

DRIED SPLEEN MEAL AS A BIOSTIMULATOR IN KID RATIONS

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Growing concern over the use of antibiotics and other growth stimulants in animal feed industry as well as the need for a safe food supply provided motivation to investigate and develop new non antibiotic or natural and safe feed additive. Exploratory feeding trial in rabbits and rats by incorporating dried spleen at the rate of 0.1 per cent in the rations has been reported to augment nutrient utilisation (James and Gangadevi, 1991) thereby the feed nutrients could be saved even upto 25 per cent in the rations. Inspired by this, an experiment was planned and executed in growing Malabari kids to elucidate the possibility of incorporating dried spleen in the ration.

Materials and Methods

Twenty four female Malabari kids with an average body weight of 8.5 kg were distributed randomly and as uniformly as possible into four groups of six animals each, with regard to age and body weight, and placed on four rations. Out of the 24 kids, 12 kids were maintained on concentrate mixture containing 16 per cent of crude protein and the remaining 12 were maintained on concentrate mixture containing 12 per cent of crude protein, the rations being isocaloric. In each protein level 6 animals were on ration containing 0.1 per cent spleen meal while the other six were on ration without spleen meal. Jack leaves (*Artocarpus heterophyllus*) offered *ad libitum* formed the sole source of roughage to the animals. The animals were

maintained on their respective feeding regime for a period of 120 days. For the preparation of spleen meal, buffalo spleen collected from slaughter house was properly chopped and dried below 100° C and powdered.

The animals were fed individually, their requirements being periodically determined on the basis of their body weight.

Records of daily feed intake and weekly body weights were maintained throughout the experimental period. Blood samples were collected towards the end of the trial for haematological studies.

The feed samples were subjected to proximate analysis as per standard procedures (AOAC, 1990). Calcium and magnesium content of feed samples were estimated by using atomic absorption spectrophotometer (Perkin Elmer-model 2380) and phosphorus by colorimetry (Ward and Johnston, 1962). Haemoglobin content of the samples were determined by cyanmet haemoglobin method (Benjamin, 1974), plasma protein values by Biuret method (Gornall *et al.*, 1949), plasma calcium and magnesium by atomic absorption spectrophotometer (Perkin Elmer-model 2380) and plasma inorganic phosphorus by colorimetry. The experimental data gathered during the course of the present investigation were analysed statistically by methods described by Snedecor and Cochran (1967).

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Results and Discussion

Ingredient and percentage chemical composition of the concentrate mixture and jack leaves are presented in Table 1 and 2. In Table 3, data on average body weight, drymatter intake, feed efficiency, protein efficiency and data on economics on incorporation of dried spleen in the ratio are given.

Table 1 Feed ingredients

Ingredients	Ration A 16% C.P.	Ration C 12% C.P.
Yellow maize	33	45
Gingelly oil cake	16	5
Wheat bran	34	42
Bengal gram	14	5
Mineral mixture	2	2
Salt	1	1
Vitablend A B ₂ D ₃	25 g/100 kg	25 g/100 kg

Growth

It can be seen from the data presented in Table 3 that the animals maintained on 16 per cent crude protein diet with or without 0.1 per cent of dried spleen and on rations containing 12 per cent crude protein plus 0.1 per cent dried spleen and ration C (Group IV) containing 12 per cent crude protein without incorporation of dried spleen, exhibited a characteristic increase in body weight gain during the experimental period of 120 days and the effect is more appreciated in animals maintained on rations D, B, A and C in that descending order. Statistical analysis of weight gain reveals that a significant increase ($P < 0.01$) in growth response was observed in animals maintained on rations A, B and D, while the growth response exhibited by the animals maintained on ration C was not well pronounced

when compared to that of animals maintained on rations A, B and D, indicating that, incorporation of dried spleen at the rate of 0.1 per cent in the ration influenced the growth response of animals maintained on respective rations (rations B and D) but the growth response was more pronounced in animals maintained on spleen incorporated rations containing 12 per cent of crude protein (ration D).

The growth rate obtained during the present study is comparable to that of varying growth rates and daily gain in growing kids which have been reported by several authors (James, 1978b; Mercy *et al.*, 1981).

Better growth rate obtained on incorporation of spleen preparation reported by Mahapatro and Roy (1970) in Hariana Calves, Makarov *et al.* (1970) in Red Steppe Cattle, Shukla and Mahapatro (1975) in rats, and James and Gangadevi (1991) in rabbits and rats also concur with the results of the present study.

