

COMPARISON OF DIGESTIBILITY OF DIFFERENT NUTRIENTS IN NILI-RAVI BUFFALO, SAHIWAL AND CROSSBRED CATTLE

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The experiment was conducted to determine the digestibility of various nutrients in buffalo, Sahiwal, and crossbred (Holstein Friesian x Sahiwal) calves at College of Veterinary Sciences Lahore (Pakistan). The digestion trial was conducted on 15 buffalo, 15 Sahiwal, and 15 crossbred calves. Yearling male calves of about equal age, weight, and size were selected for the experiment. Experimental ration was computed to meet their maintenance requirement. Daily faeces voided were collected and weighed for 24 hours time. The practice was carried out for 5 consecutive days after 10 days of transitional period. After proper mixing a representative sample of faeces was collected. The dried samples of faeces and ration were chemically analysed for proximate composition. The dry matter and other nutrient digestibility was greater in buffalo than in other two species. However, the digestibility of various crude protein was non significant among species, whereas, the digestibility of crude fibre, fat, mineral matter and total digestible nutrients was significantly greater in buffalo than in other species. It has been revealed that buffalo has more retention time of ingesta, therefore, digestion of nutrients was higher than in cattle.

digestibility; nutrients; buffalo; cattle; crossbreds

INTRODUCTION

In most countries of the tropics and particularly in developing countries, the most difficult constraint to productivity that need to be overcome in both the short and long term is that of shortage of feed and knowledge about digestibility of different nutrients in various species of animals. In the traditional south Asian grazing system of animal production, expansion of cropping into marginal areas and onto traditional grazing lands associated with

rapid increase in human population and below average rainfall, it has led to increases in stocking pressure and degradation of rangelands. In more intensive agricultural system reduction in farm size has also contributed to reduce availability of livestock feed. The deficiencies in feed quantity are more difficult to overcome than any deficiencies in quality of standing dry feed (Vercoe, Frisch, 1993).

One way in which chronic shortage of feed could be combatted is to use animals with a low maintenance requirement (Malik, 1977). The best way is the efficient utilization and digestion of various feedstuffs available in those areas. In order to develop practical feeding system, nutrient requirements and feed formulation the digestibility of various nutrients are essential tool to achieve the goal (Bhatia et al., 1979). Much work has been done on digestibility trials of cattle in developed world, but the buffalo which contributes 3 time more milk fat than that of cow has been still neglected.

The present study was designed to elaborate the digestibility of various nutrients in buffalo of Pakistan with comparison to crossbred and Sahiwal cattle, which may help in estimation of proper feeding standard of these species.

MATERIAL AND METHODS

The trial was conducted on 15 Sahiwal, 15 crossbred (Sahiwal x Holstein Friesian) and 15 buffalo calves at Animal Nutrition Centre Rakh Dera Chahl, College of Veterinary Sciences Lahore (Pakistan). The animals of about equal weight, age and size were selected. Before the start of experiment proper deworming of the animals was done. An experimental ration was computed for all the three group of animals to meet their maintenance requirement. Composition of ration is shown in Tab. I, and its chemical composition in Tab. II. Total daily feed allowance was given in two equal proportions according to their nutritional requirements. The animals were initially fed on the experimental ration for transitional period of 10 days to accustom them to the experimental ration. All the animals were properly managed and kept under strict observation during the conduct of experiment. Water was supplied *ad-libitum* to each animal throughout the experimental period.

The faeces collected manually on 24 hour basis separately for each animal in properly covered steel cans and were weighed daily. After thorough mixing composite samples were drawn in duplicate and dried to constant weight in hot air oven at 105 °C to determine the dry matter content. The dried and finally ground samples were preserved in labelled bottles for proximate analysis. Digestion coefficients of nutrients were worked out according to formula given as:

I. Composition of experimental ration

Feedstuffs	Quantity (kg)	DM (kg)	DP (kg)	TDN (kg)
Berseem green 1st cut	13.76	2.04	0.30	1.36
Cotton seed cake	2.30	2.14	0.36	1.57
Wheat straw	1.36	1.23	-	0.60

II. Chemical composition of experimental ration

Components	Percentage
Original dry matter (ODM)	28.84
* Crude protein (CP)	15.66
* Ether extract (EE)	5.85
* Crude fibre (CF)	28.03
* Mineral matter (MM)	11.08
* Nitrogen free extract (NFE)	39.38

* = on dry matter basis

Digestion coefficients of nutrients =

$$= \frac{\text{nutrients in feedstuffs} - \text{nutrients in residues after digestion}}{\text{nutrients in feedstuffs before digestion}} \cdot 100$$

Proximate analysis of feed and faecal samples were analysed for crude protein (N x 6.25), ether extract, crude fibre and mineral matter according to AOAC (1984). The nitrogen contents were estimated by Kjeldahl method. Ether extract was estimated by Soxhlet's apparatus using ether as a solvent. Crude fibre was determined by acid and alkali digestion. The mineral matter was determined in muffled furnace at 600 °C.

