Universal Impact Factor0.9285:2012; 1.2210:2013

Index Copernicus
ICV 2011: 5.09
ICV 2012: 6.42
ICV 2013: 15.8
ICV 2014:89.16

NAAS Rating
2012 : 1.3;
2013-2014-2015:2.69

Received on:
23rd February 2016

Revised on:
11th April 2016

Accepted on:
24th April 2016

Published on:
1st June 2016

Volume No.
Online & Print
76 (2016)

Page No.
12 to 17

*Life Sciences Leaflets is an international open access print & e journal, peer reviewed, worldwide abstract listed, published every month with ISSN, RNI Free- membership, downloads and access.*

# EFFECT OF INCORPORATION OF DRIED DATE PALM (*PHOENIX DACTYLIFERA* L.) LEAVES IN TOTAL MIXED RATION ON *IN VIVO* RUMEN FERMENTATION IN ADULT MARWARI SHEEP

**PARMAR, V. N.[1], PATEL, D. C.[2], PARNERKAR, S. [3], DUBEY, S. [4], TRIPATHI, A.[5] AND *CHAUDHARY, J. H.[6]**

**[1-5.] DEPARTMENT OF ANIMAL NUTRITION AND RESEARCH STATION, COLLEGE OF VETERINARY SCIENCE AND ANIMAL HUSBANDRY,**

**[*6.] DEPARTMENT OF VETERINARY PUBLIC HEALTH AND EPIDEMIOLOGY, COLLEGE OF VETERINARY SCIENCE AND ANIMAL HUSBANDRY, ANAND AGRICULTURAL UNIVERSITY, ANAND.**

**Corresponding author's e-mail: jitvph007@gmail.com**

## *ABSTRACT:*

The study was conducted to evaluate the effect of incorporation of dried and green date palm (Phoenix dactylifera) leaves in total mixed ration (TMR) comprising of 30:70 concentrates: Jowar hay as maintenance ration of adult Marwari sheep. Based on the in vitro studies and availability of air-dried date palm leaves (ADPL) and green date palm leaves (GDPL), the date palm leaves replaced 40% of jowar hay in total mixed ration. From each treatment groups four adult Marwari sheep (30-35 kg B.W.) were of similar age (26-30 months) and uniform conformation were selected and fed as per ICAR (1998) standard to meet their nutrient needs as donor of rumen inoculum for rumen fermentation pattern. Rumen liquor was collected at 0,2,4 and 6 h post feeding through a stomach tube against negative pressure created by a suction pump The energy and protein requirements of sheep were met as per ICAR (1998) standards. The treatments were, TMR without Date palm leaves (T1); TMR with ADPL

replacing 40% of jowar hay (T2) and TMR with GDPL replacing 40% of jowar hay on dry matter equivalent basis (T3). The average values of T1, T2, and T3 groups for rumen parameters were pH (6.75, 6.64 and 6.98); Total nitrogen (92.74, 92.80 and 92.31 mg/dl); Non-protein nitrogen (13.03, 13.01 and 13.20 mg/dl); Soluble nitrogen (68.47, 68.73 and 68.87 mg/dl); Ammonia-N (10.96, 11.20, 11.16 mg/dl) and Total volatile fatty acids (12.34, 12.40 and 12.57 mM/dl). These treatment groups did not differ significantly.

***KEY WORD:*** *Dried Date Palm (Phoenix dactylifera* L.*), leaves, in vivo, marwari sheep.*

## *INTRODUCTION:*

Livestock productivity of our animals often remains low due to inadequate and nutritionally imbalanced supply of feed and fodder. Recurring natural calamities particularly drought and flood, fodder scarcity during lean period, encroachment of grazing lands for other purposes increasing pressure on cultivated lands for food crops and industrial purposes compounded by ever increasing livestock population have widen the gap between forage demand and supply in the country (IGFRI, 2011). At present, the country faces a net deficit of 63.5% green fodder and 23.5% dry crop residues. Supply and demand scenario of forage and roughage would remain almost similar by 2025. To meet the current level of livestock production and its annual growth in population, the deficit in all components of fodder, dry crop residues and feed has to be met either from increasing productivity, utilizing untapped feed resources, increasing land area (not possible due to human pressure for food crops) or through imports.

