CHAPTER IV

4. DISCUSSION

The results of the comparative investigations made to study the nutritive value of green as well as the silage prepared from Vidisha 60-l variety of jowar fertilized at the rate of 60 kg N/ha with soil + spray application of urea have already been presented in chapter III of part III. In this chapter an attempt has been made to discuss the important results on the basis of the established facts and scientific reasonings.

4.1 Chemical composition

Chemical composition of the green jowar and silage prepared out of it (Table 12) revealed that organic matter, crude protein, ether extract and nitrogen free extract content was higher in green; to varying levels (already discussed in the results) as compared to silage, whereas the content of acid detergent fibre and ash was more in silage. This could be attributed to the losses on ensilage and the chemical and biochemical changes taking place in the silage under anaerobic fermentation.

The chemical composition of green jowar and silage of the present investigation could be compared to the reports of some of the other workers as given below:-
<table>
<thead>
<tr>
<th></th>
<th>OM</th>
<th>CP</th>
<th>EE</th>
<th>CF</th>
<th>NFE</th>
<th>Ash</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patel et al. (1968)</td>
<td>G 91.5</td>
<td>5.2</td>
<td>3.7</td>
<td>28.6</td>
<td>70.0</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>S 90.6</td>
<td>3.4</td>
<td>4.5</td>
<td>34.8</td>
<td>47.9</td>
<td>-</td>
</tr>
<tr>
<td>Bhatia &amp; Talapatra (1968)</td>
<td>G -</td>
<td>5.1</td>
<td>1.3</td>
<td>34.0</td>
<td>51.9</td>
<td>7.7</td>
</tr>
<tr>
<td></td>
<td>S -</td>
<td>5.4</td>
<td>1.4</td>
<td>34.9</td>
<td>45.4</td>
<td>12.9</td>
</tr>
<tr>
<td>Gaffar &amp; Kaduskar (1972)</td>
<td>G 90.23</td>
<td>5.76</td>
<td>1.93</td>
<td>34.11</td>
<td>48.4</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>S 89.14</td>
<td>4.68</td>
<td>1.94</td>
<td>36.04</td>
<td>46.48</td>
<td>-</td>
</tr>
<tr>
<td>Present investigation</td>
<td>G 91.30</td>
<td>7.52</td>
<td>1.23</td>
<td>33.14*</td>
<td>49.11</td>
<td>8.70</td>
</tr>
<tr>
<td></td>
<td>S 87.83</td>
<td>7.24</td>
<td>1.10</td>
<td>34.14*</td>
<td>45.34</td>
<td>12.18</td>
</tr>
</tbody>
</table>

G : Green  
S : Silage  
* : ADF

It could be seen from the comparative figures that the Vidisha 60-1 variety of jowar with the management processes in connection with levels and methods of application of urea (already discussed above) have got more CP content than the earlier reports. As far as the constituents are concerned they are quite comparable to the values reported by earlier workers.

4.2. Intake

Feed intake is an integrated component of nutritive value. Nutritive feeding stuff is of very little value if the
same is not consumed in sufficient quantity by the animal to meet its nutritional needs. Thus the feeding value of the forage depends on how much it contributes towards the daily energy need of the animal which in turn depends almost completely on how much of forage is voluntarily consumed.

