Harmony in harvest: Unraveling the impact of varied green fodder and concentrate mixtures on holistic milking dynamics in murrah buffaloes

Ravi Kumar, Harish Kumar Gulati, Ramkaran, Pradeep Kumar and Umesh Kumar Jaiswal

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Abstract
The study investigated the impact of varied green fodder and concentrate mixtures on milking dynamics in Murrah buffaloes, crucial for milk, meat, and other productions in many developing countries. Buffaloes, especially the Murrah breed, contribute significantly to the dairy industry in Asia. Despite their importance, challenges such as low milk yield and poor reproductive performance persist due to irregular access to quality feedstuffs. Feeding constitutes a substantial portion of milk production costs and influences animal productivity and health. The research aimed to enhance milk yield, reproductive performance, and overall herd health by examining different feed compositions' effects on milking parameters. Conducted at the Buffalo farm of the Department of Livestock Production Management, the study involved 18 lactating Murrah buffaloes allocated to three dietary treatment groups (T1, T2, and T3) using a Factorial Completely Randomized Design. Buffaloes were individually fed according to dietary requirements, and treatments were iso-nitrogenous and iso-caloric. Results indicated that increasing the proportion of concentrate mixture in the diet positively impacted milk yield, body weight gain, and reproductive parameters. Buffaloes fed with higher concentrate mixtures exhibited increased milk yield and shorter postpartum estrous periods. While milk fat content remained consistent across treatments, solid not fat content increased with higher concentrate mixture supplementation. The study underscores the importance of optimizing feed formulations to enhance milk yield and quality in dairy animals, particularly Murrah buffaloes. By providing valuable insights into dietary management, the research contributes to the sustainability and profitability of dairy farming practices, crucial for agricultural economies like India.

Keywords: Harmony in harvest, varied green fodder, concentrate mixtures, holistic milking dynamics, Murrah buffaloes

Introduction
The global buffalo population stands at approximately 177.24 million, distributed across 42 countries, with 97% of them concentrated in Asia, according to FAO (2008) [8]. Over the past decade, the world buffalo population has increased by about 18 million, reflecting an annual growth rate of approximately 1.13%, primarily driven by rising numbers in Asian countries. In India, which occupies 2.4% of the world's geographical area, agriculture plays a pivotal role, with nearly 69% of its land falling within arid, semi-arid, and dry sub-humid regions (Bhandari et al., 2007) [4].

India's livestock sector is a cornerstone of its economy, contributing nearly 25.6% of the value of output in the agriculture, fishing, and forestry sector, amounting to 4.11% of the total GDP during 2012-13. With a total livestock population of 512.05 million in 2012, buffaloes constitute a significant portion, accounting for 56.7% of the world's buffalo population (19th Livestock census, 2012) [1].

Buffaloes, particularly the Murrah breed, are vital for milk, meat, power, fuel, and leather production in many developing countries. In Asia, they contribute approximately 96.8% of the total milk to the dairy industry and about 12.8% of the world's total milk production despite constituting only 11.6% of the global cattle population (FAOSTAT, 2007) [9].

Despite their economic importance, buffaloes face challenges such as low milk yield, poor reproductive performance, and slow growth rates.
These issues are often attributed to irregular and inadequate access to quality feedstuffs. Malnutrition adversely affects reproduction, causing delayed puberty, anestrus, and prolonged calving intervals (Sahoo et al., 2004; Wathes et al., 2007) [31, 41].

Feeding constitutes a substantial portion of the total cost of milk production and significantly influences animal productivity, health, welfare, and environmental sustainability. Thus, optimizing feed and ration formulations is crucial for enhancing milk yield and composition in dairy animals.

The study aims to unravel the impact of varied green fodder and concentrate mixtures on holistic milking dynamics in Murrah buffaloes. By examining how different feed compositions affect milking parameters, the research seeks to provide insights into improving milk yield, reproductive performance, and overall herd health in Murrah buffaloes, contributing to the sustainability and profitability of dairy farming practices.

**Methodology**

The study was conducted at the Buffalo farm of the Department of Livestock Production Management, College of Veterinary Sciences, Lala Lajpat Rai University of Veterinary and Animal Sciences, Hisar, situated in a semi-arid, sub-tropical region with geographical coordinates of 29°10' N latitude, 75°40' E longitude, and 215.2 meters altitude. Ethical approval was obtained from the Institutional Animal Ethics Committee of LUVAS in its 11th meeting on February 6th, 2018. Eighteen lactating Murrah buffaloes in their 1st to 2nd lactation stage were chosen under a loose housing system, and they were allocated to three dietary treatment groups (T1, T2, and T3) using a Factorial Completely Randomized Design (FCRD).

