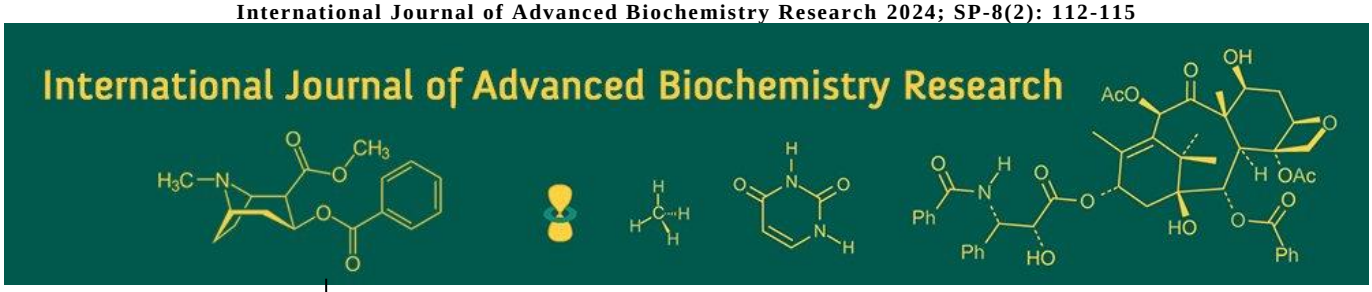

ISSN Print: 2617-4693
ISSN Online: 2617-4707
IJABR 2024; SP-8(2): 112-115
www.biochemjournal.com
Received: 09-12-2023
Accepted: 16-01-2024

Dhawal Kant Yadav
ICAR-Indian Veterinary Research Institute, Izatnagar, Bareilly, Uttar Pradesh, India

Parth Gaur
Animal Genetics and Breeding, National Dairy Research Institute, Karnal, Haryana, India

Garima Kansal
Livestock Production Management, National Dairy Research Institute, Karnal, Haryana, India

Panch Kishor Bharti
Livestock Production and Management, ICAR-Indian Veterinary Research Institute, Izatnagar, Bareilly, Uttar Pradesh, India

Pardeep Kumar
Department of Animal Nutrition, IIVER, Rohtak, Haryana, India

Corresponding Author:
Dhawal Kant Yadav
ICAR-Indian Veterinary Research Institute, Izatnagar, Bareilly, Uttar Pradesh, India

Assessment of the outcomes of crossbred dairy cattle in subtropical environments fed treated feed including particular ingredients

Dhawal Kant Yadav, Parth Gaur, Garima Kansal, Panch Kishor Bharti and Pardeep Kumar

DOI: https://doi.org/10.33545/26174693.2024.v8.i2Sb.517

Abstract
To assess how well the twenty-four crossbred animals (8 to 12 months old) performed in the experiment, they were randomly assigned to four groups of six. Group 2 (76% treated feed), Group 3 (49% treated feed), Group 4 (100% treated green fodder). Group 4 was control. Groups were assigned treatments accordingly, (F-1). 1.5% urea+5% molasses+0.5% salt, (F2)1.5% urea + 5% molasses + 1.5% salt, (F3) 1.5% urea+10% molasses+0.5% salt, 1.5% urea+10% molasses+1.5% salt 5% molasses+0.5% salt, and 10% molasses+0.5% salt, respectively, were administered to the remaining feed A-1, A-2, A-3, A-4, A-5, and A-6. The average weight gain for the A1 treatment group for the first, second, third, and fourth animal groups was, respectively, 1.60, 3.50, 2.66 and 3.33Kg weekly. The weight increases for the animals in the A2 group were 0.33, 4.00, 2.33, and 3.66kg in that order. The results for the A3 group were 3.66, 3.33, 2.83, and 0.50 in that order. The F4 group experienced weight increases of 1.66, 6.66, 6.16, and 6.50kg in that order. The weight gains for the A5 treatment group were 5.50, 6.00, 7.00 and 1.50kg in that order. The weight gains for each of the six animal groups of A6 were 1.66, 5.57, 4.83 and 5.33, in that order. Giving animals fresh green fodder in half portions did not have any detrimental effects on performance or feeding costs while also utilizing waste, despite weight increases making it evident that feeding treated feed including urea and molasses in its entirety is not acceptable.

