Indian J. Anim. Prod. Mgmt. Vol. 31(1-2) 84-89 (2015)

HAEMO-BIOCHEMICAL STUDIES IN INDIGENOUS CALVES ON FEEDING AMMONIATED SOYBEAN STRAW

P. A. KAHATE ; S. D. CHAVAN ; S. P. WAGHMARE AND R. R. SHELKE
Department of Animal Husbandry and Dairy Science
Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola

Received : 28.10.2014 ***Accepted : 10.03.2015***

ABSTRACT

The present study was carried out in the Department of Animal Husbandry and Dairying, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola, comprising duration of 90 days. Soybean straw was treated with urea at 1.0, 1.5 and 2.0 per cent level and covered with tarpoline, kept under shed for 28 days for incubation under anaerobic condition to allow for chemical reaction. The selected 20 calves were divided in four groups on the basis of nearness in BW and age, thereby each group comprised of five calves. Further, one calf from each group was allocated randomly to each treatment, namely untreated SBS (T_1), 1.0

% urea treated SBS (T_2), 1.5 % urea treated SBS (T_3) and 2.0 % urea treated SBS (T_4). As a result, each treatment was replicated on five calves. It was found that, rate of increasing serum total lipids it appears that feeding of urea treated SBS was advantageous than that of untreated SBS. Thus in general, it appears that feeding of urea ammoniated SBS to calves had no adverse effect on haemo-biochemical blood profile.

Key words: Untreated soybean straw, Treated soybean straw, Concentrate, Hybrid Napier, Blood parameters.

Haematological parameters are those parameters that are related to the blood and blood forming organs. Blood act as a pathological reflector of the status of exposed animals to toxicant and other conditions. Laboratory tests on the blood are vital tools that help detect any deviation from normal in the animal. The examination of blood gives the opportunity to investigate the presence of several metabolites and other constituents in the body of animals and it plays a vital role in the physiological, nutrition and pathological status of an organism.

Amongst the various non-conventional feeds, poultry litter with almost an equivalent amino acid inventory as that of cereals holds great promise[12]. Since, nutrients absorbed in blood through normal physiological processes affect the compositional blood profile pictures, its analysis for haematological and biochemical parameters reflects an idea regarding the nutritional status of the animal. The animal health status can be judged properly on the basis of different haemo-chemical parameters of the animals. Moreover, this knowledge could help in evaluating judiciously the effect of feeding SBS diet to calves. With this view the data obtained in terms of different parameters of blood profile as influence by the feeding of untreated and treated Soybean straw to calves.

MATERIALS AND METHODS

Twenty descript calves ranging from 60 to 90 kg body weight and 7 to 11 months age was selected from the herd. These calves were randomly divided into four groups, each of five animals on the basis of nearness in their body weight and age. The differences .between the groups with regards to body weight and age were non-significant. The randomly divided groups were subjected to four different feeding treatments as T1, T2, T3 and T4 and nursed under adequate management care with ample access to prescribed nutrients[8].

Soybean straw (SBS) was given urea treatment at the rate of 1.0, 1.5 and 2.0 per cent was fed on W/W basis. The feeding of untreated SBS was designated as control. As per the requirement of urea was dissolved in 40 liters of water and the solution was sprinkled uniformly on 100 kg soybean straw. The treated soybean straw was stored at 40 % moisture level with filled in the thick plastic bags and covered with tarpoline cloth by 28 days for incubation in anaerobic condition. All the samples were properly mixed, sampled and analysed to ascertain their chemical composition.

In all the treatments soybean straw was offered ad lib. Thus four different feeding regimes framed were-

T_1 – Untreated Soybean straw + 2 kg green Hybrid Napier + 400 g sugras (control)

T_2 – 1.0 % urea treated Soybean straw + 2 kg green Hybrid Napier + 300 g sugras

T_3 – 1.5 % urea treated Soybean straw + 2 kg green Hybrid Napier + 200 g sugras

T_4 – 2.0 % urea treated Soybean straw + 2 kg green Hybrid Napier + 100 g sugras

(**Sugras** is a concentrate trade name prepared by Maharashtra Agro Industries Development Corporation, Yevatmal, M.S.)

