Efficacy evaluation of herbal methionine supplement in cows during early lactation

K. Hadiya¹, K. Ravikanth², M.J. Saxena², Adarsh²*

¹M.V.Sc. (Obstetrics and Gynaecology), Anand, Gujarat-388 001, India
²Research & Development Division, Ayurvet Limited, Baddi, India

K. Hadiya, K. Ravikanth, M.J. Saxena and Adarsh are conferred with World Pharmaceutical Research Award-2015

Abstract
32 multiparous HF crossbred cows in their late gestation (10-15 days prior to parturition) were randomly divided into four groups. Group T0 (n=8) healthy multiparous HF crossbred cows fed standard basal ration & not supplemented with any synthetic or herbal methionine. Group T1 (n=8) cows fed standard basal ration and supplemented with AV/BMP/35 (herbal methionine supplement) (10g/ day/cattle) and Group T3 (n=8) cows fed standard basal ration and supplemented with AV/BMP/35 (20g/day/cattle) from 0-15 weeks post partum. Milk yield per group for duration of 0-18 weeks post partum, milk fat %, Milk SNF % and Milk Somatic Cell Count Parameters were recorded during the study at 35th, 70th & 105th day. Results revealed that in AV/BMP/35 supplemented cattles had improved milk production, maintained Fat % and SNF. Results suggest that the AV/BMP/35@20g/day/Cattle (M/S Ayurvet Limited, India) was ideal to improve the performance of the cattle.

Citation:

All Rights Reserved with Photon.

Photon Ignitor: ISJN17846372D772330042015

1. Introduction

Methionine has been identified as one of the most limiting AA for the synthesis of milk and milk protein by dairy cows in fed diets (Leonardi et al., 2003; Rulquin et al., 1993; NRC, 2001). Under routine farm conditions, protein entering the small intestine is not sufficient to meet the production requirements of the animals (Ali et al., 2009). Free amino acids in the rumen are degraded by microbes in rumen (Chalupa et al., 1976). Studies reported that supplementing the diets of dairy cows with ruminally protected methionine, lysine and bypass methionine-lysine has increased the milk yield, milk composition, improved the nitrogen balance and improved the nutrient digestibility (Tůnáctý et al., 2009; Kudrna et al., 2009; Movaliya et al., 2013; Wang et al., 2012; Wang et al., 2010; Chen et al., 2011; Titi et al., 2013). Some reports indicate negative effects of synthetic methionine supplementation. Reduced feed intake associated with unpalatability of the diet has been reported when methionine hydroxy analog was fed in amounts greater than 80 g/d (Griel et al., 1968; Polan et al., 1970). Synthetic methionine is listed among the prohibited synthetic substances and its usage has been questioned in organic farming practices (EC, 1999). There are abundant evidence that
methionine is one of the most toxic amino acids. Consumption of excess methionine results in growth depression reduced feed intake, depressed nitrogen retention, tissue damage and BW loss when it is incorporated excessively into a diet low in protein (Harper et al., 1970; Satter et al., 1975; Abe et al., 1999).

1.1 Objective of Research
The objective of current study was to compare efficacy of coated dl-methionine (dl-Met) formulation with herbal methionine supplement AV/BMP/35 (m/s Ayurvet Limited, India) in high producing multiparous Holstein cows in early to mid lactation. Herbal methionine supplementation is non-toxic, economical and efficacious in improving productivity parameters in cows in comparison to synthetic methionine supplementation.

2. Materials and Methods
Thirty two multiparous HF crossbred cows in their late gestation (10-15 days prior to parturition) were selected for the experimental trial. The cows were randomly divided into four groups, one untreated control group and three treatment groups. In group T0, 8 Healthy multiparous HF crossbred cows fed standard basal ration & not supplemented with any synthetic or herbal methionine. Group T1 (n=8) cows fed standard basal ration and supplemented with brand A at 20g/ day/cattle from 0-15 weeks post partum. Group T2 (n=8) cows fed standard basal ration and supplemented with AV/BMP/35 (M/S Ayurvet Limited, India) at 10g/day/cattle from 0-15 weeks post partum. Group T3 (n=8) cows fed standard basal ration and supplemented with AV/BMP/35 at 20g/ day/cattle from 0-15 weeks post partum. Parameters studied
were, weekly record of milk yield per group for duration of 0-18 weeks post partum, milk fat %, Milk SNF % and Milk Somatic Cell Count during the study at 35th, 70th & 105th day. Recording of any diseases related to metabolic or Infectious like Milk Fever or Hypocalcaemia, Ketosis was also done.

