Journal Homepage: - www.journalijar.com

INTERNATIONAL JOURNAL OF ADVANCED RESEARCH (IJAR)

Article DOI: 10.21474/IJAR01/18394
DOI URL: http://dx.doi.org/10.21474/IJAR01/18394

RESEARCH ARTICLE

INFLUENCE OF SUPPLEMENTATION OF FALLEN APPLE ON THE PERFORMANCE OF LACTATING COWS

Dr. Srividhya S.[1], Dr. Putan Singh[2] and Dr. Subodh Khan Saha[3]

1. PhD Scholar, Animal Nutrition Division, Indian Veterinary Research Institute, Bareilly, Uttarpradesh.
2. Principal Scientist, Animal Nutrition Division, Indian Veterinary Research Institute, Bareilly, Uttarpradesh.
3. Principal Scientist, Animal Nutrition Division, Indian Veterinar Research Institute, Bareilly, Uttarpradesh.

Manuscript Info

Manuscript History
Received: 10 January 2024
Final Accepted: 14 February 2024
Published: March 2024

Key words:-
Fallen Apple, Urea Treated Apple, Milk Yield, Milk Composition

Abstract

The present study was conducted to evaluate the influence of supplementation of feeding fallen apple on the performance of lactating cows. Eighteen multiparous dairy cows (2-4 lactation number) were divided into three groups based on the average milk yield. The animals in the group-1(6 cows, average milk yield of 7.34 kg per day,control group- C) where fed maize fodder, concentrate mixture as per the requirement, while the animals in the group-2(6 cows, average milk yield of 7.35 kg per day, Apple fed group, T1) were fed maize fodder, concentrate mixture as per the requirement and chopped fresh fallen apple 4 kg per animal per day, while the animals in the group-3 (6 cows, average milk yield of 7.37 kg per day, Urea treated apple fed group, T2) where fed maize fodder, concentrate mixture as per the requirement and 4% urea treated fallen apple 500g per animal per day. The milk yield in lactating cows of C, T1 and T2 were comparable and did not vary significantly. There were no significant differences in the haematological parameters of C, T1 and T2 groups. Dry matter intake (DMI) was similar among the three groups. Average fortnightly body weight were not statistically significant among the three experimental groups. It was observed that apparent digestibility coefficients (%) of dry matter, organic matter, ether extract, neutral detergent fibre and acid detergent fibre were comparable among the three groups. The milk yield, dry matter intake, fortnightly body weight changes, digestibility of the nutrients were also not statistically significant among the threegroups. Hence, it is concluded that the supplementation of fallen apple and urea treated apple on the lactating cows did not affect significantly the intake and digestibility of nutrients as well as milk production and its composition.

Introduction:-

A huge quantity of about 1.3 billion tonnes of fruits was wasting every year and the palatable apple waste which were rich source of sugar, pectin, phenolic components, minerals and vitamins (Wadhwa et al.,2015). Apple production is the highest (10.62 lakh MT) in the Jammu and Kashmir, second highest (6.25 lakh MT)in Himachal Pradesh, third highest (0.62 lakh MT) in Uttarkhand (Chhimwal et al., 2019). Being the major horticultural

Corresponding Author:- Dr. Srividhya S.
Address:- PhD Scholar, Animal Nutrition Division, Indian Veterinary Research Institute, Bareilly, Uttarpradesh.

production apple becomes the back bone of the rural economy of Jammu and Kashmir, Himachal Pradesh and Uttarkhand States (Yildizhan et al., 2021).Utilization of fruit wastes in the efficient way as a animal feed supplement would reduce the cost of feeding and useful practice in waste management in terms of reducing environmental pollution (Pandey et al., 2020). Therefore, it is better to utilize this newer feed as a supplement in order to reduce the gap between the requirement and supply of feeds (Habib et al.,2016). Considering all the above facts, the present experiment was conducted to study the effect of feeding fallen and sorted apples and urea treated apples on feed intake, nutrient digestibility, milk yield and its composition in lactating Vrindavani cows.