All the calves had free access to clean drinking water. The feeding lasted over the period of 90 days. All the animals from each group were subjected to blood collection. Collection of blood was carried out early in the morning before feeding and watering of animals. The blood samples were collected from the jugular vein with sterile hypodermic needle (No. 18) in two sterile vials, one for serum for biochemical and anti coagulant and other containing for hematological studies. Hemoglobin was estimated by Sahil's acid hematin method[10]. The biochemical profile viz serum glucose level, total protein and total lipids were estimated by diagnostic kits on serum auto analyzer. All haemobiochemical parameter were carried out at '0' (before feeding) and on 45 days and 90 days post feeding. The data obtained was analyzed statistically by using standard statistical methods[13].

RESULTS AND DISCUSSION

The quality of feeds in terms of its physical and chemical composition has a direct impact on supply of nutrients through the ration. In view of this the proximate principles of untreated and treated SBS, Hybrid Napier and concentrate mixture are presented in the Table 1.

Table 1: Average proximate composition of different feed stuffs (% DM basis)

Particulars	DM	CP	CF	EE	NFE	Ash
Untreated SBS	90.53	8.82	39.31	1.50	38.39	11.98
1.0% urea treated SBS	91.05	10.32	38.15	1.55	37.94	12.04
1.5% urea treated SBS	91.55	11.42	37.80	1.67	36.87	12.24
2.0% urea treated SBS	91.69	12.96	36.71	1.70	36.14	12.49
Hybrid Napier (Yeshwant)	23.10	9.72	30.90	2.52	45.56	11.30
Concentrate mixture (Calf ration, Grade I)	90.84	22.18	10.80	2.60	61.65	3.77

Thus, it appeared from Table 1 that, the CP content of USBS was substantially higher than that of the conventional straws. The CP and CF contents in SBS were influenced significantly by the treatment of urea at different levels. Significantly highest CP (12.96 %) was noticed as a result of 2.0 % urea treatment while, lowest CP content of 8.82 % was observed in USBS and the CP content of 10.32 and 11.42 % was obtained with 1.0 and 1.5 % urea treatments, indicating there was increase in the CP content of straw with increase the level of urea treatment. On the other hand CF content showed significant decrease with the increase level of urea treatment, being 39.31, 37.80, 36.71 and 30.90 % on DM basis in USBS, 1.0, 1.5 and 2.0 per cent urea treated SBS, respectively. These findings corroborate the observations of earlier workers1 of increased in CP content of Berseem straw by 1.72 folds and decreased in CF content by 4 to 5 units as a result of 4.0 per cent urea treatment. Earlier workers[7] observed an increase of 1.53 folds in CP content and decrease in CF content by 7 to 8 units due to 4 per cent ammoniation of lentil straw. These observations are supportive to present trend on treatment of SBS leguminous straw with urea, though their value on increase of CP are on higher side.

Metabolic blood profile

The animal health status can be judged properly on the basis of different parameters of metabolic blood profile of the animals. Moreover, this knowledge could help in evaluating judiciously the effect of feeding SBS diet to calves. With this view the data obtained in terms of Haemoglobin, serum total glucose, serum total protein and serum total lipids as influence by the feeding of untreated and treated SBS to calves are tabulated in Table 2. The overall mean haemoglobin concentration was low before initiation of treatment.