The complete data thus collected from experiment were statistically analysed by the methods of one and two way of analysis of variance. The differences of means were tested by Least significant difference test (Steel, Torrie, 1981).

RESULTS AND DISCUSSION

The dry matter digestibility in buffalo, Sahiwal and crossbred animals are given in Tab. III. A higher value of (65.58 ± 1.30%) of dry matter digestibility was obtained in buffalo calves as compared to Sahiwal (64.16 ± 1.30%).

III. Dry matter digestibility coefficients in buffalo, Sahiwal and crossbred calves

Time	Buffalo	Sahiwal	Crossbreds
1	64.26	62.31	61.87
2	68.11	66.75	66.74
3	69.07	65.92	67.57
4	63.31	62.85	63.68
5	63.18	67.01	60.95
Mean	65.58 ± 1.30	64.96 ± 0.99	64.16 ± 1.30

IV. Analysis of variance of the data of dry matter digestibility in buffalo, Sahiwal and crossbred calves

Source of variation	Degree of freedom	Sum of squares	Mean squares	F-ratio
Species	2	5.096	2.54	0.318 NS
Time	4	21.14	5.285	0.661 NS
Error	8	63.958	7.994	-
Total	14	90.194	-	-

NS = non significant

However, there was non significant ($P > 0.05$) statistical difference in dry matter digestibility among species (Tab. IV). The findings were in agreement with the results of Ponnappa et al. (1971), Bhatia et al. (1979) and Malik (1977). The results were not in agreement with the findings of Mallikarjunappa and Mudgal (1984) who reported in 4-month-old buffalo calves that there was no difference in the intake and digestibility of dry matter. This was probably due to incomplete development of rumen of buffalo calves.

Crude protein digestibility in different species of experimental animals is presented in Tab. V. The minimum value (69.46 ± 1.26) of digestion coefficient of crude protein was recorded in crossbred and maximum value (71.5 ± 1.32) in buffalo calves. Statistical analysis is shown in Tab. VI. The difference was statistically non significant ($P > 0.05$) among species. Ganooski and Ivanov (1982) also recommended low fibre for the best digestibility of crude protein in cow than in buffalo. The results are in favour of the conclusions made by Pannu and Kaushal (1985).

Fat digestibility in buffalo, Sahiwal and crossbred calves is given in Tab. VII. A maximum value (81.46 ± 2.25) of ether extract digestibility was

V. Crude protein digestibility coefficients in buffalo, Sahiwal and crossbred calves

Time	Buffalo	Sahiwal	Crossbreds
1	71.18	67.67	67.58
2	75.12	73.63	71.32
3	75.12	72.10	73.47
4	68.23	68.20	68.23
5	69.13	72.25	66.73
Mean	71.50 ± 1.32	70.57 ± 1.08	69.46 ± 1.26

VI. Analysis of variance of the data of crude protein digestibility in buffalo, Sahiwal and crossbred calves

Source of variation	Degree of freedom	Sum of squares	Mean squares	F-ratio
Species	2	10.37	5.18	1.96 NS
Time	4	69.33	17.33	6.56 **
Error	8	21.13	2.64	-
Total	14	100.83	-	-

NS = non significant

** = highly significant

VII. Fat digestibility coefficients in buffalo, Sahiwal and crossbred calves

Time	Buffalo	Sahiwal	Crossbreds
1	81.77	77.00	76.84
2	85.53	83.02	83.44
3	83.19	81.69	79.76
4	79.51	77.50	74.83
5	72.33	76.75	75.83
Mean	81.46 ± 2.25	79.19 ± 1.31	78.14 ± 1.58

observed in buffalo calves. There were highly statistical significant difference ($P < 0.01$) among species of animals (Tab. VIII). Similar findings were reported by Tsankova et al. (1985) but these findings disagree with the results of Pannu and Kaushal (1985), who reported lower digestibility

VIII. Analysis of variance of the data of fat digestibility in buffalo, Sahiwal and crossbred calves

Source of variation	Degree of freedom	Sum of squares	Mean squares	F-ratio
Species	2	28.90	14.45	13.63 **
Time	4	115.25	28.81	27.17 **
Error	8	8.49	1.06	—
Total	14	152.64	—	—

** = highly significant

IX. Crude fibre digestibility coefficients in buffalo, Sahiwal and crossbred calves

Time	Buffalo	Sahiwal	Crossbreds
1	62.71	47.72	54.73
2	61.60	50.54	58.58
3	60.31	51.21	59.51
4	56.30	48.37	54.42
5	55.26	46.18	57.52
Mean	59.23 ± 1.47	48.80 ± 0.92	56.95 ± 1.02

X. Analysis of variance of the data of crude fibre digestibility in buffalo, Sahiwal and crossbred calves

Source of variation	Degree of freedom	Sum of squares	Mean squares	F-ratio
Species	2	300.71	150.35	35.04 **
Time	4	46.82	11.70	2.72 NS
Error	8	34.32	4.29	—
Total	14	381.85	—	—

NS = non significant

** = highly significant

of ether extract in cattle than in buffalo. This may be because of only roughage diet.

