

EFFECT OF INCORPORATION OF TEA (*CAMELLIA ASSAMICA*) WASTE IN THE RATIONS OF CROSSBRED CATTLE CALVES (JERSEY X ASSAM LOCAL) ON DIFFERENT BLOOD BIOCHEMICAL PARAMETERS

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Tea (*Camellia assamica*) waste as a byproduct of tea industry contains fluffs, stalks and is very rich in crude protein (21.9 %) with high level of all amino acids. The study was planned to evaluate the effect of feeding different levels of tea waste supplemented rations on different biochemical parameters of crossbred calves (Jersey x Assam Local) and to ascertain the level of inclusion of factory tea waste in the diets of these animals. The overall mean values of post experimental period for blood glucose (mg/dl), total serum protein (g/dl), blood urea nitrogen (mg/dl) and blood cholesterol (mg/dl) were recorded and values showed non-significant differences among different groups and all the values were found to be well within the normal range. Results of the experiment revealed that tea waste can be successfully incorporated in the diets of crossbred cattle calves by replacing wheat bran in the concentrate mixture up to 100 percent level.

Key Words: “Tea waste”, “Blood biochemical parameters”, “Crossbred calves”

Shortage of feeds and fodders in terms of both quality and quantity is a chronic problem hampering the growth of Indian livestock industry since a long time. Further, due to liberalization of export policy and diversion of conventional animal feeds for human consumption and fuel production, existing shortage of 18 million tones of digestible crude protein and 94 million tones of total digestible nutrients in our country is going to be get aggravated further (Dikshit and Birthal, 2010). In this situation the use of unconventional feed stuffs for feeding of

livestock becomes essential to satisfy the ever increasing demand of feed by livestock sector. In India, annual production of tea is approximately 8,57,000 tones which is 27.4% of total world production (Wasewar *et al.*, 2008). The average amount of dry tea produced from 100 kg green tea leaves is 22 kg and approximately 18 kg tea is packed for the market. The remaining 4 kg of dry tea material is treated as a waste and usually get thrown away by tea estates (Cay *et al.*, 2004) thus, total amount of tea waste produced per year after processing is about 1,90, 400 tones. Tea (*Camellia assamica*) waste as a byproduct of tea industry contains fluffs, stalks and is very rich in crude protein (21.9 %) with high level of all amino acids (Deka, 2001). Essential amino acids content of tea waste have similarity with commonly used protein sources like cotton seed cake and its methionine content exceeds that of whole egg protein (Barman & Rai, 2003). A major portion of this byproduct is disposed off as a waste and have potential to be utilised as a feed in the diets of domestic animals by replacing some other costly ingredients. Therefore, the present study was undertaken to evaluate the effect of feeding different levels of tea waste supplemented rations on different biochemical parameters of crossbred calves (Jersey x Assam Local) and to ascertain the level of inclusion of factory tea waste in the diets of these animals.

MATERIALS AND METHODS

A growth trial of 13 weeks was conducted on 12 growing crossbred male cattle calves of 6-7 months age and approximately same body weight. All the experimental animals were dewormed against ecto and endo

parasites before starting the experiment. Three nearly iso-nitrogenous concentrate mixtures prepared and were designated as T₁, T₂ and T₃. T₁ was served as control and was prepared with maize, ground nut cake,

wheat bran and til oil cake, while in T₂ and T₃ wheat bran was replaced by tea waste at 50 and 100% level, respectively keeping other ingredients same as used in control (Table 1).

Table 1: Composition of Concentrate Mixtures

Ingredients	Concentrate Mixture		
	Control	Experimental	
	I	II	III
Maize	30.5	35	38
Deoiled GNC	6.5	14	17
Wheat Bran	40	20	-
Tea Waste	-	20	40
Til oil cake	20	08	02
Mineral Mixture*	02	02	02
Common Salt	01	01	01
Crude Protein** (%)	19.69	20.20	20.80
TDN** (%)	73.84	72.80	71.10

*Mineral mixture contains : Calcium 23.60 %, phosphorus 11.40 %, copper 1800ppm, cobalt 300 ppm, manganese 510 ppm, iodine 1000 ppm, sulphur 0.75 % and iron 0.24 %

** Calculated from the table values of Ranjhan (1978)

Table 2: Percent Chemical Composition of Tea Waste, Concentrate Mixture, Para Grass and Paddy Straw (On DM Basis)

Particulars	Concentrate mixture			Para Grass (<i>Brachiria mutica</i>)	Paddy Straw	Tea Waste
	Control	Experimental				
	I	II	III			
Dry matter	90.35	90.46	90.50	15.00	92.90	89.20
Organic matter	92.49	93.85	93.50	87.00	84.10	95.00
Crude Protein	19.07	19.57	19.15	10.93	4.00	21.58
Ether Extract	3.32	3.28	3.16	1.26	1.50	4.35
Crude Fibre	8.28	10.04	10.42	33.24	38.50	17.20
Nitrogen Free Extract	61.82	60.96	60.77	41.57	40.10	51.86
Total Ash	7.51	6.15	6.50	13.00	15.90	5.00

Nutrient requirements (for 500 g daily gain in growing calves) were calculated as per Kears (1982) and weighed quantity of experimental concentrate mixtures were offered to each animal each day in the morning at 7.00 AM. Paddy straw was provided *ad lib*. To each animals along with one kg para grass as a source of roughage throughout the experimental period of 13 weeks. Blood was collected from each animal (about 5 ml) at 0 day, 45th day and 91st day in the morning hours from jugular vein before feeding. Blood serum was separated by centrifugation at 3000 rpm for 15 minutes and all samples were analysed

immediately for different parameters like blood glucose, total serum protein, blood urea nitrogen and blood cholesterol using Crest Biosystems kits as per the set of standard procedures provided with it. The statistical analysis of data was carried out according to method described by Snedecor and Cochran (1994).