Keywords: Performance, Leftover Feed, Molasses, Palatability, Urea, and Vrindavani

1. Introduction
The developing nation of India, located in tropical south Asia, is severely lacking in dry fodder, green fodder, and cereal grains. Present shortages include 35.6% of green fodder, 10.95% of dry agricultural leftovers, and 44% of concentrate feed components. This difference can be closed by imports, increased productivity, the utilisation of underutilized feed supplies, and land area development. The main diet of bovines, the largest dairy animals, is composed of green fodder, followed by dry roughage and a concentrate mixture. The cost of feeding dairy cattle accounts for 60–70% of the total input cost of keeping and producing the animals. Around 142 million hectares of net cultivable area, not including forests, associated grasslands, and sources of animal feed (Singh *et al*., 2014) [21]. Due to the tremendous pressure on land for crop production to meet the rising demand for food grains for human consumption, farmers are unable to set aside space for the production of fodder for the cattle (Singh *et al*., 2014) [21]. Bulk roughage, generally considered waste, is the leftover feed from organized farms in India that is deposited in agricultural fields. The main ingredients of leftovers in the northern plains of India include maize, jowar, bajra, berseem, and Napier grass; however, the exact contents of leftovers vary according to the availability of fodder (Birthal and Jha, 2005) [3]. Studies (Sahoo *et al*., 2004; Verma *et al*., 2006) [17, 22] show that feed intake, digestibility, and palatability of rice straw all increase when animals fed straw combined with molasses and urea. Several trials treating the lower quality feed with urea, ammonia, and molasses at different inclusion amounts have been conducted for this purpose, with positive results. It was discovered that urea treatment might increase the nutritional value of straw by 46% because it breaks down the bonds between the lignin, hemicellulose, and cellulose (Wanapat *et al*., 2009) [23].

2. Material and Methods

2.1 Study location

Located at latitude 28° 22' north, longitude 79° 24' east, and elevation 169.2 meters above mean sea level, the study site was the Cattle and Buffalo Farm of the ICAR-Indian Veterinary Research Institute in Izatnagar, India. The region, which is a portion of the upper Gangetic Plain, has a subtropical climate with high levels of humidity, particularly during the winter. The weather gets cooler throughout winter, which spans from November to February, and during summer, which spans from May to August. Most of the year's rainfall, which ranges from 90 to 120 cm, occurs in July and August.

2.2 Experiment design

The flavor and effectiveness of various mixes of treated leftover feed and fresh fodder were tested on dairy animals. The primary resources for the leftover feed included chaffed fodder sorghum, millets, maize, napier grass, and berseem (clover). Six combinations of urea, molasses, and salt were used to increase the remaining feed's nutritional value and palatability (table 1). The animals in different treatment groups had their weight growth compared, and the viability of the treatment was assessed from December to April.

Table 1: For the treatment of residual feed, six distinct urea, molasses, and salt combinations are utilized

Feed material (on fresh matter basis)	Chemical compound (based on basal feed's dry matter foundation)			Treated feed
	Urea	Molasses	Salt	
Remaining food	1.5%	5%	0.5%	A1
	1.5%	5%	1.5%	A2
	1.5%	10%	0.5%	A3
	1.5%	10%	1.5%	A4
	Nil	5%	0.5%	A5
	Nil	10%	0.5%	A6

2.3 Selecting the appropriate experimental animals

24 crossbred animals, aged between 8 and 12 months, were selected, and they were split into four groups at random, each including six individuals: 100% treated remaining feed was given to Group-1 (Gr-1), 75% treated feed was given to Group-2 (Gr-2), 50% treated feed was given to Group-3 (Gr-3), and 100% treated leftover feed was given to Group-4 (Gr-4). or entirely green diet; processed feed was not utilized as a control. Feeding was done for seven days in four different ratios (table-2) of treated and fresh green fodder to evaluate the flavor of each mixture.