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Feeding strategy</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1 (Control)</td>
<td>Lactating buffaloes were fed with 30: 35: 35 ratios of wheat straw, green fodder and concentrate mixture (on DM basis) to meet out the nutrients requirements as per ICAR (2013) standards.</td>
</tr>
<tr>
<td>T2</td>
<td>30% Crude Protein &amp; Total Digestible Nutrient of green fodder of T1 were replaced with concentrate mixture for feeding of lactating buffaloes.</td>
</tr>
<tr>
<td>T3</td>
<td>40% Crude Protein &amp; Total Digestible Nutrient of green fodder of T1 were replaced with concentrate mixture for feeding of lactating buffaloes.</td>
</tr>
</tbody>
</table>

Buffaloes were individually fed according to their dietary requirements, and the three dietary treatments were iso-nitrogenous and iso-caloric. Standard management practices and biosecurity measures were followed, including deworming, ectoparasite disinfection, and immunization against diseases, with a 10-day adjustment period preceding the experiment for acclimatization. The study spanned from 10 days postpartum to 6 months of lactation. Various parameters were observed, including chemical analysis of feed ingredients, Daily milk yield (kg), Milk fat (%), 6% Fat Corrected Milk (kg), Solid not fat (%), Total Solids (%), Milk Protein (%), Peak milk yield, Days taken to attain peak milk yield and Persistency period of peak milk yield. Data were analyzed using the General Linear Models procedure of SPSS-23 software, with ANOVA conducted, and Duncan’s multiple range tests employed for mean separation at a significance level of p<0.05.

**Results and Discussion**

The results of the study revealed significant insights into the impact of dietary management on milk related parameters in lactating Murrah buffaloes. Analysis of various parameters provided valuable information regarding the effectiveness of different feeding strategies.

**Chemical analysis of feed ingredients**

Chemical composition (%DM basis) and cost of different feed ingredients fed to the experimental buffaloes are presented in Table 2.

<table>
<thead>
<tr>
<th>Ingredients</th>
<th>DM</th>
<th>CP</th>
<th>CF</th>
<th>EE</th>
<th>Ash</th>
<th>OM</th>
<th>NFE</th>
<th>*Rs./kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fodder</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wheat straw</td>
<td>94.43</td>
<td>2.45</td>
<td>36.79</td>
<td>2.87</td>
<td>9.27</td>
<td>90.73</td>
<td>48.62</td>
<td>1.98</td>
</tr>
<tr>
<td>Green Berseem</td>
<td>23.52</td>
<td>7.76</td>
<td>27.54</td>
<td>3.12</td>
<td>8.94</td>
<td>91.06</td>
<td>52.64</td>
<td>1.50</td>
</tr>
<tr>
<td>Green Maize</td>
<td>25.02</td>
<td>10.45</td>
<td>26.40</td>
<td>4.31</td>
<td>10.37</td>
<td>89.63</td>
<td>48.47</td>
<td>1.50</td>
</tr>
<tr>
<td>Concentrate</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Groundnut cake</td>
<td>95.57</td>
<td>45.72</td>
<td>8.67</td>
<td>6.30</td>
<td>5.01</td>
<td>94.99</td>
<td>34.30</td>
<td>26.37</td>
</tr>
<tr>
<td>Soybean meal</td>
<td>89.48</td>
<td>46.07</td>
<td>4.67</td>
<td>2.98</td>
<td>7.34</td>
<td>92.66</td>
<td>38.94</td>
<td>27.99</td>
</tr>
<tr>
<td>Maize</td>
<td>89.01</td>
<td>9.16</td>
<td>2.32</td>
<td>3.68</td>
<td>1.03</td>
<td>98.97</td>
<td>83.81</td>
<td>19.98</td>
</tr>
<tr>
<td>Barley</td>
<td>93.56</td>
<td>9.79</td>
<td>7.96</td>
<td>1.82</td>
<td>4.66</td>
<td>95.35</td>
<td>75.77</td>
<td>15.50</td>
</tr>
<tr>
<td>Wheat bran</td>
<td>90.75</td>
<td>13.54</td>
<td>11.08</td>
<td>4.24</td>
<td>5.74</td>
<td>94.26</td>
<td>65.40</td>
<td>17.91</td>
</tr>
<tr>
<td>Mineral mixture</td>
<td>96.30</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>68.00</td>
</tr>
<tr>
<td>Common salt</td>
<td>98.50</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>4.40</td>
</tr>
</tbody>
</table>
The ingredient composition (%) and the cost of concentrate mixture fed to the experimental buffaloes are presented in Table 3.