3. Results and Discussion

3.1 Milk yield
Previously reported studied claimed that on methionine supplementation the milk yield improves (Piepenbrink et al., 2004; Socha et al., 2008).

<table>
<thead>
<tr>
<th>Period (Weeks)</th>
<th>Parameters</th>
<th>Control Group</th>
<th>Treatment Group 0</th>
<th>Treatment Group 1</th>
<th>Treatment Group 2</th>
<th>Treatment Group 3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Production (Ltrs/Day)</td>
<td>12.79</td>
<td>14.30</td>
<td>15.87</td>
<td>15.94</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Fat %</td>
<td>3.85</td>
<td>3.71</td>
<td>3.95</td>
<td>3.93</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SNF %</td>
<td>88.50</td>
<td>88.75</td>
<td>89.50</td>
<td>88.50</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SCC (x10^6)</td>
<td>84.50</td>
<td>89.88</td>
<td>82.38</td>
<td>88.13</td>
<td></td>
</tr>
</tbody>
</table>

|               | Production (Ltrs/Day) | 14.09 | 14.53 | 16.08 | 16.34 |
|               | Fat %       | 3.84 | 3.80 | 3.96 | 3.96 |
|               | SNF %       | 89.00 | 89.38 | 88.88 | 88.88 |
|               | SCC (x10^6) | 102.98 | 87.50 | 82.63 | 87.38 |

|               | Production (Ltrs/Day) | 14.34 | 14.90 | 16.33 | 16.74 |
|               | Fat %       | 3.81 | 3.83 | 3.95 | 3.95 |
|               | SNF %       | 88.83 | 89.58 | 89.75 | 89.59 |
|               | SCC (x10^6) | 102.68 | 84.25 | 81.38 | 85.25 |

|               | Production (Ltrs/Day) | 14.59 | 15.28 | 16.59 | 17.07 |
|               | Fat %       | 3.85 | 3.83 | 4.00 | 3.90 |
|               | SNF %       | 88.63 | 90.63 | 89.25 | 88.38 |
|               | SCC (x10^6) | 97.38 | 82.75 | 84.00 | 88.63 |

|               | Production (Ltrs/Day) | 14.90 | 15.39 | 16.80 | 17.44 |
|               | Fat %       | 3.88 | 3.85 | 4.00 | 4.00 |
|               | SNF %       | 88.75 | 88.63 | 89.50 | 89.13 |
|               | SCC (x10^6) | 96.50 | 84.88 | 84.88 | 87.63 |

|               | Production (Ltrs/Day) | 15.11 | 15.51 | 16.95 | 17.72 |
|               | Fat %       | 3.88 | 3.84 | 3.96 | 3.99 |
|               | SNF %       | 89.50 | 89.13 | 89.13 | 89.59 |
|               | SCC (x10^6) | 102.88 | 84.00 | 83.13 | 91.38 |

|               | Production (Ltrs/Day) | 15.22 | 15.64 | 17.14 | 17.93 |
|               | Fat %       | 3.85 | 3.81 | 3.98 | 3.99 |
|               | SNF %       | 88.75 | 89.38 | 89.50 | 88.88 |
|               | SCC (x10^6) | 106.13 | 87.88 | 85.25 | 87.38 |

|               | Production (Ltrs/Day) | 15.34 | 15.77 | 17.41 | 18.24 |
|               | Fat %       | 3.85 | 3.83 | 3.99 | 4.00 |
|               | SNF %       | 89.50 | 89.13 | 89.00 | 89.88 |
|               | SCC (x10^6) | 98.50 | 83.88 | 86.63 | 89.75 |

|               | Production (Ltrs/Day) | 15.48 | 13.89 | 17.54 | 18.37 |
|               | Fat %       | 3.87 | 3.84 | 4.01 | 3.99 |
|               | SNF %       | 88.88 | 90.23 | 89.63 | 89.25 |
|               | SCC (x10^6) | 96.50 | 89.00 | 82.13 | 87.13 |

|               | Production (Ltrs/Day) | 15.61 | 15.98 | 17.67 | 18.52 |
|               | Fat %       | 3.85 | 3.84 | 4.02 | 3.99 |
|               | SNF %       | 90.50 | 89.50 | 89.38 | 89.63 |
Kellog (1990) and O’Donoghue et al. (1995) reported that on organic methionine (Zn-Met) supplementation the milk yield increased non significantly by 1–5%. In the current study maximum increase in milk yield was observed in AV/BMP/35 supplemented (20g/day/Cattle) group T3. In group T0 (untreated control) the average milk yield at first week was 12.79 liters/day and an increase of 16.57% (2.12 lit/day) was recorded at 15th week (14.91 liters/day) as shown in table 1. The overall average milk production in group T0 during 15 weeks was 15.14 liters/day.

