

DIGESTIBILITY OF NUTRIENTS IN CROSSBRED (*BOS TAURUS* X *BOS INDICUS*) CATTLE: AS A FUNCTION OF AGE.

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Introduction

The voluntary food intake and efficiency of feed utilization differs with the breed and age of animal (Frisch and Vercoe, 1977). Many breed comparisons have been made with regard to growth rate and milk production, but the information on digestibility and utilization of nutrients in crossbred cattle is rather meagre. The effect of age on biochemical profile, endocrine levels and body weight gains is well documented. However, its effect on digestibility and utilization of nutrients particularly in crossbred cattle has not been established. Therefore, an effort was made to study the effect of age on digestion and utilization of nutrients from 25 to 96 weeks of age in Holstein Friesian X Haryana male calves.

Materials and Methods

Ten weaned crossbred (Holstein Friesian X

Haryana) male calves were obtained from Institute L.P.R. Division and maintained on standard growth ration till 24 weeks of age. Thereafter they were put to either standard growth ration (E.L.I) as per Kerl (1982) or on 25% less energy (E.L.II). Protein was provided to meet out the full requirement to both the groups. The ingredients and chemical composition of ration were as follows and concentrate: roughage ratio was 50:50.

The entire period of 72 weeks was divided into 6 age periods (25-36, 37-48, 49-60, 61-72, 73-84 and 85-96 weeks). The calves were maintained on individual stall feeding and put to metabolism trials during the each age period. The nutrients intake and outgo was worked out to calculate their digestibility and utilization by conventional balance trial methods. Analytical methods to estimate the nutrients were followed as per the A.O.A.C. (1965). Protein estimations were made on Kjel-Auto (Model VS-KT-P, MRK, Japan) following the microkjeldahl principle. The data

TABLE 1. COMPOSITION OF RATION (%)

	Concentrate		Roughage
	Energy Level I	Energy Level II	
Physical			
– Groundnut cake	20	45	
– Crushed maize	40	25	
– Wheat bran	37	27	
– Min. Mixture	2	2	
– Salt	1	1	
– Vitablend – for Vitamin A requirement			
Chemical (g/100 g D.M. basis)			
– Moisture	5.0	8.0	1-2
– Crude protein	17.85	22.59	2.50
– Ether extract	2.57	3.10	0.08
– Crude fibre	7.94	8.57	39.00
– Energy contents(Kcal/g)	4.468	4.435	4.23

were analysed as per the Snedecor and Cochran (1967).

Results and Discussion

The calves under both the energy levels received their full requirement of protein aiming the average daily gain of 500g.

Total dry matter intake ranged from 22.2g to 26.6g/kg. B.W. from 25 to 96 weeks of age. Between the different age periods differences were

small except that during the age between 61 to 72 weeks the D.M. intake was highest (26.6g/kg B.W.). Mean digestibilities of nutrients for the various age periods are presented in table 2.

Dry Matter Digestibility

The overall D.M. digestibility was found to be 60.97 ± 0.52 percent and it did not differ significantly between the two energy levels. Between the various age periods the dry matter digestibility was observed to be significantly higher ($P < 0.01$)

TABLE 2. DIGESTIBILITY OF NUTRIENTS AND NITROGEN RETENTION DURING THE VARIOUS AGED PERIODS (MEAN \pm S.E.)