Date palm serves as the foremost fruit crop in arid and semi-arid regions of the globe. In the state of Gujarat also, the rangeland of Kutch area is dominated by date palm trees. It covers around 16693 hectares of land (Anonymous, 2010-11). A date palm tree annually produces approximately 20 kg of leaves (Bahman *et al*., 1997; Pascual *et al*., 2000; Arhab *et al*., 2006). Thus it can add to the feed basket of livestock if its exact nutritive value and optimum level of incorporation in livestock ration is worked out in a systematic manner. Bahman *et al*. (1997) and Pascual *et al*. (2000) have concluded that date palm leaves could be used as an acceptable alternative to barley straw for feeding goats and cows.

Date palm leaves is one of the most abundant agricultural by products in Iran. Recently, date palm leaves has been used in the total mixed rations for lambs (Valizade *et al*., 2011) and dairy goats. Salahi *et al*. (2011) there was no any adverse effect on feed intake, growth and feed conversion efficiency, (Valizade *et al*., 2011) rumen and blood parameters (Valizade *et al*., 2011 and Salahi *et*

*al*., 2011). The milk yield and milk constituents (fat, protein and lactose) yield (Salahi and Valizade, 2011). Thus, the authors concluded that DPL can be fed in TMR to such animals without any adverse effect. The DPL was found beneficial mainly for small holder farmers during periods of low rainfall and in dry areas with poor vegetation. It is necessary to make attempts to establish the potential of date palm leaves as an alternative source of livestock feed in the state of Gujarat or in the country.

## *MATERIAL AND METHODS:*

Four adult Marwari sheep (30-35 kg B.W.) were of similar age (26-30 months) and uniform conformation were selected and fed as per ICAR (1998) standards to meet their nutrient needs as donor of rumen inoculum for rumen fermentation study from each three grops. Rumen liquor was collected at 0,2,4 and 6 h post feeding through a stomach tube against negative pressure created by a suction pump. The collected rumen liquor was strained through four layered muslin cloth and was referred as Strained Rumen Liquor (SRL). The SRL was brought to the laboratory in a pre-warmed (39 ± 1 $^0$C) thermos flask. Carbon dioxide gas was passed through the SRL for one minute and was maintained at 39 ± 1 $^0$C temperature for further analysis.

## *RESULTS AND DISCUSSION:*

### Ruminal pH

The average pH value in SRL is presented in Table 1. The ruminal pH in different groups varied within a narrow range. This indicates more or less stable rumen fermentation on account of feeding total mixed rations. The average pH values in SRL of T1, T2 and T3 groups was 6.75, 6.64 and 6.98, respectively, and the values were statistically similar from each other. The trend of pH values of SRL at different time intervals after feeding indicated that it dropped to lowest at 2h post feeding except T2, which was elevated again at 6 h post feeding indicating that the pH of SRL collected at different time intervals differed significantly ($P<0.05$). However, Valizade *et al*. (2011) reported ruminal pH as, 6.55, 6.56 and 6.53 in Baluchi lambs for the TMR groups having 8, 16 and 24% DPL, respectively. Moreover, Salahi *et al*. (2011) found ruminal pH as, 6.41 and 6.24 in lactating Saanen dairy goats for the TMR groups having 20% DPL and 20% ensiled DPL on dry matter basis, respectively. The values of ruminal pH as reported by these workers corresponds well with the present study.

### Total Nitrogen

The average total nitrogen in SRL is presented in Table 1. It was 92.74, 92.80 and 92.31 mg/dl in T1, T2 and T3 groups, respectively. The peak concentration was found at 2 h post feeding and then

concentration declined and was found to be lower at 6 h post feeding compare with 2 and 4 hrs. post feeding. The concentration at each time interval was found to be statistically different from each other.