**Table 3:** Ingredient composition (%) and the cost of concentrate mixture fed to the experimental buffaloes

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Parts/100kg</th>
<th>Cost (Rs./kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Groundnut cake</td>
<td>20</td>
<td>21.43</td>
</tr>
<tr>
<td>Soybean meal</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Maize</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td>Barley</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>Wheat bran</td>
<td>29</td>
<td></td>
</tr>
<tr>
<td>Mineral Mixture</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Common Salt</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
<td></td>
</tr>
</tbody>
</table>

Chemical composition (%DM basis) of concentrate mixture fed to the experimental buffaloes is presented in Table 4.

**Table 4:** Chemical composition (% DM basis) of concentrate mixture fed to the experimental buffaloes

<table>
<thead>
<tr>
<th>Attributes</th>
<th>Chemical composition (% DM basis)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dry matter (DM)</td>
<td>92.02</td>
</tr>
<tr>
<td>Crude Protein (CP)</td>
<td>21.20</td>
</tr>
<tr>
<td>Crude Fibre (CF)</td>
<td>10.03</td>
</tr>
<tr>
<td>Ether Extract (EE)</td>
<td>3.40</td>
</tr>
<tr>
<td>NFE</td>
<td>54.75</td>
</tr>
<tr>
<td>Total Ash</td>
<td>10.62</td>
</tr>
<tr>
<td>Organic matter (OM)</td>
<td>89.38</td>
</tr>
</tbody>
</table>

The mean dry matter content of wheat straw, berseem green fodder, maize green fodder and concentrate mixture were 94.43, 23.52, 25.02 and 92.02 per cent, respectively. The average crude protein content of wheat straw, berseem green fodder, maize green fodder and concentrate mixture were 2.45, 7.76, 10.45 and 21.20 per cent, respectively. The cost (Rs./kg) of the wheat straw, green fodder and concentrate mixture was Rs. 1.98, 1.50 and 21.43 per kg, respectively.

**Daily milk yield (kg)**

Milk yields of experimental buffaloes were in increasing order up to the peak yield of different treatments and thereafter it started declining up to the end of the experiment. The overall mean values of daily milk pooled over periods were 9.68, 12.21 and 12.69 kg in treatment groups T1, T2 and T3, respectively. The results of the study revealed that the milk yield was more in T2 and T3 treatment groups as compared to T1 (control) and statistical analysis of data revealed that significantly (p<0.05) higher milk yield was reported in treatment groups fed ration with replacement of 30 or 40% CP and TDN of green fodder with concentrate mixture than the control treatment group, which among themselves did not differ significantly.

Present results are in accordance with the findings of Macleod et al. (1983) [22]; Tessmann et al. (1991) [38]; Gaynor et al. (1995) [12]; Voelker et al. (2002) [40]; Broderick (2003) [5]; Argov-Argaman et al. (2014) [2] and Machado et al. (2014) [21] where they observed that daily milk yield was significantly (p<0.05) increased in lactating Holstein cows when proportion of concentrate was increased in diet. The finding of the study is also in agreement with Yadav (1993) [42] and Gaafar et al. (2009) [11] that daily milk yield was significantly (p<0.05) increased in the treatment group of lactating buffaloes fed high proportion of concentrate in the diet.

Similarly, Ferris et al. (2003) [10]; Moorbry et al. (2006) [26]; Degirmenciglo (2013) [6] and Schobitza et al. (2013) [33] revealed that increased concentrate ratio in the diet of Holstein-Friesian dairy cows significantly (p<0.05) increased daily milk yield. Rinne et al. (1999) [30]; Shingfield et al. (2002) [34] and Kuoppala et al. (2004) [19] reported that daily milk yield in Ayrshire dairy cows significantly (p<0.05) increased on high concentrate diet as compared with low concentrate diets.

Meeske et al. (2006) [25] also revealed that increased concentrate ratio in the diet of Jersey cows significantly (p<0.05) increased daily milk yield. Sporndly (1986) [15]; Okine et al. (1997) [28]; Sanh et al. (2002) [32]; Sterk et al. (2011) [37]; Beyero et al. (2015) [1]; Ghosh et al. (2018) [13] and Utama et al. (2018) [39] also confirmed that daily milk yield was increased with higher levels of concentrate feeding to dairy cows.