The haemoglobin concentration showed increasing trend over the period of 90 days as compared to initial level in group T2, T3 and T4 (Table 2). The levels were increased from 10.54 to 10.76, 10.50 to 10.94 and 10.36 to 10.94 mg/dl/calf in T2, T3 and T4 calves, respectively at the end of the 90 days period, while the haemoglobin content in calves fed with untreated SBS diet (T1) did not show any improvement. This trend therefore indicates that feeding of urea ammoniated diet improved the haemoglobin concentration. The Hb concentration noticed in T1 calves was significantly lower over the rest of the groups. Despite of the above trend, the haemoglobin content of all the calves were found within the normal prescribed range of 8-12 g/dl. The haemoglobin concentration reported by few workers in male crossbred calves , crossbred calves and Gaolao calves ranged between 11.42 to 14.27 g/dl, which appears to be higher than that of the present value[2,5,6 & 11].

Table 2: Average Haemo-biochemical profile by feeding untreated and treated soybean straw to calves

Sr. No.	Parameter	Treatment	Initial	45 days	90 days	Pooled mean treatment
1	Haemoglobin (mg/dl)	T_1	10.54	10.46	10.34	10.44 a
		T_2	10.54	10.62	10.76	10.64 b
		T_3	10.50	10.88	10.94	10.77 c
		T_4	10.36	10.74	10.94	10.68 bc
		Polled mean period	**10.48 a**	**10.67 b**	**10.74 c**	
2	Blood glucose (mg/dl)	T_1	90.65	86.71	85.28	87.54 a
		T_2	99.02	103.71	105.01	102.58 b
		T_3	86.76	96.33	100.99	94.70 c
		T_4	93.37	103.66	110.54	102.51 b
		Polled mean period	**92.45 a**	**97.60 b**	**100.45 b**	
3	Total protein (g/dl)	T_1	4.20	4.07	3.96	4.078 a
		T_2	4.19	4.50	4.97	4.556 b
		T_3	4.33	4.62	5.12	4.710 c
		T_4	4.22	4.49	5.19	4.633 bc
		Polled mean period	**4.236 a**	**4.423 b**	**4.824 c**	
4	Total lipid (mg/dl)	T_1	201.08	220.96	229.12	217.05
		T_2	205.08	210.38	219.42	211.63
		T_3	200.88	207.12	218.64	208.88
		T_4	203.02	210.32	213.66	209.00
		Polled mean period	**202.52 a**	**212.20 a**	**220.21 b**	

Means with similar superscript do not differ significantly

A reference to Table 2 revealed that, the average blood glucose level in calves before the start of the trial was 92.45, mg/dl. However, the feeding treatments and experimental period affected significantly blood glucose level. The levels increased significantly from 92.45 to 97.60 mg/dl at 45 days interval and their after remained more or less similar till the end of trial as the differences were non significant.

Moreover, irrespective of experimental period the average blood glucose levels were significantly higher in T_2 and T_4 calves as compared to T_1 and T_3 calves. The average blood glucose content in calves was 87.54, 102.58, 94.70 and 102.51 mg/dl in T_1, T_2, T_3 and T_4 calves, respectively. Moreover, the interaction between treatments X period affected significantly blood glucose levels in all the calves. However, in T_1

calves there was reduction in blood glucose level from 90.65 to 85.28 over a period of 90 days, while in T_2, T_3 and T_4 calves there was increase from 99.02 to 105.01, 86.76 to 100.99, 93.37 to 110.54 mg/dl, respectively. Earlier researchers reported reduction in blood glucose levels in buffalo heifers as a result of feeding untreated SBS[3,4,14]. The observations support the present trend. On other hand, feeding of alkali treated SBS to buffalo heifers increased the blood glucose levels supporting present results on feeding urea treated SBS to calves[3, 4].

The average serum total protein levels were 4.24 g/dl before the start of trial which seems to be marginally lower than the normal prescribed range of 5-8 g/dl in cattle. The analysis of variance indicated that the serum total protein level found significant between different groups. The critical differences and mean comparison, however, demonstrated that the serum total protein level in T1 group found significantly declined as compare to urea treated SBS diet. The protein levels raised from 4.19 to 4.97, 4.33 to 5.12 and 4.22 to 5.19 g/dl in T_2, T_3 and T_4 calves, respectively after 90 days. This means feeding of urea treated diet to calves was beneficial to bring the serum protein levels within normal range (5 – 8 g/dl) over feeding of untreated SBS diet. Probably, the breakdown of cell wall structure by urea treatment and thereby better utilization of straw might be the reason to increase the serum total protein levels.