**Ammonia Nitrogen**

The average Ammonia nitrogen in SRL is presented in Table 1. The average ammonia nitrogen in SRL in T1, T2 and T3 groups was 10.96, 11.20 and 11.16 mg/dl, respectively. The treatment groups T2 and T3 did not differ significantly ($P<0.05$) from each other. The treatment groups did not significantly from each other. The maximum Ammonia nitrogenconcentration was recorded at 2 h which then declined up to 6 h post feeding following the same pattern in all the three treatment groups. However, Valizade *et al*. (2011) reported ammonia-N concentration as, 12.4, 11.12 and 10.38 mg/dl in Baluchi lambs for the TMR groups having 8, 16 and 24% DPL, respectively, which were similar than the results of current study. But, Salahi *et al*. (2011) reported ammonia-N concentration as, 22.9, 19.00 mg/dl in lactating Saanen dairy goats fed TMRs having 20% DPL and 20% ensiled DPL on dry matter basis, respectively. The values of Salahi *et al*. (2011) are higher than the present study.

**Non Protein Nitrogen**

The average NPN in SRL is presented in Table 1. The result revealed that average NPN in SRL of T1, T2 and T3 groups was 13.03, 13.01 and 13.20 mg/dl, respectively. The treatment groups did not differ significantly from each other. The maximum NPN concentration was recorded at 2 h which then declined up to 6 h post feeding following the same pattern in all the three treatment groups.

**Soluble Nitrogen**

The average soluble Nitrogen in SRL is presented in Table 1. The average soluble nitrogen in SRL of T1, T2 and T3 groups was 68.47, 68.73 and 68.87 mg/dl, respectively. The treatment groups did not differ significantly from each other. The maximum soluble nitrogen concentration was recorded at 2 h and which then dwindled up to 6 h post feeding following the same pattern in all the treatment groups.

**Total Volatile Fatty Acids Concentration**

The average TVFA in SRL is presented in Table 1. The average TVFA concentration in SRL was 12.34, 12.40 and 12.57 mM/dl in T1, T2 and T3 groups, respectively. The values in treatment groups were statistically similar. As depicted in Figure 4.9 the maximum TVFA concentration was observed at 2 h and then it declined up to 6 h of post feeding following the same pattern in all the treatment groups.

## CONCLUSION:

The rumen characteristics studied were in the normal range. The ruminal pH, total-N, ammonia-N, soluble-N, NPN and TVFA were statistically similar. Thus, ADPL or GDPL are equally palatable to sheep and maintain the body weight during whole experimental period.

## REFERENCES:


Anonymous (2011). *Horticulture in Gujarat*. Directorate of economics and statistics, Government of Gujarat, Gandhinagar.

AOAC. (1995). *Official Methods of Analysis* (15$^{th}$ed.). Arlington, VA: Association of Official Analytical Chemists.

Arhab, R.; Macheboeuf, D.; Doreau, M.; Bousseboua, H. (2006). Nutritive value of date palm leaves and *Aristidapungens* estimated by chemical, *in vitro* and *in situ* methods. *Trop.Subtrop. Agroecosyst.***6**: 167-175.

Bahman, A.M.; Topps, J.H.; Rooke, J.A. (1997). Use of date palm leaves in high concentrate diets for lactating Friesian and Holstein cows. *J. Arid Environ.* **35**: 141-146.

ICAR. (1998). *Nutrient Requirement of Livestock and Poultry*. Indian Council of Agricultural Research, New Delhi, India.

Pascual, J.J.; Fernandez, C.; Diaz, J.R.; Garces, C.; Rubert-Aleman, J. (2000). Voluntary intake and *in vivo* digestibility of different date-palm fractions by Murciano-Granadina (*Capra Hircus*). *J. Arid Environ.***45**: 183-189.

Salahi, A.; Valizade, R.; Naserian, A. and Tahmasbi, A. (2011). Effect of date palm leaves substitution with wheat straw onhealth and rumen parameter of Saanen dairy goats. *J. Dairy Sci*. **93**, E-Suppl.: 150

Valizade, R.; Salahi, A. and Mahmodi, M. (2011). Growth performance of Bluchi female lambs fed by diets containing different levels of date palm leaves. *J. Dairy Sci.***93**, E-Suppl.: 149

Van Soest, P. J.; Robertson, J. B. and Lewis, B. A. (1991). Methods of dietary fiber, neutral detergent fiber and non-starch polysaccharides in relation to animal nutrition. *J. Dairy Sci*. **74**: 3583-3597**.**