The IM intake of green jowar (7.71 ± 0.32 kg/day; 87.16 ± 2.69 g/W0.75) and silage (4.47 ± 0.66 kg/day; 52.72 ± 3.47 g/W0.75) observed in the present investigation is quite close to the values reported by Patel et al. (1968), Bhatia and Talapatra (1968) and Gaffar and Kaduskar (1972) for green jowar and silage and Verma (1974) only for silage. Each animal on average consumed 24.75 kg green jowar and 16.77 kg silage/day indicating that the palatability of the green forage was better than silage. The IM intake from the green was found to be significantly higher (P < 0.01) than the silage. The intake of organic matter, acid detergent fibre (ADF), crude protein and ether extract were also significantly more (41.01, 29.85, 43.07, 50.00 per cent respectively) from green fodder as compared to silage. Thus it was evident from the perusal of the data that due to ensiling there was a considerable reduction in the intake of the nutrients of the forage. The finding that the intake of silage is lower than the fresh crop is in agreement with the earlier reports of Harris and Raymond (1963); Bhatia and Talapatra (1968); Patel et al. (1968) and Gaffar and Kaduskar (1972). The
reduction in the intake of the DM and consequently the other nutrients could be possibly attributed to the production of lactic, acetic and propionic acid and longer chain fatty acids (Thomas et al., 1961; Hook et al., 1963; Ulyatt, 1965) or due to the products of protein degradation (Wilkins et al., 1971) or also due to some undesirable products (Moore et al., 1960; McCullough, 1961) or due to formation of fibrous dough in the rumen (Campling, 1964) because there is no single factor causing the intake of unwilted silage to be lower than that of the equivalent fresh forage as reported by Thomas et al. (1961).

The total water intake for green fodder was 26.8 l litres as compared to 24.3 l litres for silage. The data is quite close to the observation of Lucci et al. (1969), where the total water intake was 19.7 l for silage. The DM to water intake ratio was statistically narrower with green (1:3.16) as compared to silage (1:5.47), showing that when green fodder was fed, the water intake per unit dry matter intake was less; whereas when the silage was fed the water intake was more per unit of dry matter intake.

4.3 Digestibility

Chemical analysis is starting point for determining the nutritive value of feeds, but the actual value of ingested
material is dependent upon the use which the body is able to make of them. The first consideration here is digestibility since undigested nutrients do not get into the body proper (Maynord & Loosei, 1969).

The digestibility of DM (56.51 ± 1.16 and 58.11 ± 1.72) and organic matter (60.53 ± 0.94 and 60.97 ± 1.03) from the green and silage, respectively, were similar. There was a little increase in the digestibility coefficients of these nutrients when the forage was conserved in the form of silage but differences did not reach the level of significance. This finding is in accordance with the observation of Watson and Ferguson (1937).

The digestibility of ADF was significantly higher (P < 0.01) in silage (69.12 ± 1.96) than the green jowar (51.19 ± 0.98) indicating that ADF digestibility increased by about 16.33 per cent due to ensilage. Patel et al. (1968) reported digestibility of crude fibre in green jowar as 78.6 ± 2.71 per cent whereas in the silage OF digestibility was 80.6 ± 0.54 per cent. Similar reports were made by Bhatia and Talapatra (1968) as well as Gaffar and Kaduskar (1972). Thus the present observations corroborate the findings of earlier workers.

The ensilage has decreased the digestibility of CP, EE and NFE significantly to the extent of 13.11, 5.50 and 4.19 per cent, respectively. Watson and Nash (1960) also indicated
the lower digestibility of silage than the crop ensiled. In some cases, however, this may have been because of the intake of silage was based on dry matter determination made at 100°C. The values for silage made from tropical grasses are often less than 60 per cent (Miller, 1963; Miller et al., 1963). Harris and Raymond (1963) showed that the silages may suffer from considerable losses of volatile constituents during oven drying. This may be applicable to present investigations as well. These findings are also in line with Patel et al. (1968). These workers compared the nutritive value of jowar green, silage and hay and reported that protein from jowar green was digested to the extent of 58.8 per cent, while from silage only 33.6 per cent was digested.

h.h Nutritive value

The nutritional value of forage is determined primarily by its availability to meet the requirements of animals for energy and protein. By far the largest purpose which food serve is the production of energy for body process including energy storage. Since all the organic nutrients can serve this purpose, energy value provides a common basis for expressing their nutritive value and relative value of various food. There have been various systems of describing the energy values of the forage, namely TDN, digestible energy (DE); metabolizable energy (ME), net energy (NE) and Scandinavian feed unit system. The protein value is expressed in terms of digestible crude protein.
The Vidisha 60-1 variety of jowar fertilized with 60 kg N by half soil + half spray method of application have been found to contain 4.17 ± 0.07 per cent DCP and 55.41 ± 0.80 per cent TDN on dry matter basis. The values when compared to the earlier reports of Bhatia and Talapatra (1968) 0.87 per cent, DCP and 23.82 per cent TDN; Patel et al. (1968) 3.06% DCP and 68.28 per cent TDN; Gaffar and Kaduskar (1972) 1.92 per cent DCP and 52.75 per cent TDN revealed that Vidisha 60-1 contained more DCP than the varieties evaluated earlier without any reduction in TDN under the management conditions adopted in this investigation. The silage made out of the fresh jowar in the present investigation as well, gave higher CP and TDN contents than the values for silage reported by these workers.

