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Veal calf performance in response to concentrate diets of different rumen degradable protein content

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Introduction

It is generally assumed that growing calves, just like high-producing cows, need a certain amount of UDP to supply their protein needs (Chalupa, 1975; Trotta *et al*., 1984). While no guidelines exist for calves of live weight less than 100 kg, suggested UDP levels range from 90-92% and 47-49% for 100 kg and 200 kg large-breed growing male calves, respectively (NRC, 1989). This study was conducted to establish the level of UDP requiremed for young calves intended for veal production.

Materials and Methods

Thirty-two Holstein bull calves, 3 to 10 days of age, were blocked according to arrival date and birth date and then randomly assigned to one of four treatments. The trial was divided into two periods of ten weeks each. Calves were housed in elevated individual pens (115 x 340 cm) with slatted wooden floors. Experimental diets were formulated to be iso-nitrogenous and iso-caloric, with the largest possible difference in UDP content between the two diets in each period, given the available feedstuffs. Treatments were: (1) starter- and finisher diet of high protein degradability (HH), (2) starter diet of high protein degradability and a finisher diet of low protein degradability (HL), (3) starter diet of low protein degradability and a finisher diet of high protein degradability (LH) and (4) starter and finisher diet of low protein degradability (LL). All dry feeds were pelleted total mixed diets. Calves received 4 l of milk per day for the first 21 days and then 2 l of milk per day until weaning at 28 days. Calves received starter pellets *ad lib.* from day 7 until week 10 of the trial and finisher pellets *ad lib.* from week 11 through week 20. At the end of week 20 the calves were slaughtered for veal. Cold carcass mass was used to determine dressing percentage. Data were analysed as a randomized block design by the GLM procedure of SAS (1985) and least squares means were separated using the PDIFF option.

Results and Discussion

The only difference in chemical composition between the diets was in terms of RDP content. The respective CP degradabilities of SLD, SHD, FLD and LHD were 52.0, 65.8, 55.5, and 68.7%. Results are presented in Table 1. Feed intake, body weight gain and feed conversion ratio (FCR) did not differ significantly between treatments in the pre-weaning and starter (0-10 weeks) period. Only FCR differed significantly in the finishing (11-20 weeks) and the total (0-20 weeks) experimental periods. In the finishing period, the FCR of LL and HL were significantly better ($P < 0.05$) than that of LH. The FCR of HH tended to be more favourable ($P = 0.06$) compared to the FCR of LH. Over the total experimental period, the FCR of LL was significantly better than that of LH, though no significant differences occurred between the FCR of these two treatments and that of HL and HH. There were no significant differences in carcass data between treatments. Results in this trial agree with results reported by Swartz *et al*. (1991) for calves between 1 and 25 weeks of age as well as results from a trial by Abdelgadir *et al*. (1996) with calves reared to the age of 8 weeks.

Conclusion

The level of CP degradability appears to have no effect on calf performance during the first 10 weeks of age. This may be due to incomplete rumen development and sub-optimal rumen fermentation (Cruywagen & Holtshausen, 1997). In the finishing period, CP degradability did affect the FCR. It appears to be beneficial to feed finisher diets with a lower CP degradability. Further research into the optimum level of UDP in finisher diets for grain-fed veal appears warranted.

Table 1 Feed intake, body weight gain and feed conversion ratio for the experimental periods, and carcass data of veal calves receiving different levels of rumen degradable protein.

	Treatment				
	L		H		s.e.
0 - 4 weeks:					
Total dry matter intake (liquid and dry feed)	20.27		19.22		0.9323
Dry matter intake (kg/day)	0.72		0.69		0.0333
Total body weight gain (kg)	10.03		9.09		1.1431
Average daily gain (kg/day)	0.36		0.32		0.0408
FCR (kg intake/kg gain)	2.26		2.81		0.3410
0 - 10 weeks:					
Total dry matter intake (liquid and dry feed)	105.13		102.63		4.0763
Dry matter intake (kg/day)	1.50		1.47		0.0582
Total body weight gain (kg)	47.25		44.66		2.0321
Average daily gain (kg/day)	0.67		0.64		0.0290
FCR (kg intake/kg gain)	2.24		2.33		0.0534
	LL	LH	HL	HH	
11 - 20 weeks:					
Total dry matter intake (liquid and dry feed)	295.11	302.63	298.36	290.64	11.1340
Dry matter intake (kg/day)	4.22	4.32	4.26	4.15	0.1591
Total body weight gain (kg)	90.00	84.56	91.44	88.13	2.9246
Average daily gain (kg/day)	1.29	1.21	1.31	1.26	0.0418
FCR (kg intake/kg gain)	3.29[a]	3.61[b]	3.27[a]	3.31[ab]	0.1040
0 - 20 weeks:					
Total dry matter intake (liquid and dry feed)	400.13	405.36	398.11	393.42	16.2566
Dry matter intake (kg/day)	2.86	2.90	2.84	2.81	0.1161
Total body weight gain (kg)	138.31	130.75	135.31	133.56	5.2347
Average daily gain (kg/day)	0.99	0.93	0.97	0.95	0.0374
FCR (kg intake/kg gain)	2.90[a]	3.11[b]	2.95[ab]	2.96[ab]	0.0699
Carcass mass (cold)	92.94	90.31	93.69	91.44	2.8147
Dressing percentage	51.33	51.36	51.92	51.74	0.4919

[a,b] Means within a row without common superscripts differ significantly ($P < 0.05$).

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