In group T1, the average milk yield at first week was 14.30 liters/day and at 15th week was 17.25 liters/day, there was increase of 20.6% (2.95 lit/day) in milk yield was observed. The overall average milk production in group T1 during 15 weeks was 15.65 liters/day.

In group T2 on AV/BMP/35 supplementation at 10g/day/Cattle, milk yield increased significantly from 15.87 liters/day at 1st week to 18.34 liters/day at 15th week of study indicating a significant increase of 15.5 % (2.47 lit/day) as shown in table 1. The overall milk yield of 17.90 liters/day was recorded in group T3 during the entire study, significantly higher than group T0, T1 and T2. Overall an increase of 0.83 lit/day, 0.35 lit/day and 0.97 lit/day in milk yield was observed in group T1, T2 and T3 respectively when compared to control group T0 at 15th week. AV/BMP/35 having good sign to sustain the peak production. As discontinuation of product led to decrease in milk yield is suggestive for prolongation of trial period or treatment should continue through out lactation.

### Milk fat and SNF

Ruminant fat is an important part of the human diet, particularly bovine milk fat which represents up to 75% of the total consumption of fat from ruminant animals (Chilliard et al., 2000). Ideal nutritional milk fat would contain 10% polyunsaturated fatty acids, 8% saturated fatty
acids, and 82% monounsaturated fatty acids. This cannot be accomplished by modifying diets of lactating cows (Grummer, 1991). In group T0 (untreated control), the overall average fat percentage was 3.77% and SNF was 88.96 as shown in table 1. No significant change in the fat percentage and SNF was observed during the entire study. In group T1, there was no significant change in the fat percentage and SNF during the entire study though the fat % increased slightly from 3.71 at 1st week to 3.89 at 15th week and SNF from 88.75 at 1st week to 89.00 at 15th week, with overall average fat percentage 3.82% and SNF 89.35 during the entire study. In group T2, the milk fat increased from 3.95% at 1st week to 4.05% at 15th week and SNF also increased from 89.50 at 1st week to 90.38 at 15th week respectively. The average milk fat and SNF during 15 weeks was 4.00% and 89.18 respectively. Economic returns for milk are based on the quantities of milk components such as milk fat (butterfat), protein, and other solids (Morris, 1978). The increased milk fat content of the milk adds more economics to it.

3.3 Somatic cell count
The most significant subclinical abnormality of the milk is the increase in somatic cell count. Somatic cells in milk including neutrophils, macrophages and few epithelial cells (Jones, 2006). SCC is indicator of development of new intramammary infection in the diary animals. In group T0 the SCC (x10^3 cells/ml) increased from 84.50 at 1st week to 140.25 at 15th week of study with an increase of 65.97% in SCC. The overall mean SCC during entire study was significantly high (105.84) as compared to the treated groups. In group T1, a slight change in the SCC (10^3 cells/ml) from 89.88 at 1st week to 107.50 at 15th week of trial (table 1) indicating that there may be some incidence of new intramammary infection. In group T2 the SCC (10^3 cells/ml) at 1st week was 78.33 and at 15th week was 84.88 indicating that there was no incidence of new intramammary infection. In group T3 the SCC (10^3 cells/ml) at 1st week was 88.13 and at 15th week was 89.88 indicating that there is no incidence of new intramammary infection. Somatic cell counts (SCC) have long been used as a way of measuring milk quality (Bennett, 1987; Schukken et al., 1992; Rodrigues and Ruegg, 2005). The maintained low level of somatic cells in AV/BMP/35 supplemented group indicates decrease in milk production losses.

Conclusion
Fat % during trial remain constant and bit improved during treatment but statistically not significant shows that the AV/BMP/35 was good to maintain optimum fat through out of lactation. AV/BMP/35 was more effective than other competitive product. The treatment group T4 was best out of the all treatment groups for the improving milk production, maintains of Fat % and SNF. As the data suggest that the herbal methionine supplement AV/BMP/35@ 20 g/day/Cattle is ideal to improve the production indices and milk qualitative parameters in the cattle.

Acknowledgement
The author is thankful to Ayurvet Limited, Baddi, H.P., India for providing necessary samples and guidance.

References


For publications/ Enquiries/ Submissions: Email: photonjournal@yahoo.com