A significant reduction (P < 0.01) has been found in DCP per cent (Table 14) due to ensilage which ran to the extent of 22.78 per cent. There has been some reduction in TDN as well but to a very small extent accounting for 0.10 per cent only which was found to be statistically not significant.

These findings are in agreement with the reports of Bijstra (1966). Patel et al. (1968) also reported that DCP was maximum in jowar green providing as high as 3.06 kg DCP as compared to 1.11 kg supplied by silage. However, the present values
are better than the findings reported by Patel et al. (1968), Bhatia and Talspatra (1968) and Gaffar and Kaduskar (1972).

The gross energy, digestible energy and particularly the metabolisable energy of the silage was found to be lower than the fresh material. This could be explained on the same line as for digestibility coefficients of various nutrients. In the present investigation the digestible energy of the Vidisha 60-1 silage (3.21 Mcal/kg) was found to be 13.42% more as compared to 2.83 Mcal/kg reported by Verma (1974) for the same variety of sorghum. The GE of sorghum silage in the present investigation was found to be 5.32 Mcal/kg as compared to 5.57 Mcal/kg reported by Melotti and Boin (1969).

Nutritive value index was worked out as suggested by Crampton et al. (1960) for numerical description of the green jowar and its silage based on relative intake together with the in vivo per cent digestibility of energy. It was evident that due to comparatively higher intake of nutrients and digestibility (Table 43) the green fresh jowar has got a higher value of NVI as compared to silage.

4.5 Plane of nutrition

The estimated value of DCP and TDN from the green jowar and its silage have been compared with the availability of these nutrients with the mid Morrison (1959) value of the nutrient requirement (Table 45).
The feeding of green jowar as revealed in the present investigation was just enough to meet the DCP requirements of the dry cows as per mid Morrison Standard. Whereas, the availability of TDN was 41.65 per cent more than the actual requirements. This could be attributed to the characteristics of the crop; because sorghum being a cereal is rich in carbohydrate and poor in protein content. Furthermore, when fresh jowar is ensiled, the DCP availability is significantly (P < 0.01) reduced (Table 45), and was found to be 39.85 per cent less than the actual requirement and was not in a position to meet even the maintenance requirement of DCP as per mid Morrison standard. The low availability of DCP from sorghum silage could be mainly attributed to the reduction in the intake of silage, resulting in the decline in available nitrogen as compared to green fodder. Furthermore, due to the microbial fermentation there might be losses of nitrogen in the process of silage making. As discussed earlier, the digestibility of the protein from silage was also less as compared to green fodder.

The reduction of 36.82 per cent in the availability of TDN due to conservation, the silage could not meet the energy requirements of the dry cows. Thus the conclusion could be that even the energy requirement for maintenance could not be met by feeding silage as a sole diet. Furthermore, the DCP
requirement could also not be met when silage was fed alone. It might be desirable that either the silage has to be fed to replace the partial requirement of green fodder or it will have to be supplemented with a suitable concentrate mixture.

The findings in relation to the availability of DCP and TDN from green jowar and reduction in the availability of these nutrients due to ensilage are in agreement with the reports of Patel et al. (1968); Bhatia and Talapatra (1968) and Gaffar and Kaduskar (1972).

Thus it is evident that the feeding of green jowar CV VidiSha 60-1 is in a position to meet the DCP and TDN requirements as per mid Morrison (1959) value, however, while feeding jowar silage it would be necessary to feed either along with other green fodder or with concentrates to meet the DCP and TDN requirement of the cattle.