Biswas, 1994). The efficacy of AV/RMF/17 observed to be more pronounced than T3 group i.e. treatment with Ruchamax on 45th day of post treatment period. This might be due to better stimulation of appetite and utilization of cellulose during digestive process and as a result of additive effective of the ingredient added in the preparation of AV/RMF/17.

CONCLUSIONS

Overall observation in this study indicated that new polyherbal formulation AV/RMF/17 and digestive tonic Ruchamax treatment were non- significantly efficacy in relation to physical examination of rumen liquor and rumen liquor profile, however, growth related parameter indicated significantly better efficacy of AV/RMF/17 in relation to body weight, FCR and body weight gain, comparatively less intake of feed than the animal treated with Ruchamax.

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