

Tea Waste – A New Livestock and Poultry Feed

Edited by

Bizendra K. Konwar and Prafulla C. Das



**All India Coord. Research Proj. on Agril. by products,
Department of Animal Nutrition,
Assam Agricultural University
Khanapara, Guwahati-781 022
Assam : India**

Botanical Name : *Camellia assamica*
Camellia sinensis.
Common Name : Sahpat, Sahpata.

Livestock production in the North-Eastern Region is characterized by traditional backyard or small scale unit. But due to import of better breed and improvement of the existing livestock through cross-breeding the genetic potentiality of the livestock population can be improved. But livestock feed has been a major constrain to small farmer livestock operation and the most single important constrain for the increased production in this region is the inadequacy of feeds and fodder resources both in quality and quantity. This has further aggravated due to lack of appreciation of modern technology and practices. This has eventually led to an ailing and depressed rural economy.

The availability of feeds and fodder is not commensurate with their requirements. A gigantic gap of about 44% concentrate, and 36% each of green fodder and dry roughages exists between the demand and supply of animal feed resources in the country. When estimated for the N E Region the shortage is about 75% concentrate, 35% green fodder and 28% dry fodder for the present livestock population alone. It is clear that the region has to depend largely upon other states for procurement of concentrate feeds. There is, thus, a clear and sound need to look beyond the traditional feed resources available to alleviate the demand for animal feeds. Realising this Animal Nutritionists in India started studies on subsidiary feeds to augment the existing feed resources.

To bridge this gap and for making the use of unconventional feeds, Indian Council of Agricultural Research initiated All India Coordinated Research Project on Agro-Industrial Byproducts etc. from 1967 in different parts of the country and a centre at Assam Agricultural University is functioning from the 1st October, 1981. Several agricultural and industrial by-products and forest products are tested as a potential source of feeds for the livestock and poultry in this centre and tea waste is one of them.

Considering the large scale availability of tea waste of *Camellia assamica* and *Camellia sinensis* in this region the research work on utilization of the tea waste both Factory tea waste (FTW) and Decaffeinated Tea Waste (DCTW) as a source of feed for livestock and poultry was taken up at Guwahati Centre. There is no available data on systematic research studies on the utilization of tea waste as well as

decaffeinated tea waste on livestock and poultry. The studies on the screening of toxic substances present in Factory Tea Waste and Decaffeinated tea waste and innovation of suitable methods for removal of toxic substances, palatability, nutritive value and the performances of various categories of Cattle (growing and lactating), pigs (growing and finishing) and Poultry (Broiler) were conducted on long term basis. The results of these studies as well as some other related information are summarized in this Bulletin.

Table-1 : Tea Waste Chemical composition of Factory Tea Westes and Decaffeinated (Camellia assamica)

Nutrients	FTW	DCTW	Spent tea
Dry matter	90.52	90.27	-
Crude protein	19.48	17.94	25.00
Ether extract	1.37	0.33	3.53
Crude fibre	11.05	12.64	8.60
Nitrogen free extract	60.52	60.01	57.00
Total Ash	7.58	9.08	5.87
Sol. Ash	6.45	7.92	-
Insol. Ash	1.13	1.16	-
Calcium	5.46	5.61	1.5
Phosphorus	0.84	0.80	0.53

Table-2 : Screening of Toxic /Incriminating substance in different types of Tea Waste (% on DM basis)

Type/ Varieties	Alkalo id	Glycos ide	Resi n	Tannic acid	Heavy metals			Pesticides
					As	Sb	Hg	
1. Factory Tea Waste	3.1	Nil	Nil	6.30	Nil	Nil	Nil	Nil
2. Factory Tea Waste (Treated with water 1 : 50)	-	-	-	-	-	-	-	-
3. Decaffeinated Tea Waste (without water washed)	Trace	-	-	3.0	-	-	-	-
4. Decaffeinated Tea Waste (Water washed)	Trace	-	-	0.8	-	-	-	-