Dry matter consumption

Data on feed intake presented in Table 3, reveal no significant difference between the groups. The average daily drymatter intake (g) recorded for the kids maintained under groups I, II, III and IV being 574.5, 562.9, 564.0 and 572.3 g respectively indicating that incorporation of dried spleen had not influenced the dry matter consumption, irrespective of plane of nutrition.

Shukla and Mahapatro (1984) from their investigation on effect of biostimulator feeding in goats recorded a high intake in biostimulator fed kids at low plane of nutrition and indicated an increased nutrient requirement to compensate the higher growth rate in Barbari and Black Bengal kids (Shukla and Mahapatro, 1982). The observations made during the present study is at variance with the results reported by Shukla *et al.*

(1982 and 1984), probably because of the low plane of nutrition achieved by restricting 25 per cent of the concentrate mixture of the ration, while in the present investigation, 25 per cent of crude protein was restricted.

Table 2 Chemical composition of the concentrate mixture and jackleaves

	Concentrate (16% CP)	Concentrate (12% CP)	Jack leaves
Drymatter	90.63	91.43	57.47
Crude protein	16.35	12.24	15.09
Ether extract	5.21	3.55	4.03
Crude fibre	3.56	5.97	18.61
Total ash	7.58	6.52	11.25
Nitrogen free extract	67.3	71.72	51.02
Calcium	0.768	0.751	1.586
Phosphorus	0.416	0.409	0.410
Magnesium	0.367	0.302	3.488
Cost/Quintal (Rs)	538.00	419.00	25.00

Feed efficiency

The feed efficiency presented in Table 3 for animals maintained on the respective ration show that the efficiency of feed utilisation is decreased in the descending order in animals maintained on ration D (9.13), B (9.31), A (10.07) and C (14.01). The difference between the groups II and III, I and III and IV and III was significant ($P < 0.01$), while no significant difference could be detected between the groups II and I, II and IV and I and IV. The data suggests that incorporation of dried spleen in the ration significantly ($P < 0.01$) enhances the efficiency of feed nutrient utilisation, particularly in animals maintained on ration D containing low level of crude protein. It was further noticed that the feed conversion efficiency was better in kids, maintained on high level of crude protein (ration A) compared to kids maintained on low level of

protein (ration C). Better feed conversion efficiency and nutrient utilisation observed in the spleen incorporated rations concurs with the results of James and Gangadevi (1991) who reported a better feed conversion efficiency in rabbits and rats maintained on ration containing dried spleen as growth stimulator.

Protein efficiency ratio

On evaluation of the response obtained between animals maintained on rations B and D, better response in efficiency of protein utilisation was observed with ration containing low level of protein (ration D) compared to that containing high level of protein (ration B). The results of the study indicated that efficiency of protein utilisation is more in animals maintained on spleen incorporated rations (rations B and D), the effect being more with ration containing low level of protein. The results of the present study is in agreement with the findings of James and Gangadevi (1991).

Cost efficiency

Comparative data on feed efficiency and cost per kg gain due to the four rations for a period of 120 days (Table 2) was found to be Rs.26.14, 32.58, 35.08 and 38.63 for the groups IV, II, I and III respectively. On critical evaluation of the data, it was seen that, while a cost of production per kg gain of Rs.32.58 and 26.14 was registered for animals maintained on spleen incorporated groups (rations B and D, Groups II and IV), the same for the animals maintained on the corresponding control groups (rations A and C, Groups I and III) was Rs.35.08 and 38.63 respectively indicating that, the cost efficiency is comparatively better in spleen incorporated groups, especially in animals maintained on low level of protein (ration D).

Mahapatro and Roy (1970) observed that, injections of biostimulator attained identical weight gain in Hariana calves maintained on control rations and 25 per cent less than the control ration. James and Gangadevi (1991) reported that rabbits and rats maintained on diets containing 12 per cent and 15 per cent crude protein respectively with dried spleen as growth stimulator resulted in similar weight gains as those maintained on diets containing 16 per cent and 20 per cent crude protein without growth stimulator. The result of the present study is in agreement with Mahapatro and Roy (1970) and James and Gangadevi (1991).

The blood values with respect to RBC, WBC, Haemoglobin and plasma protein concentration were within the normal range, irrespective of the level of protein or growth stimulator incorporated in the ration. Plasma calcium, inorganic phosphorus and magnesium concentrations were within normal range. The values recorded in the present study were found to agree with those reported by James (1978) and James and Mukundan (1978).