The digestibility of crude fibre in various species is given in Tab. IX. Buffalo digested more crude fibre (59.23 ± 1.47) than Sahiwal and crossbreds, whereas crossbreds were better than Sahiwal in crude fibre digestibil-

XI. Mineral matter digestibility coefficients in buffalo, Sahiwal and crossbred calves

Time	Buffalo	Sahiwal	Crossbreds
1	37.65	34.87	29.32
2	41.48	43.03	40.74
3	41.99	44.22	38.18
4	38.67	35.95	33.15
5	32.96	39.10	27.35
Mean	38.55 ± 1.62	35.83 ± 1.85	33.75 ± 2.54

XII. Analysis of variance of the data of mineral matter digestibility in buffalo, Sahiwal and crossbred calves

Source of variation	Degree of freedom	Sum of squares	Mean squares	F-ratio
Species	2	93.46	46.73	7.82 **
Time	4	202.37	50.59	8.47 **
Error	8	47.82	5.974	—
Total	14	343.65	—	—

** = highly significant

XIII. Total digestible nutrients in buffalo, Sahiwal and crossbred calves

Time	Buffalo	Sahiwal	Crossbreds
1	64.89	62.52	61.82
2	67.33	66.52	65.12
3	67.95	66.18	65.40
4	64.12	63.11	61.99
5	63.24	66.71	61.19
Mean	65.50 ± 0.914	65.00 ± 0.908	63.10 ± 0.891

ity. There was significant difference ($P < 0.05$) among species (Tab. X). The findings were supported by Gupta, Tripathi, (1982) and Pannu, Kaushal (1985). The results differ from the observation of Bhatia et al. (1979). This may be because of difference in buffalo breeds. Mineral matter digestibility in buffalo, Sahiwal and crossbred animals is shown in Tab. XI. Minimum digestibility of mineral matter (33.75 ± 1.62%) was ob-

XIV. Analysis of variance of the data of total digestible nutrients in buffalo, Sahiwal and crossbred calves

Source of variation	Degree of freedom	Sum of squares	Mean squares	F-ratio
Species	2	15.74	7.87	7.67 **
Time	4	36.18	9.04	8.81 **
Error	8	8.2	1.025	–
Total	14	60.12	–	–

** = highly significant

served in crossbred while maximum (38.55 ± 1.62) in buffalo calves. Statistical analysis showed significant difference ($P < 0.05$) in mineral matter digestibility between different species of animals (Tab. XII). In total digestible nutrients value buffalo showed the same trend of high digestibility like cattle (Tab. XIII). Maximum values were found in crossbreds ($63.10 \pm 0.89\%$). The data was significantly different ($P < 0.05$) among species (Tab. XIV). The findings were in agreement to B a k h s h i et al. (1981).

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JAFFAR, G. H. – MALIK, M. Y. (Česká zemědělská univerzita, Institut tropického a subtropického zemědělství, Praha, Česká republika; Vysoká škola veterinární, Lahore, Pákistán):

Porovnání stravitelnosti různých živin u buvolů Nili Ravi, skotu plemene sahiwal a kříženců.

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Na Vysoké škole veterinární v Laore (Pákistán) byl proveden pokus za účelem zjištění stravitelnosti různých živin u telat buvolů, skotu plemene sahiwal a kříženců (holštýnsko-fríské x sahiwal). Pokus byl uskutečněn na 15 telatech buvolů, 15 telatech skotu plemene sahiwal a 15 křížencích. Pro pokus byli vybráni býčci stejného věku, hmotnosti a tělesných rozměrů. Pokusná krmná dávka byla vypočtena tak, aby pokryla záchovný požadavek. Trus byl sbírán a vážen každých 24 hodin. Pokus byl prováděn po dobu 5 dnů následujících po 10denním přechodném období. Po důkladném promíchání byl odebrán vzorek trusu. Vysušené vzorky trusu byly chemicky analyzovány ke stanovení jejich složení. Stravitelnost sušiny a dalších živin byla větší u buvolů než u ostatních dvou skupin telat. Avšak rozdíly mezi skupinami ve stravitelnosti hrubého proteinu nebyly významné, zatímco stravitelnost hrubé vlákniny, tuku, minerálních látek a celkových stravitelných živin byla významně vyšší u buvolů než u ostatních skupin. Bylo zjištěno, že buvoli mají delší dobu retence živin než skot.

stravitelnost; živiny; buvoli; skot; kříženci

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