Table 2: Trial feeding different mixes of green fodder and processed leftover meal

Feeds	F1 group	F2 group	F3 group	F4 Control
Green: unused food	0: 100	24:76	49:51	100:0
Concentrated nourishment	Served equally to all group (following the feeding schedule established by the institute)			

Palatability score was utilized to measure the palatability of the treatment; all the 24 animals were weighed before and after each feeding trail and their weight gains were compared after the end of each trial.

2.4 Chemical examination of feed

To determine changes in the nutritive values (crude protein, crude fiber, moisture, dry matter, and ash content), leftover feed was analyzed both before and after treatment using proximate analysis. The treated feed was also examined for the presence of fungal toxins, specifically mycotoxin and ochratoxin.

2.5 Statistical analysis: The SPSS 20.0 software program was used to analyze the experiment data.

3. Results

3.1 Performance of the animals: Performance of the experimental animals was measured by weighing them before and after starting the experiment and the results are shown in Table-3

Table 3: Animals' weight following ingestion of several kinds of leftover food

Feed	Parameter	F- 1 Treated: Fresh feed (100:0)	F-2 Treated: Fresh feed (76:24)	F-3 Treated: Fresh feed (51:49)	Control Treated: Fresh feed (0:100)
A1	I (Kg.)	226.23±9.5	237.83±11.83	231.16±11.35	234.33±15.82
	F (Kg.)	228.01±9.54	241.33±11.83	232.84±11.88	237.66±15.52
	G(Kg.)	1.68±1.60	3.50±1.54	2.66±0.0.66	3.33±0.63
A2	I (Kg.)	224.83±11.41	240.16±10.47	228.55±13.55	232.83±16.67
	F (Kg.)	227.66±11.41	244.16±9.26	230.83±13.87	236.54±16.51
	G(Kg.)	0.34±0.61	4.00±1.84	2.33±0.65	3.65±0.64
A3	I (Kg.)	232.00±10.06	242.67±8.82	237.5±12.53	243.56±18.64
	F (Kg.)	236.51±9.83	246.00±8.67	2401.33±13.4	247.16±18.44
	G(Kg.)	0.51±0.55[a]	3.33±0.52[b]	2.82±0.71[ab]	3.66±0.81[b]
A4	I (Kg.)	24.67±9.54	258.83±8.24	250.01±10.48	253.33±14.71
	F (Kg.)	249.34±8.54	265.00±7.81	256.45±10.83	261.50±15.35
	G(Kg.)	1.67±1.48	6.66±1.63	6.13±0.48	6.5±0.71
A5	I (Kg.)	254.33±8.82	271±6.96	260.01±9.13	267.5±15.57
	F (Kg.)	253.83±9.18	278.17±7.01	266.01±9.67	271±15.41

	G(Kg.)	1.52±0.67[a]	7.01±0.60[b]	6.03±1.13[ab]	5.52±0.61[b]
A6	I (Kg.)	256.33±12.73	283.67±9.24	278.16±10.90	285.84±18.51
	F (Kg.)	262±13.57	288.26±9.06	282±10.82	288.16±18.32
	G(Kg.)	1.63±0.98	5.54±1.53	4.88±0.83	5.32±0.49

Where, IW- Initial weight, FW= Final Weight, WG= Weight gain

The initial body weight difference (IW) was not statistically significant for any group. Gr-1 found a significant difference in the animals' final body weight (FW) and weight gain (WG) for F3 and F5, comparing Gr-3 and Gr-4 to the control group. When it comes to the ratio of treated to fresh feed, the weight increase in Gr-2 was shown to be even better than the control, but the difference was not statistically significant. It's possible that the feed's greater nutritional content and acceptability than in other groups contributed to the Gr-2 group's performance being comparable to the control group. In the third and fifth groups, the starting body weights of the control, Gr. 1, Gr. 2, and Gr. 3 animals did not differ much from one another.