RESULTS AND DISCUSSION

The per cent chemical composition of different concentrate mixtures as well as tea waste, paddy straw and para grass has been revealed in Table No. 2. The crude protein content of tea waste was 21.58 per cent

which is found to be higher than earlier reported values (Konwar and Das, 1990). The per cent chemical composition of paddy straw and para grass shows similar pattern with earlier reported values (Sen *et al.*, 1976 and Ranjhan, 1991). The dry matter intake in terms of g/day and g/Kg $W^{0.75}$ weight was

statistically similar among different groups but was significantly ($P>0.05$) lower in T_3 group (Table 3) when calculated in terms of kg/100 kg body weight which may be attributed to presence of tannins in tea waste due to its astringent property (Kumar and Singh, 1984).

Table 3: Average Dry Matter Consumption by Experimental Calves of Different Groups

Particulars	Concentrate mixture			Statistical analysis
	Control	Experimental		
	Group T1	Group T2	Group T3	
Average body wt. (kg)	64.00	63.50	63.25	NS
Average metabolic body wt. (kg)	22.35	22.29	22.38	NS
DM Intake				
Kg/ per day	1.913	1.898	1.779	NS
Kg/100 kg body wt.	3.00 ^a	2.98 ^a	2.82 ^b	*
g/ kg $W^{0.75}$	83.70	83.62	79.32	NS

*^{abc} Mean bearing different superscript in a row differ significantly ($P>0.05$)

Table 4: Effect of Different Levels of Tea Waste Supplemented Rations on Biochemical Parameters of Growing Calves (Jersey X Assam Local).

Days	T ₁ (Control)	T ₂ (50 % tea waste)	T ₃ (100 % tea waste)	Significance
Blood glucose (mg/dl)				
0 day	53.51	52.78	52.22	
45 days	53.14	52.77	52.96	
91 days	53.33	53.51	53.33	
Overall Mean	53.24	53.05	53.15	NS
Total Serum protein (g/dl)				
0 day	7.01	6.93	7.09	
45 days	6.99	6.99	6.96	
91 days	7.12	6.99	7.23	
Overall Mean	7.06	6.99	7.10	NS
Blood Urea Nitrogen (mg/dl)				
0 day	21.14	21.14	21.01	
45 days	20.76	21.01	20.88	
91 days	21.40	20.88	20.68	
Overall Mean	21.08	20.95	20.88	
Serum Cholesterol (mg/dl)				
0 day	106.90	103.45	106.90	
45 days	108.05	104.60	110.23	
91 days	109.20	112.42	108.05	
Overall Mean	108.63	108.51	109.14	NS

NS- Non-significant

The average values obtained for blood glucose, total serum protein, blood urea nitrogen and blood cholesterol are shown in Table 4. The overall mean values of post experimental period for blood glucose

(mg/dl), total serum protein (g/dl), blood urea nitrogen (mg/dl) and blood cholesterol (mg/dl) were recorded to be 53.24, 7.06, 21.08 and 108.63 in T_1 , 53.05, 6.99, 20.95 and 108.51 in T_2 and 53.15, 7.10, 20.88 and 109.14 in T_3 group, respectively. Statistical

analysis of the values showed non-significant differences which clearly indicates that there is no adverse effect of feeding tea waste on blood glucose, total serum protein, blood urea nitrogen and cholesterol levels in experimental calves and all the values were found to be well within the normal range. The present findings are in good agreement with Lee (2005) and Sarker *et al.* (2010) found non-significant effect of supplementation of 0.02% green tea byproducts on blood components in beef cattle and Korean Hanwoo calves, respectively. Similarly, (Soren *et al.*, 2010, Chanjula *et al.* 2007, Jadhav *et al.*, 2011, Garba and Abubaker, 2012) found non-significant effect on different blood biochemical parameters on feeding non conventional feeds to different livestock. Whereas, Kondo *et al.* (2004) observed a significant decrease in the serum cholesterol contents of lactating cow when diets contained 5% of green tea byproducts in cow diet.

CONCLUSION

Results of the experiment revealed that feeding of tea waste (*Camellia assamica*) in the diets of growing crossbred cattle calves by replacing wheat bran in the concentrate mixture at 50 and 100 percent level has not shown any adverse effect on their health as supported by non-significant variation in different blood biochemical parameters of control and tea waste fed animals. Thus it can be concluded that tea waste can be successfully incorporated in the diets of crossbred cattle calves by replacing wheat bran in the concentrate mixture up to 100 percent level.

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