Haematological parameters

Table 3 Drymatter intake, weight gain, feed efficiency, protein efficiency and cost efficiency of the kids

Treatments	Ration A	Ration B	Ration C	Ration D
Average daily drymatter consumption (g)	574.5±36.81	562.9±20.28	564.0±25.21	572.3±30.40
Average cumulative gain in 120 days (kg)	6.88±0.35	7.40±0.51	5.00±0.42	7.52±0.37
Average daily gain (g)	57.36±2.92	61.67±4.23	41.67±3.53	62.64±3.11
Average cumulative feed efficiency	10.07±0.61	9.31±0.62	14.01±1.25	9.13±0.15
Average cumulative protein efficiency	0.64±0.04	0.70±0.05	0.55±0.05	0.81±0.02
Total feed consumption (kg)				
a) Concentrate	42.37	42.40	42.77	43.87
b) Roughage	53.60	52.01	55.72	51.03
Total feed cost (Rs)	241.35	241.09	193.15	196.57
Cost per unit gain (Rs)	35.08±2.02	32.58±2.10	38.63±3.31	26.14±0.99

Summary

The effect of dried spleen as a growth promotant was studied in twenty four female Malabari kids of similar age and body weight maintained at two levels of crude protein (16 and 12 per cent). Six animals from each group were fed with spleen supplemented diets and the others were kept as the controls. The results indicated that incorporation of dried spleen in the ration enhanced the growth performance of animals,

especially in animals maintained on low level of protein. The efficiency of feed and protein utilisation also exhibited the same trend, and the cost efficiency was better. It can be concluded that incorporation of dried spleen in the ration of goats at the rate of 0.1 per cent on dry matter basis play a positive role in augmenting better weight gain and that dried spleen can be utilised as a harmless natural growth promotant in animal production with economic benefit.

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References

- AOAC (1990). *Official Methods of Analysis*. Association of Agricultural Chemists, Washington, D.C.
- Benjamin, M.M. (1974). *Outline of Veterinary Clinical Pathology*. 2nd Ed. The Iowa State University Press, USA, pp.56.
- Gornall, A.G., Bardawil, C.J. and David, M.M. (1949). Determination of serum protein by the biuret reaction. *J. Biol. Chem.* **177**: 951-966.
- James, C.S. (1978). Comparative evaluation of conventional and unconventional feed for evolving cheap and economic ration for goats. *Kerala J. Vet. Sci.* **9**(2): 206-214.
- James, C.S. and Gangadevi, P. (1991). Use of dried spleen as growth stimulator in laboratory animals. *J. Vet. Anim. Sci.* **22**(1): 145-148.
- James, C.S. and Mukundan, G. (1978). Suitability of jack tree leaves (*Artocarpus*) as a fodder for stall-fed goats. *Indian Vet. J.* **55**: 716-721.
- Mahapatro, B.B. and Roy, C.R. (1970). Study on growth rate and on digestibility of nutrients in Haryana calves. *Indian Vet. J.* **47**: 867-872.
- Makarov, M.A., Tolokonnikov, Jn. A. Ivanova, E.D., Zarkov, A.D. and Vasilisin, V.V. (1970). The effect of an agar tissue preparation on the productivity of young Red Steppe Cattle. *Anim. Breed. Abstr.* **39**(1497): 240.
- Marcy, A.D., Sivaraman, E., Kunjikutty, N. and Annamma Kurian (1981). Studies on the growth rate, feed efficiency and digestibility coefficients of nutrients in Alpine-Malabari Crossbred Kids. *Kerala J. Vet. Sci.* **12**(1): 164-170.
- Shukla, D.C. and Mahapatro, B.B. (1975). Effect of feeding biostimulator on the growth and body composition of rats. *Indian J. Anim. Prod.* **6**(1,2): 59-62.
- Shukla, D.C. and Mahapatro, B.B. (1982). Use of biostimulator in animal production. 1) effects on growth of Barbari and Black Bengal kids. Cited in *Indian J. Anim. Sci.* **54**(12): 1146-1150.
- Shukla, D.C. and Mahapatro, B.B. (1984). Effect of biostimulator feeding on digestibility and utilisation of nutrients in goat. *Indian J. Anim. Sci.* **54**(12): 1146-1150.
- Shukla, D.C. and Mahapatro, B.B. (1990). Use of biostimulators for animal production, effect on blood constituents in goat. *Indian J. Anim. Health.* **29**(1): 43-49.
- Snedecor, G.W. and Cochran, W.G. (1967). *Statistical methods*. The IOWA State University Press, America, USA. 6th Ed.
- Ward and Johnston (1962) cited by Gupta, P.C. Khatta, V.K. and Mandel, A.B. (1986). *Analytical techniques in Animal Nutrition* Directorate of Publications, Haryana Agrl. Uty.