Table-3 : Amino acid composition of spent tea leaf

Amino acids	g/100g protein
Alanine	4.8
Arginine	4.9
Aspartic acid	8.0
Cystine	1.4
Glutamic acid	9.8
Glycine	4.6
Histidine	2.5
Iso-Leucine	4.2
Leucine	7.4
Lysine	6.3
Methionine	1.4
Phenylalanine	4.3
Proline	4.2
Serine	4.3
Threonine	4.0
Tyrosine	3.3
Valine	5.0

POTENTIALITY: About 20000 MT of Factory Tea Waste (FTW) is available annually in about 844 tea gardens of the state. A major portion of this by-product is going waste at present and only part of it is utilized by Caffeine industries for extraction of caffeine. During the process in the factory the fibre portion of leaves are extracted in the fibre extraction and discarded as Factory Tea Waste which also contains some tea leaves and dust. These waste products are denatured by adding lime to avoid scrupulous business of mixing with good quality tea. It was estimated that Factory Tea Waste contains 6.3% Tannic acid which interferes on protein metabolism. Therefore, a suitable easy and cheap methodology was developed to remove this ant metabolite.

Table-4 : Degree of removal of tannic acid in FTW and effect on CP content

Sample	% DM basis	
	Tannic acid	CP
I. Untreated FTW	6.3	19.48
II Treated FTW		
a) 1 : 10 dil.	4.83	19.45
b) 1 : 15 dil.	3.42	19.43
c) 1 : 20 dil.	2.10	19.02
d) 1 : 30 dil	0.92	18.88
e) 1 : 50	Nil	18.45

Factory Tea Waste soaked in water for overnight in 1:50 dilution was completely free from tannic acid without much effects on their CP contents.

A. FACTORY TEA WASTE (FTW)

Factory Tea Waste which contains tannic acid is one of the limiting factors for utilization of this byproduct in livestock feeding. The palatability of factory tea waste as such is not encouraging, however, in composite rations with more palatable feed ingredients particularly with molasses the voluntary intake can be increased upto 15% in concentrate ration.

I. FTW AS BROILER FEED:

Experimental results showed that Factory Tea Waste at higher level beyond 5% has deleterious effect on the growth and performances of broiler chicks due to high content of tannic acid, however upto 5% level the chicks develop tolerance and can sustain body weight compared to the control without any adverse effect.

II. FTW AS PIG FEED:

1. In pig feeding also same effect was observed. It was therefore, concluded that the adverse effect on the performances at higher level of FTW beyond 5% might be due to increasing intake of tannic acid content present in the diets as tannin has some growth inhibiting property.

2. However, when Factory Tea Waste soaked with water for overnight at the rate of 1:50 dilution the tannic acid content of FTW could be completely removed.

This is the very simple and economic Process for eliminating anti metabolites like tannic acid for utilizing efficiently. Long term feeding trial on growing and finishing Hamp5hire pigs indicated that water treated Factory Tea Waste (1:50 dil.) can be included in pig rations safely upto 15% level without any adverse effect.

8. DECAFFEINATED TEA WASTE (DCTW)

Decaffeinated Tea Waste (DCTW) is the waste available in the Caffeine factories after the extraction of caffeine from Factory Tea Waste (FTW). The interesting feature of this industrial waste is that it contains little quantity of tannic acid (0.4-1.0% on DM basis) if washed with boiled water during the process of extraction and become useful for feeding to livestock without further processing which is very important for formulating economic rations. Decaffeinated Tea Waste received after steam extraction with ethane without washed through boiled water contains about 3.0 % tannic acid. Successive experiments of long term durations on growth and production in different categories of livestock and poultry were conducted with DCTW (water washed) as one of the feed ingredients and the following observations were noted.