Materials and Methods:-

A total of 18 lactating cows based on the lactation number and milk yield were selected and distributed into three groups of 6 animals each i.e.,C (Control), T1 (fresh chopped apple) and T2 (urea treated chopped apple) in order to avoid biasedness. The lactating cows of group C were fed to fulfill the nutrient requirements as per ICAR (2013) recommendations. The fresh fallen apple were collected, chopped and removed their seeds before fed to lactating cows (T1) at the quantity of 4 kg on fresh basis per animal daily along with the concentrate feed. The energy from the fallen apple were adjusted accordingly by reducing the amount of concentrate mixture. The fresh fallen apple were collected, chopped, removed their seeds and treated with 4% urea. The urea treated chopped apple were fed about 500 grams on fresh basis per animal along with the concentrate mixture to the lactating cows of the treatment group T2. The protein from the urea treated apple were adjusted accordingly by reducing the amount of protein from the concentrate mixture.

The blood sample were collected on 0^{th} day, 60^{th} day and 120^{th} day of the feeding trial and analysed for their haematological, serum biochemical, serum enzyme and erythrocytic antioxidant parameters in the three different experimental groups.

Analytical techniques:

The fresh sample of fallen apple and 4% urea treated apple were analysed for their crude protein content. The fresh sample were dried in hot air oven and analysed for their dry matter. The dried samples were ground and used for proximate analyses. Milk yield was recorded every day and milk composition analysed. Fortnightly body weight was also recorded. The digestibility trial was conducted and samples were collected to assess the nutrient utilisation parameter, haematological, serum biochemical, enzyme parameters and erythrocytic antioxidant indices.

Statistical analysis:

The effect of supplementation of feeding fallen apple strategy were analysed by the one-way ANOVA using the SPSS software Version 21. The probabilities with the difference (P) greater than 0.05 were considered as statistically non-significant. Data were presented as Mean ± SE.

Results:-

Table 1:- Plan of nutrition of Lactating cows during the metabolic trial.

PARTICULARS	COMPARISION	E1	E2	E3
Body weight (BW)	**(kg)**	530.83±6.21	527.22±7.61	530.79±5.60
DMI	**ICAR (2013) requirement(kg/d)**	13.54±8.92	13.67±5.84	13.83±7.12
	Actual Intake (Kg/d)	12.69±0.56	13.26±0.22	13.60±0.57
	% of ICAR (2013)	93.73%	97.00%	98.34%
CPI	**ICAR (2013) requirement(g/d)**	578.99±0.55	585.33±0.23	580.61±0.22
	Actual Intake (g/d)	567.76±0.35	559.12±0.54	532.72±0.64
	% of ICAR (2013)	98.06%	95.53%	91.76%
TDNI	**ICAR (2013) requirement(kg/d)**	5.49±0.22	5.74±0.27	5.66±0.32
	Actual Intake (Kg/d)	5.22±0.29	5.61±0.30	5.41±0.23
	% of ICAR (2013)	95.08%	97.74%	95.59%

Table 2:- Fortnightly average milk yield (kg/day) of lactating cows.

FORTNIGHTS	C	T1	T2	P value
AVERAGE	7.26±0.57	7.24±0.86	7.28±0.77	0.055

Table 3:- Average milk composition (%) of lactating cow.

Group	FAT	SOLID NOT FAT	PROTEIN	LACTOSE
Control (C)	3.62±0.17	8.83±0.71	2.97±0.67	4.65±0.82
Treatment group-1 (T1)	3.65±0.39	8.47±0.56	3.07±0.20	4.72±0.81
Treatment group-2 (T2)	3.62±0.14	8.33±0.28	2.67±0.41	4.56±0.37
P value	0.986	0.762	0.451	0.333

Discussion:-

Dry matter Intake:

The good palatability of the apple pomace causes increased dry matter intake. It was found that DMI was significantly reduced in the cows fed 15% apple pomace silage but increased with cows fed 30% apple pomace silage (Ghoreishi et al.,2007).