Age periods (weeks)	Digestibility coefficients				Nitrogen retention (% of intake)
	Dry matter	Crude protein	Ether extract	Inorganic matter	
25-36	59.42 \pm 1.07	83.80 \pm 0.70	52.20 \pm 4.35	27.17 \pm 2.99	50.41 \pm 1.87
37-48	63.83 \pm 1.41	76.50 \pm 1.51	58.20 \pm 2.19	28.17 \pm 2.99	46.90 \pm 1.64
49-60	57.66 \pm 1.43	74.54 \pm 1.42	62.50 \pm 3.14	25.17 \pm 2.66	47.45 \pm 2.20
61-72	60.34 \pm 0.63	73.73 \pm 1.39	65.20 \pm 3.12	27.83 \pm 1.30	56.09 \pm 2.02
73-84	61.80 \pm 0.96	72.63 \pm 1.60	59.10 \pm 3.71	32.00 \pm 3.89	50.72 \pm 1.25
85-96	62.65 \pm 1.11	71.26 \pm 1.70	54.50 \pm 3.44	28.00 \pm 2.42	50.08 \pm 0.95
Energy Level I	60.81 \pm 0.65	73.42 \pm 1.14	61.70 \pm 1.87	28.89 \pm 1.27	51.09 \pm 1.10
Energy Level II	61.09 \pm 0.82	77.32 \pm 0.87	55.53 \pm 1.92	27.22 \pm 1.66	50.13 \pm 1.10
Mean (\pm S.E.)	60.97 \pm 0.52	75.32 \pm 0.75	58.62 \pm 1.39	28.06 \pm 1.04	50.61 \pm 0.78

during the age periods 2 (37-48 weeks) over the period 1 and 3 but not with the remaining age periods.

Crude Protein

All the calves were fed on isoproteinous diet as per their requirement. The protein intake varied from 6 to 10 g/kg B.W.^{0.75} during the period from 25-96 weeks. The overall protein digestibility was recorded as 75.32 ± 0.75 percent and it ranged from 71.26 to 83.80 percent. The protein digestibility was significantly higher ($P < 0.01$) upto the age of 37 weeks and declined steadily through the different age periods to the value of 71.26 percent at 96 weeks of age. These results indicate initially high protein digestibility which gradually declines with age to a significantly lower level. The protein digestibility was effected by the level of energy in the ration also as it was significantly ($P < 0.01$) higher at 75% energy level than that of 100% energy level.

Inorganic Matter

The overall ash digestibility was recorded as 28.06 ± 1.04 percent and it varied from 25.17 ± 2.66 (period III) to 32.00 ± 3.89 (period IV) percent. At two energy levels, values were 28.89 ± 1.27 and 27.22 ± 1.66 percent in E.I. I and II respectively. The ash digestibility was not significantly effected either by the age or by the level of energy.

Ether Extract

The overall ether extract digestibility was recorded as 58.62 ± 1.39 percent. Age had significant effect on the fat digestibility as it was lowest upto 36 weeks of age and increased thereafter upto the age of 72 weeks. The digestibility was significantly higher ($P < 0.01$) between the age of 61 to 72 weeks over all the remaining age periods, but it again declined significantly at the age of 85 to 96 weeks. The E.E. digestibility was significantly higher ($P < 0.01$) at 100% energy level than

that of 75% energy level. Thus the ether extract digestibility was higher during the period when body weight gains were also highest.

Nitrogen Retention

As the calves were in their active phase of growth, the effect of age on the nitrogen retained was of great importance. It was determined as a balance of nitrogen digested and excreted through urine and was calculated as nitrogen retained g/day and nitrogen retention as a percentage of nitrogen intake. The later values were analysed statistically for the effect of age and level of energy intake. The overall mean nitrogen retention was recorded as 50.6 ± 0.78 percent. Nitrogen retention as the percent of intake varied with the age and it was lowest (46.90 ± 1.64) at the age period 2, but significantly higher ($P < 0.01$) at the age period 4 (61-72 weeks - 56.09 ± 2.02). It again declined during the period 5 but slightly improved during the period 6. Thus it was evident that nitrogen retention was significantly higher during the age period of 61-72 weeks, when the body weight gains were also highest. Average daily gains were highest ($P < 0.01$) during the same age period of 61 to 72 weeks over the remaining age period (Shukla et al., 1987). The nitrogen retention

values for the two energy levels I and II were recorded as 51.09 ± 1.10 and 50.13 ± 1.10 percent respectively and did not differ significantly.

(Key Words: Crossbred Cattle, Nutrient Utilization, Age Effect).

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