I. DCTW AS CATTLE FEED

1. Nutritive value of decaffeinated tea waste in the form of DCP and TDN in adult cattle were found to be 11.6 and 52.4% respectively on dry matter basis, Nitrogen, Calcium and phosphorus were also found to be positive.

2. In growing cross-bred male calves feeding for 224 days decaffeinated tea waste at graded levels in replacement of wheat bran did not show any adverse effect upto a certain level on growth and feed utilization. DM, CP, EE, CF, NFE Digestibility and the balances of nitrogen, calcium and phosphorus were found to be comparable to control feeding containing all conventional feed ingredients with 20% level of feeding of decaffeinated tea waste. The cost of feeding was also low and there was about 11.0% savings at this level. Considering all these factors it was recommended that decaffeinated tea waste in the ration of calves can be used upto 20% replacing wheat bran in concentrate ration with initial adjustment of at least 15 days for adaptation with more palatable feed ingredient.

3. a. A feeding trial for 270 days on lactating crossbred cows was conducted using decaffeinated tea waste at 0, 15, and 20% level in concentrate mixtures with adaptation period of 21 days. The results indicated no significant changes amongst

the treatments in respect of body weight changes, milk production (FCM) and milk composition. The feed utilization, however, is slightly affected upto 20% level incorporation. The data on cost of feeding revealed that feeding decaffeinated tea waste reduced the cost per kg milk and FCM production, Considering all these aspects it was recommended that decaffeinated tea waste can be incorporated upto 15% level in concentrate mixtures with economic advantages.

3.b. Decaffeinated tea waste is a new unconventional industrial waste material containing tannic acid of 0.4-1.0% (Water washed DCTW) as one of the anti metabolites so far identified. There might be some other unknown incriminating substances which may secrete through the mammary glands and thereby may be available in milk which may ultimately affect the health of the consumers. With this point and on the public health point of views an experiment was conducted on the performances of laboratory animals by feeding with milk received from the lactating cows fed with decaffeinated tea waste after feeding for about 210 days. The general performances of the laboratory animals revealed that probably there is no other incriminating substances other than a small quantity of tannic acid to effect on the health of the consumers. Therefore, it was considered that milk of lactating cows fed with decaffeinated tea waste is safe for the consumers.

II. DCTW AS PIG FEED.

1. Decaffeinated tea waste as one of the feed ingredients was fed to growing and finishing Hampshire pigs at graded levels in concentrate mixtures for a period of 140 days. No significant differences were observed in body weight gain, feed consumption, feed conversion, apparent digestibility coefficients of nutrients and utilization of nitrogen and minerals due to inclusion of DCTW in pig rations upto 15% level. The cost per kg weight gain was also found to be lower in groups fed rations containing DCTW. The results, thus, indicated that DCTW can safely be incorporated in growing and finishing pig rations upto 15% with distinct economic advantages.

2. Hematological studies did not show any significant differences amongst the groups except a slight depression in the levels of glucose and blood urea nitrogen (BUN) in treated groups. Toxic substances present in feeds usually affect the cellular components of blood which in turn changes the hematology and serum chemistry particularly the levels. of glucose, BUN, protein and bilirubin. Since no significant alteration in any hematological and serum chemistry in pigs feeding DCTW for a period of 140 days could be revealed it was concluded that decaffeinated tea waste upto 15% level do not produce any toxic effect on pigs (daily gain 415 g).

III. DCTW AS POULTRY FEED

Successive experiments conducted on Broilers with decaffeinated tea waste as unconventional feed ingredient incorporated at different Levels in their diets revealed that decaffeinated tea' waste can be fed to Broiler safely and economically upto a substantial level of 100/0 replacing wheat bran by suitably adjusting the protein contents of the rations.