Milk yield and milk composition:

Supplementation of ensiled mixed tomato and apple pomace (EMTAP) who found that the milk yield increased because of the increased DM intake, nutrient digestibility and palatability of the diet, compared to the control (Abdollahzadeh et al., 2010). Milk yield increased when apple pomace silage mixed well with wheat bran, chopped alfalfa and milled rice bran about 10% on DM basis and fed to dairy cows (Toyokawa et al., 1984). Milk total solids and SNF contents were significantly increased in the overall tested rations (R2, R3 and R4) compared with the control R1, and the differences among them were not statistically significant (Ghoreishi et al., 2007)

Digestibility/ Nutrient utilisation:

The higher digestibility of DM and OM in the diet containing apple pomace due to presence of more NFE, appreciable quantities of soluble carbohydrates which was equivalent to corn silage (Rumsey et al.,1978). The sufficient nitrogen with optimizing the degradable: undegradable protein ratio could be maximize the digestibility of ruminant rations (Miller et al.,2002).

Blood parameters:

Feeding different levels of apple pomace causes the albumin in the normal range of about 3.25 to 4.27 g/dl and the globulin concentration highest in the higher levels of feeding apple pomace (40%) and the activity of the serum enzymes decreased significantly with increased levels of apple pomace feeding (El Nahas et al., 2010).

Conclusion:-

The milk yield and milk composition were similar with the control group. The utilisation of the fruit waste were found to be a alternative feed source for rearing livestock in hilly areas and it reduces the environmental pollution due to dumping of fruit waste.

References:-

1. Abdollahzadeh F.; R. Pirmohammadi ; F. Fatehi and I. Bernousi (2010). Effect of feeding ensiled mixed tomato and apple pomace on performance of Holstein dairy cows. Slovak J. Anim. Sci., 43 (1): 31-35

2. Chhimwal, M., Pandey, R.K. and Srivastava, R.K., 2019. Status of agriculture and horticulture farming in the hill state of India-Uttarakhand. Journal of Pharmacognosy and Phytochemistry, 8(4), pp.1626-1631.
3. El-Nahas,H.M.; G.H.A. Ghanem; H.M.A. Gaafar and E.E. Ragheb. (2004). Effect of feeding berseem and orange waste silages on productive performance of lactating Friesian cows. J. Agric. Sci. Mansoura Univ., 29 (11): 6137-6148
4. Ghoreishi S.F.; R. Pirmohammadi and Teimouriyansari, A. (2007). Effects of ensiled apple pomace on milk yield, milk composition and DM intake of Holstein dairy cows. Journal of Animal and Veterinary Advances, 6: 1074- 1078.
5. Habib, G., Khan, M.F.U., Javaid, S. and Saleem, M., 2016. Assessment of feed supply and demand for livestock in Pakistan. Journal of Agricultural Science and Technology, A, 6(2016), pp.191-202.
6. Miller E. L. (2002). Protein nutrition requirement of farmed Livestock and dietary supply. FAO Anim. Prod. And Health, Proc. Of Protein sources for the animal feed industry, Bangkok 29 April-3May, pp: 29-75
7. Pandey, S. and Dwivedi, N., 2020. Utilisation and management of agriculture and food processing waste. In Innovations in Food Technology (pp. 269-288). Springer, Singapore.
8. Patil, A.P., Gawande, S.H., Nande, M.P. and Gobade, M.R., 2009. Constraints faced by the dairy farmers in Nagpur district while adopting animal managenment practices. Veterinary World, 2(3), p.111.
9. NRC. 2001. Nutrient requirements of dairy cattle. 6th Edition. National Academy of Science, National Research Council, Washington, D.C
10. Rumsey T.S. (1978). Ruminal fermentation products and plasma ammonia of fistulated steers fed apple pomace-urea diets. J. Anim. Sci., 47: 967- 976
11. Tiwari S.P.; M. P. Narang and M.Dubey (2008) Effect of feeding apple pomace on milk yield and composition in crossbred (Red Sindhi × Jersey) cow. Livestock Research for Rural Development 20 (4)
12. Wadhwa, M., Bakshi, M.P. and Makkar, H.P., 2015. Waste to worth: fruit wastes and by-products as animal feed. CAB Reviews, 10(31), pp.1-26.
13. Yildizhan, H., Taki, M., Özilgen, M. and Gorjian, S., 2021. Renewable energy utilization in apple production process: A thermodynamic approach. Sustainable Energy Technologies and Assessments, 43, p.100956.