4. Discussion

A thorough examination of the feed After each treatment, a proximate analysis of the feed showed an increase in nutritional value, which was attributed to the urea ammoniation of the remaining feed, and an increase in the amount of carbohydrates, molasses, and ash, which was attributed to the presence of minerals in the salt and other contaminants in the premix. The content of crude protein and crude fiber has increased, according to Gordon and Chesson (1983) [6] and Sarwar *et al*. (2010) [20], who found higher levels of crude protein and total protein in barley or wheat straw treated with 4% urea (Ambawat and Kheterpal 2018) [1]. The results are in line with those of Saadullah *et al*. (1980) [16], who discovered that treating rice straw with 3% urea increased its crude protein content from 2.9 to 5.9%, while treating it with 5% urea boosted it to 6.7%. Hassan *et al*. (2011) [7] reported that ruminal NH3-N levels were raised in bulls fed straw treated with urea. Fike *et al*. (1995) [4] and Dass *et al*. (2000) [2] urea-ammoniated wheat straw and reported higher crude protein levels; however, Prasad *et al*. (1998) [14] showed higher digestible protein and digestible nutrients in rations that contained either stacked or baled urea-treated rice straw. Treatments five and six had only molasses and salt, and due to their nice aroma and golden brown color, they were substantially more palatable. Sahoo *et al*. (2002) [18] found that wheat straw treated with urea had the highest amounts of hemicellulose digestibility, neutral detergent fiber, and organic matter. Other publications, such as Manyuchi *et al*. (1992) [10], Nisa *et al*. (2004) [12], Sarwar as al. (2004) [19], and Jabbar *et al*. (2008) [8], have reported findings that are similar to these.

4.1 Evaluation of animal performance

The treatment groups for F3 and F5 feed had significantly lower weight gains than the other three groups, despite the fact that the animals' initial and final weights did not differ statistically. This could have been due to the treated feed's poorer palatability when compared to fresh green fodder. The control group's diet's higher nutritional values, acceptability, and palatability may have contributed to their identical performance in Gr-2 (Garg *et al*., 2006) [5]. But in the current study, weight gain and feed palatability were included while evaluating performance. According to Kilic and Emre (2017) [9], certain additives can increase the digestibility of wheat and soybean straw. According to Mishra *et al*. (2012) [11], adding urea molasses block enhanced cows' milk output, live weight, and body score substantially. Similarly, after receiving molasses treatment, crossbred heifers (Pathak *et al*., 2015) [13] and lambs (Rath *et al*., 2001) [15] displayed increased feed acceptance.

5. Conclusions

Using different ratios of urea, molasses, and salt, residual feed might be processed without creating mycotoxins or ochratoxin-like fungus. This increased the quantities of fiber and crude protein in the diet. The animals fed a diet consisting of 50% fresh green forage and 50% treated feed gained weight just as well as the control group. In addition to being a more cost-effective option in times of poor fodder production, farms can use the excess feed to feed other classes of dairy animals and lower the cost of raising them.
Statements of interest - Regarding the subject matter of this research, the authors disclose no conflicts of interest.

6. Acknowledgements

The Director of the ICAR-Indian Veterinary Research Institute (IVRI), Izatnagar, is acknowledged by the authors for providing the necessary resources for the study.

7. References

1. Ambawat S, Khetarpaul N. Comparative assessment of antioxidant, nutritional and functional properties of soybean and its by-product okara. Ann Phytomed. 2018;7(1):112-118.
2. Dass RS, Mehra UR, Verma AK. Nitrogen Fixation and In-Situ dry matter and fibre constituents' disappearance of wheat straw treated with urea and Boric Acid in Murrah buffaloes. Asian-Aust J Anim Sci. 2000;13(8):1133-1136.
3. Birthal PS, Jha AK. Various economic losses due to various constraints in dairy production in India. Indian J Anim Sci. 2005;75(12):1470-1475.
4. Fike GD, Simms DD, Cochran RC, Vanzant ES, Kuhl GL, Brandt RT. Protein Supplementation of Ammoniated Wheat Straw: Effect on performance and Forage Utilization in Beef Cattle. J Anim Sci. 1995;73:1595-1601.
5. Garg MR, Mehla AK, Singh DK. Advances in the production and use of urea molasses mineral blocks in India. A technical manual of NDDB, Anand. 2006;4:22-27.
6. Gordon AH, Chesson A. The effect of prolonged storage on the digestibility and nitrogen content of ammonia-treated barley straw. Anim Feed Sci Technol. 1983;8(2):147-153.
7. Hassan Z, Shahzad MA, Nisa M, Sarwar M. Replacing concentrate with wheat straw treated with urea molasses and ensiled with manure. Asian-Aust J Anim Sci. 2011;24(8):1092-1099.
8. Jabbar MA, Muzafar H, Khattak FM, Pasha TN, Khalique A. Simplification of urea treatment method of