**Table 1: The Average ruminal pH, total-N, NH3-N, NPN, Soluble-N and TVFA in different treatment groups**

| Hours post-feeding | | | | | |
|---|---|---|---|---|---|
| **Ruminal pH** | | | | | |
| | 0 hr | 2 hr | 4 hr | 6 hr | Average |
| $T_1$ | 6.87 ± 0.09 | 6.61 ± 0.03 | 6.71 ± 0.19 | 6.79 ± 0.17 | 6.75 |
| $T_2$ | 6.98 ± 0.08 | 6.58 ± 0.02 | 6.44 ± 0.10 | 6.57 ± 0.09 | 6.64 |
| $T_3$ | 7.09 ± 0.03 | 6.83 ± 0.04 | 6.96 ± 0.06 | 7.04 ± 0.05 | 6.98 |
| P value | 0.954 | 0.963 | 0.999 | 0.992 | 0.515 |
| **Total Nitrogen (mg/dl SRL)** | | | | | |
| $T_1$ | 71.89 ± 1.63 | 126.42 ± 3.98 | 95.48 ± 1.97 | 77.18 ± 3.08 | 92.74 |
| $T_2$ | 71.75 ± 2.44 | 126.53 ± 4.71 | 95.73 ± 4.23 | 77.18 ± 2.66 | 92.80 |
| $T_3$ | 70.70 ± 3.10 | 124.25 ± 4.29 | 95.55 ± 2.31 | 78.75 ± 1.55 | 92.31 |
| P value | 0.933 | 0.917 | 0.998 | 0.879 | 0.988 |
| **Ammonia ($NH_3$) – N (mg/dl SRL)** | | | | | |
| $T_1$ | 8.66 ± 0.22 | 16.59 ± 0.43 | 11.18 ± 0.62 | 7.40 ± 0.14 | 10.96 |
| $T_2$ | 8.93 ± 0.27 | 17.05 ± 0.75 | 11.52 ± 0.14 | 7.28 ± 0.13 | 11.20 |
| $T_3$ | 8.66 ± 0.10 | 17.24 ± 0.36 | 11.39 ± 0.21 | 7.35 ± 0.26 | 11.16 |
| P value | 0.028 | 0.000 | 0.000 | 0.000 | 0.527 |
| **Non Protein Nitrogen (mg/dl SRL)** | | | | | |
| $T_1$ | 9.38 ± 0.29 | 19.60 ± 0.39 | 13.55 ± 0.22 | 9.59 ± 0.15 | 13.03 |
| $T_2$ | 9.17 ± 0.33 | 19.74 ± 0.47 | 13.69 ± 0.25 | 9.45 ± 0.19 | 13.01 |
| $T_3$ | 9.52 ± 0.13 | 19.85 ± 0.26 | 13.72 ± 0.23 | 9.70 ± 0.12 | 13.20 |
| P value | 0.954 | 0.945 | 0.644 | 0.904 | 0.577 |
| **Soluble Nitrogen (mg/dl SRL)** | | | | | |
| $T_1$ | 39.55 ± 1.95 | 91.88 ± 2.24 | 77.18 ± 1.19 | 65.28 ± 2.01 | 68.47 |
| $T_2$ | 43.23 ± 1.19 | 90.65 ± 2.50 | 75.25 ± 1.58 | 65.80 ± 1.48 | 68.73 |
| $T_3$ | 43.93 ± 2.13 | 92.75 ± 1.58 | 73.85 ± 1.41 | 64.93 ± 1.86 | 68.87 |
| P value | 0.998 | 0.789 | 0.992 | 0.942 | 0.945 |
| **Total Volatile Fatty Acids (mM/dl SRL)** | | | | | |
| $T_1$ | 7.59 ± 0.19 | 17.29 ± 0.31 | 14.35 ± 0.26 | 10.14 ± 0.18 | 12.34 |
| $T_2$ | 7.44 ± 0.14 | 17.45 ± 0.21 | 14.65 ± 0.37 | 10.04 ± 0.34 | 12.40 |
| $T_3$ | 7.51 ± 0.18 | 17.41 ± 0.23 | 14.93 ± 0.25 | 10.41 ± 0.16 | 12.57 |
| P value | 0.824 | 0.896 | 0.983 | 0.996 | 0.307 |