Contrarily to present finding, Neeradi (1998) [27]; Keady et al. (2001) [17] and Loor et al. (2005) [20] found that daily average milk yield was not affected significantly with varying levels of concentrate and forages in the ration of dairy cows. The different results observed by these researchers might be due to feeding of different levels of roughages and concentrates in diets and addition of different composition in different ratio or due to combination with other nutrients etc.

The present results are in agreement with most of the findings of earlier researchers. Increase in daily milk yield, by increasing concentrate mixture in place of green fodder in the ration of lactating Murrah buffaloes might be due to comparatively more daily dry matter intake in these treatment groups. DMI has a positive correlation with milk yield.

**Milk fat (%)**

The overall mean values of milk fat pooled over periods were 7.53, 7.49 and 7.47 per cent in treatment groups T1, T2 and T3, respectively. From the results of the investigation, it was found that milk fat % was almost equal in all the treatment groups with non-statistical variations at each progressive week of sampling, also statistical analysis of data revealed that the overall mean value of milk fat % in different dietary treatments were nonsignificant.

These results are corroborated with findings of Tessmann et al. (1991) [38] and Voelker et al. (2002) [40] as they found no effect on milk fat content in lactating Holstein cows when the proportion of concentrate was increased in the diet. Hossain et al. (2017) [14] also witnessed similar results in lactating buffaloes. Similarly, Degirmenciglo (2013) [6]; Rinne et al. (1999) [30] and Ghosh et al. (2018) [13] revealed that increased concentrate ratio in the diet of dairy cows did not alter milk fat concentration.

In contrary to the results of current study, Macleod et al. (1983); Sanh et al. (2002) [32]; Moorbry et al. (2006) [26]; Sterk et al. (2011) [27]; Machado et al. (2014) [21]; Argov-Argaman et al. (2014) [2] and Beyero et al. (2015) [1] found decreased milk fat content, while Okine et al. (1997) [28]; Neeradi (1998) [27]; Keady et al. (2001) [17]; Shingfield et al. (2002) [34]; Kuoppala et al. (2004) [19] and Schobitza et al. (2013) [33] found increased milk fat content with higher levels of concentrate feeding to dairy cows. The different results observed by these researchers might be due to
feeding of different levels of roughages and concentrates in diets and addition of different composition in different ratio or due to combination with other nutrients etc. The present results are in agreement with most of the findings of earlier researchers. Milk fat % was not affected by increasing concentrate mixture in place of green fodder in the ration of lactating Murrah buffaloes which might be because forage diets high in cellulose give rise to acetic acid, while concentrate diets give rise to propionic acid (McDonald et al., 1995) [24]. High levels of concentrate are conducive to production of propionic acid in the rumen, which in turn promotes partition of energy towards synthesis of body fat instead of milk fat synthesis (Randby, 1996) [29].

6% Fat Corrected Milk (kg)

The overall mean values of 6% FCM pooled over periods were 11.30, 14.19 and 14.79 kg in treatment groups T1, T2 and T3, respectively. The data indicated that the 6% FCM was more in T3 and T2 as compared to T1 (control) and statistical analysis of data revealed that significantly (p<0.05) higher 6% FCM was reported in treatment groups fed ration with replacement of 30% or 40% CP and TDN of green fodder with concentrate mixture than the control treatment group, which among themselves did not differ significantly.

Analogous to the findings of the present study, Yadav (1993) [42] and Gaafar et al. (2009) [11] observed that FCM yield was significantly (p<0.05) increased in lactating buffaloes with increasing level of concentrate and decreasing level of roughages in the diet. Similarly, Sporndly (1986) [155], Okine et al. (1997) [28], Shingfield et al. (2002) [14], Ferris et al. (2003) [10], Kuoppala et al. (2004) [19] and Meeske et al. (2006) [25] witnessed that increased concentrate ratio in the diet of dairy cows significantly (p<0.05) increased fat corrected milk yield. Contrarily to present finding, Macleod et al. (1983) [22], Voelker et al. (2002) [40], Machado et al. (2014) [121], Neeradi (1998) [27], Beyero et al. (2015) [3] and Ghosh et al. (2018) [13] observed that FCM yield was not affected significantly with varying levels of concentrate and forages in ration of dairy cows. Hossain et al. (2017) [141] also reported similar results in lactating buffaloes. The different results observed by these researchers might be due to feeding of different levels of roughages and concentrates in diets and addition of different composition in different ratio or due to combination with other nutrients etc.