wheat straw for its better adoption by farmers. S Afr J Anim Sci. 2008;39(5):58-61.
9. Kilic U, Emre G. Effects of Some Additives on *In Vitro* True Digestibility of Wheat and Soybean Straw Pellets. Open Life Sci. 2017;12:206–213.
10. Manyuchi B, Orskov ER, Kay RN. Effect of feeding small amounts of ammonia treated straw on degradation rate and intake of untreated straw. Anim Feed Sci Technol. 1992;38:293-304.
11. Mishra AK, Reddy GS, Ramakrishna YS. Participatory on-farm evaluation of urea molasses mineral block as a supplement to crossbred cows for dry season feeding in rain-fed agro-ecosystem in India. Livestock Res Rural Develop. 2012;18(2).
12. Nisa M, Sarwar M, Khan MA. Influence of ad libitum feeding of urea treated wheat straw with or without corn steep liquor on intake, in situ digestion kinetics, Nitrogen Metabolism and nutrient digestion in Nili-Ravi buffalo bulls. Aust J Agric Res. 2004;55:229-236.
13. Pathak R, Jaiswal RS, Thakur TC, Joshi YP, Paudy H. Effect of feeding ammonia treated baled wheat straw with different levels of concentrate on nutrient utilization and growth of cross bred heifers. Indian J Anim Sci. 2005;5:252-255.
14. Prasad RDD, Reddy MR, Reddy GVN. Effect of feeding baled and stacked urea treated rice straw on the performance of crossbred cows. Anim Feed Sci Technol. 1998;73:347-352.
15. Rath S, Verma AK, Singh P, Dass RS, Mehra UR. Performance of growing lambs fed urea ammoniated and urea supplemented wheat straw based diets. Asian Australian J Anim Sci. 2001;14(8):1078-1084.
16. Saadullah M, Haque M, Dolberg F. Unpublished data DANIDA/Bangladesh Agricultural University Straw Treatment Programme 1979-1980.
17. Sahoo A, Elangovan AV, Mehra UR, Singh UB. Catalytic Supplementation of Urea-molasses on Nutritional Performance of male buffaloes. Asian Australian J Anim Sci. 2004;17(5):621-628.
18. Sahoo B, Saraswat ML, Haque N, Khan MY. Chemical treatment of wheat straw on intake and nutrient utilization in sheep. Indian J Anim Sci. 2002;72(12):1162-1165.
19. Sarwar M, Khan MA, Nisa M. Effect of organic acids or fermentable Carbohydrates on digestibility and nitrogen utilisation of urea-treated wheat straw in Buffalo bulls. Aust J Agric Res. 2004;55:223-228.
20. Sarwar M, Shahzad MA, Nisa M, Afzal D, Sharif M, Saddiqi HA, *et al*. Feeding value of urea molasses treated wheat straw ensiled with fresh cattle manure for growing crossbred cattle calves. Trop Anim Health Prod. 2010;DOI:10.1007/s11250-010-9745-5.
21. Singh S, Mishra AK, Singh JB, Rai SK, Bai MJ, Biradar N, Kumar A, Verma *et al*, OPS. Water requirement estimates of feed and fodder production for Indian livestock vis a vis livestock water productivity. Indian J Anim Sci. 2014;84(10):1090-1094.
22. Verma AK, Singh P, Dass RS, Mehra UR. Impact of feeding urea ammoniated and urea supplemented wheat straw on intake and utilization of nutrients in crossbred cattle. Indian J Anim Sci. 2006;76(6):46-470.
23. Wanapat M, Cherdthong A. Effects of treating rice straw with urea or urea calcium hydroxide upon intake, digestibility, rumen fermentation and milk yield of dairy cows. Asian-Australian J Anim Sci. 2009;12:294-299.