It is seen from Table 2 that significantly an increase of 8.73 % over the initial value of 202.52 mg/dl was observed irrespective of feeding treatments in calves after 90 days period. The average serum total lipid levels were 217.05, 211.63, 208.88 and 209.00 mg/dl under T_1, T_2, T_3 and T_4 calves, respectively.

CONCLUSION

On this background, on the basis of rate of increasing serum total lipids it appears that feeding of urea treated SBS was advantageous than that of untreated SBS. Thus in general, it appears that feeding of urea ammoniated SBS to calves had no adverse effect on haemo-biochemical blood profile.

REFERENCES

1. Dahiya, S. S.; Punia B. S. and Chauhan T. R. 1998. Voluntary feed intake and nutrient utilization in buffalo bullocks fed untreated and urea (ammonia) treated Berseem and Oat straws. Indian J. Anim. Nutr. 15(2) : 93-96.
2. Deshmukh, N. S. 2007 Effect of cotton straw based complete feed on performance of crossbred calves. Ph.D. (Agri.) Thesis (Unpub.), Dr. PDKV, Akola
3. Gawai, S. M. 1995 Chemical methods for treating soybean (Glycine max) straw in relation to performance of buffalo heifers. M. Sc. (Agri.) Thesis (Unpub.), Dr. PDKV, Akola.
4. Janorkar, P. H. 1995 Treated soybean (Glycine max.) straw feeding in relation to performance of buffalo heifers. M. Sc. (Agri) Thesis (Unpub.) Dr. P.D.K.V., Akola.
5. Kapale, P. M.; Jagtap D. G., Badukale D. M. and Sahatpure S. K. 2008a Haematological studies of Gaolao heifers. Veterinary World 1(1):16.
6. Kapale, P. M.; Jagtap D. G., Badukale D. M. and Sahatpure S.K. 2008b Haematological studies of Gaolao calves. Veterinary World 1(1):17.
7. Mudgal, V.; Mehta M. K. and Rane A. S. 2006 Feeding value of urea-ammoniated Lentil straw (*Lens Culinaris*) in the diet of growing Barbari bucks. Anim. Nutr. And feed technology 6:01-07.
8. NRC, National Research Council 1988 Nutrient requirement of Dairy Cattle. 6th ed., National Academy Press, Washington, D.C.

9. Rule, D. C.; Woollett L. A., Walsh L. S. and Beitz D. C. 1987. lipid metabolism in adipose tissue and lipid concentration in plasma of steers fed extruded soybean. Nutr. Abst. and Rev. Series (B) 57(1) : 26.

10. Schalm, D. W.; Jain N. C. and Carroll E. W. 1967 Veterinary Haematology, 3rd Ed Lea and Febiger and Philadaphia.

11. Singh, K. K.; Chhabra Aruna and Agrawal R. K. 1997 Influence of dietary cobalt on blood constituents and metabolites in crossbred calves. Indian J. Anim. Nutr. 13(3) : 196-198.

12. Singh, P. K.; Singh V. P. and Pandita N. N. 2002 Haematological observation of crossbred calves fed dried poultry litter and dried temple waste. Indian J. Anim. Nutr. 36(2) : 94-97.

13. Snedecor, G. W. and Cochran, W. G. 1994 Statistical Methods. 8th edition Oxford and IBH Publishing Co. New Delhi.

14. Talokar, R. M. 1993. Studies on performance of buffalo heifers on the soybean (Glycine max.) straw based diet. M. Sc. (Agri) Thesis (Unpub.) Dr. P.D.K.V., Akola.

★ ★ ★