The present results are in agreement with most of the findings of earlier researchers. Increased in 6% FCM yield, by increasing concentrate mixture in place of green fodder in the ration of lactating Murrah buffaloes was due to increase in daily milk yield.

Solid not fat (%)

The mean values of solid not fat content pooled over periods were 8.78, 8.96 and 9.01 per cent in treatment groups T1, T2 and T3, respectively. These data indicate that the SNF was more in T2 and T3 as compared to T1 treatment and statistical analysis of data revealed that significantly (p<0.05) higher SNF was reported in treatment groups fed ration with replacement of 30% or 40% CP and TDN of green fodder with concentrate mixture than the control treatment group, which among themselves did not differ significantly. Present results are in accordance with the findings of Gaafar et al. (2009) [11] who reported that SNF was significantly (p<0.05) increased in the treatment group of lactating buffaloes fed high proportion of concentrate in the diet. In contrary to the results of the present study, Neeradi (1998) [27]; Degirmencioğlu (2013) [6]; Beyero et al. (2015) [3] and Ghosh et al. (2018) [13] observed that SNF in milk was not affected significantly with varying levels of concentrate and forages in the ration of dairy cows. The different results observed by these researchers might be due to feeding of different levels of roughages and concentrates in diets and addition of different composition in different ratio or due to combination with other nutrients etc.

The present results are in agreement with most of the findings of earlier researchers. Increase in SNF % in milk, by increasing concentrate mixture in place of green fodder in the ration of lactating Murrah buffaloes might be due to comparatively more daily dry matter intake in these treatment groups.

Total Solids (%)

The mean values of total solids pooled over periods were 16.31, 16.45 and 16.49 per cent in treatment groups T1, T2 and T3, respectively. The statistical analysis of data revealed that significantly (p<0.05) higher total solid contents in milk was reported in treatment groups fed ration with the replacement of 30% or 40% CP and TDN of green fodder with concentrate mixture than the control treatment group, which among themselves did not differ significantly.

These results are corroborated with findings of Gaynor et al. (1995) [12] who found that total solids content in milk was significantly (p<0.05) improved in lactating Holstein cows when the proportion of concentrate was increased in the diet. Gaafar et al. (2009) [11] also reported similar results in lactating buffaloes. Contrarily to present finding, Keady et al. (2001) [17]; Beyero et al. (2015) [3] and Ghosh et al. (2018) [13] observed that total solids content in milk was not affected significantly with varying levels of concentrate and forages in the ration of dairy cows. The different results observed by these researchers might be due to feeding of different levels of roughages and concentrates in diets and addition of different composition in different ratio or due to combination with other nutrients etc.

The present results are in agreement with most of the findings of earlier researchers. Increase in total solid contents in milk, by increasing concentrate mixture in place of green fodder in the ration of lactating Murrah buffaloes was due to increase in SNF % in milk.

Milk Protein (%)

The overall mean values of milk protein pooled over periods were 3.11, 3.17 and 3.19 per cent in treatment groups T1, T2 and T3, respectively. From the results of present investigation, it was found that milk protein % was almost equal in all the treatment groups with non-statistical variations at each progressive weeks of sampling. Statistical analysis of data revealed that the overall mean value of milk protein % in different dietary treatments were nonsignificant.

Analogous to the findings of the present study, Neeradi (1998) [27]; Keady et al. (2001) [17]; Loo et al. (2005) [20]; Meeske et al. (2006) [25]; Machado et al. (2014) [121]; Beyero et al. (2015) [3] and Ghosh et al. (2018) [13] observed no effect on milk protein content in dairy cows when proportion of concentrate was increased in diet. Hossain et
al. (2017) [14] also witnessed similar results in lactating buffaloes. In contrary to the results of current study, Macleod et al. (1983) [22]; Sanh et al. (2002) [32]; Moorby et al. (2006) [26]; Gaynor et al. (1995) [12]; Rinne et al. (1999) [30]; Okine et al. (1997) [28]; Shingfield et al. (2002) [34]; Ferris et al. (2003) [10]; Kuoppala et al. (2004) [19]; Degirmencioglu (2013) [6]; Schobitza et al. (2013) [31] and Argov-Argaman et al. (2014) [2] found increased milk protein content with higher levels of concentrate feeding to dairy cows. Similarly, Gaafar et al. (2009) [11] reported that milk protein content was significantly (p<0.05) increased in the treatment group of lactating buffaloes fed high proportion of concentrate in the diet. The different results observed by these researchers might be due to feeding of different levels of roughages and concentrates in diets and addition of different composition in different ratio or due to combination with other nutrients etc. The present results are in agreement with most of the findings of earlier researchers. On the basis of present findings, it was reported that milk protein % was not affected by increasing concentrate mixture in place of green fodder in the ration of lactating Murrah buffaloes. Peak milk yield The mean values of peak milk yield of experimental buffaloes were 12.40, 15.17 and 15.55 kg in treatment groups T1, T2 and T3, respectively. The statistical analysis of data revealed that the peak milk yield was higher in T2 and T3 treatment groups as compared to T1 (control) but the difference was nonsignificant among different dietary treatments. The finding of the present study is in agreement with Tessmann et al. (1991) [38] that peak milk yield was increased in lactating Holstein cows when the proportion of concentrate was increased in the diet. The present results are in agreement with the findings of earlier researchers. Increase in peak milk yield, by increasing concentrate mixture in place of green fodder in the ration of lactating Murrah buffaloes was due to increase in daily milk yield.