REFERENCES

1. Anonymous (1980) Asian Livestock, Vol. V (3) : 7.
2. Chutia, S ; Saikia, A; Konwar. B.K. and Baruah. K.K. (1983) Water treated factory tea waste and pig production. Proceedings of the National Symposium on feeding systems for maximising livestock production, HAU, Hissar 49.
3. Konwar. B.K; Ahmed, H.F; Nath, N.C; Das, A. and Saikia, A. (1984) Utilization of decaffeinated tea waste in pigs. The senior author presented the paper in the International Workshop on "Relevance of Crop Residues as animal feeds in Developing Countries". Sponsored by FAO/IFS at Khon Kaen University, Thailand from 29 Nov-2nd Dec.
4. Konwar, B.K; Medhi. A.K; Ahmed. H.F; Saikia, A. and Das. P.C. (1985) Effect of feeding Factory Tea Waste in starter chicks. Indian J. Poult. Sci. Vol. 20 (2): 122
5. Ahmed. H. F; Konwar. B.K; and Nath, N.C. (1985) Studies on the palatability of Factory Tea Waste (*Camellia assamica*) in pigs: A preliminary trial. Vetcol, Vol. (XXII-XXIII).55
6. Phukan, B ; Mosses, L; Konwar, B.K ; Das, D. R; Nath, N.C; Medhi. A. K; Das, A. and Ahmed, H.F. (1985) Studies on the palatability of decaffeinated tea waste (DCTW) in cattle. Vetcol. Vol (XXII-XXIII) : 53
7. Konwar, B.K; Medhi. A.K; Das, A.K; Phukan, B; Nath. N.C; Saikia. A. and Das, P.C. (1986) Studies on the effect of feeding decaffeinated tea waste (DCTW) in Broiler. Indian J. Poult. Sci.; Vol. 21 (1) ; 11
8. Konwar, B. K ; Ahmed. H. F; Nath. N. C. and Das A. (1986) Value of decaffeinated. tea waste as feed ingredient in swine ration. Indian' Vet. J. 63: 1031.
9. Konwar. B. K; Das, A. and Ahmed, H. F. (1987) Effect of feeding decaffeinated tea waste (*Camellia assamica*) on broiler. Poultry Adviser; Vol. (XX) : 43

10. Mosses, L. S; Konwar, B. K ; Das, D. R; Phukan, B. and Ahmed. H. F (1987) Nutritive value of decaffeinated tea waste (DCTW) in cattle. Indian J. Anim. Nutri., 4(1) ; 59
11. Konwar, B. K; (1988) Potentiality and viability of Agro-Industrial by-products in N.E. Region. Paper presented in Annual Workshop, Sponsored by National Institute of Rural Development, Guwahati.
12. Nath, N. C; Konwar, B. K; Lahon. D. K; Ahmed H. F. and Das, A. (1988) Haematology and blood profiles of Hampshire pigs fed decaffeinated tea waste. J. Vet. Physiol. and Allied Sci. Vol. 7 (2) : 35
13. Konwar, B. K ; Ahmed, H. F; Phukan, B; Das, A. and Medhi, A. K. (1990) Effect of feeding decaffeinated tea waste (*camellia assamica*) in cross-bred growing calves. International J. Anim. Sci ; Vol. 5: 53
14. Konwar, B. K ; Ahmed, H. F; Phukan, B. and Gohain A. K.- Effect of feeding decaffeinated tea on the quality and quantity of milk in cross-bred cows. Indian Vet. J. (Accepted).
15. Konwar, B. K; Ahmed, H. F ; Phukan. B. and Medhi. A. K.-Utilization of decaffeinated tea waste in cross-bred calves. Indian Vet.J. (Accepted)
16. Konwar, B. K; Ahmed. H. F; Phukan, B. and Das, P.C. -Studies on the effect of feeding milk of lactating cows fed with different levels of decaffeinated tea waste on the performance of albinomice. Livestock Adviser (Submitted.)
17. Nath, N. C. and Konwar, B. K. -Screening of toxic materials and process of detoxification in Factory tea waste (*Camema assamica*). J. Assam Sci. Soc. (Accepted).