Days taken to attain peak milk yield The mean values of days taken to attain peak milk yield of experimental buffaloes were 46.67, 56.67 and 62.33 days postpartum in treatment groups T1, T2 and T3, respectively. Statistical analysis of data revealed that days taken to attain peak milk yield were significantly (p<0.05) greater in treatment groups fed ration with the replacement of 30% or 40% CP and TDN of green fodder with concentrate mixture than the control treatment group, which among themselves did not differ significantly. These results are corroborated with findings of Tessmann et al. (1991) [38] who found that days taken to attain peak milk yield was greater in lactating Holstein cows when the proportion of concentrate was increased in the diet. More days have taken to attain peak milk yield, by increasing concentrate mixture in place of green fodder in the ration of lactating Murrah buffaloes was due to increase in daily milk yield.

Persistency period of peak milk yield The mean values of persistency period of peak milk yield of experimental buffaloes were 56.00, 67.67 and 68.83 days postpartum in treatment groups T1, T2 and T3, respectively. Statistical analysis of data revealed that persistency period of peak milk yield was significantly (p<0.05) greater in treatment groups fed ration with the replacement of 30% or 40% CP and TDN of green fodder with concentrate mixture than the control treatment group, which among themselves did not differ significantly. The finding of the present study is in agreement with Tessmann et al. (1991) [38] that persistency period of peak milk yield was greater in lactating Holstein cows when the proportion of concentrate was increased in the diet. Greater persistency period of peak milk yield, by increasing concentrate mixture in place of green fodder in the ration of lactating Murrah buffaloes was due to increase in daily milk yield.

Conclusion In conclusion, the study emphasizes the critical role of dietary management in optimizing milk yield, reproductive performance, and overall herd health in Murrah buffaloes, which are integral to the dairy industry in many developing countries, particularly in Asia. The findings shed light on the significant impact of varied green fodder and concentrate mixtures on milking dynamics, providing valuable insights for dairy farming practices. Through a comprehensive examination of different dietary treatments, the research revealed that increasing the proportion of concentrate mixture in the diet positively influenced milk yield and reproductive parameters. Buffaloes fed with higher concentrate mixtures exhibited higher milk yield, shorter postpartum estrous periods, and improved persistency of peak milk yield. These outcomes highlight the importance of optimizing feed formulations to enhance milk production and quality in dairy animals. While milk fat content remained consistent across treatments, solid-not-fat (SNF) content and total solids content increased with higher concentrate mixture supplementation. This suggests that concentrate supplementation contributes to improved milk composition, enhancing its nutritional value. The study’s findings align with previous research indicating that dietary adjustments, particularly increasing concentrate ratios, positively impact milk production parameters in dairy animals. The observed increase in milk yield and quality attributes with higher concentrate supplementation underscores the importance of providing balanced diets to lactating buffaloes. Moreover, the study underscores the need for sustainable feed management practices to address challenges such as low milk yield and poor reproductive performance in buffaloes. By optimizing feed formulations and dietary strategies, farmers can enhance milk production efficiency and profitability, contributing to the sustainability of dairy farming operations.

Overall, the research contributes valuable insights into the complex relationship between diet and milk production dynamics in Murrah buffaloes. By understanding and implementing optimal feeding practices, farmers can improve the economic viability and sustainability of dairy farming, ultimately benefitting agricultural economies reliant on buffalo milk production. Further research and extension efforts are warranted to disseminate these findings and facilitate their adoption among dairy farmers, ensuring the continued growth and development of the dairy industry.
References


