

Effect of dietary crude protein level on the performance of cereal fed Holstein bulls

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Introduction It is common practice to give cereal fed bulls a 160g/kg crude protein (CP) diet to 250kg live weight, dropping to 140g/kg CP from 250kg to slaughter. The majority of intensively fed beef cattle are fed home mix rations based on rolled barley with a protein concentrate or 'protein rich' straights such as rapeseed meal and soya bean meal. In this latter situation higher protein rations will have increased ration costs. The objective of this experiment was therefore to determine the effect of feeding barley based rations containing 120, 140 or 160g/kg dietary CP on the performance of cereal fed 280kg Holstein bulls through to slaughter.

Materials and methods Forty eight Holstein bulls weighing 280kg were reared through to slaughter on a cereal beef system and fed *ad libitum* diets containing either 120, 140 or 160g/kg dietary CP. The 120g/kg CP ration contained the following ingredients (g/kg): rolled barley 755, soyabean meal 37.5, rapeseed meal 37.5, molassed sugar beet pulp 100, molasses 50, and mineral 20. The 140 and 160 g/kg CP diets were formulated with 140 and 200g/kg soyabean meal and rapeseed meal (50:50) replacing an equal quantity of barley. The cattle were housed in straw-bedded pens and were selected for slaughter at EUROP fat class 3. The data was analysed using ANOVA.

Results Overall the bulls recorded performance that either achieved or exceeded recognised targets for cereal beef production. There were no significant differences in animal performance between the treatments.

Table 1 Animal Performance

	120	140	160	s.e.d	Sig
Crude protein (g/kg)	120	140	160		
Slaughter weight (kg)	557	549	542	11.2	NS
Days to slaughter	205.6	205.0	206.4	11.09	NS
DLWG (kg)	1.34	1.32	1.33	0.054	NS
Carcass wt (kg)	284.1	280.1	277.6	5.73	NS
Kill out (g/kg)	510	510	513	4.6	NS
Carcass daily gain (kg)	0.741	0.731	0.737	5.73	NS
Conformation class ¹	2.0	2.1	2.0	0.16	NS
Fat class ¹	3.17	3.08	3.17	0.228	NS
Carcass price (£/kg)	1.76	1.77	1.76	2.92	NS
Carcass value (£)	504	497	490	13.8	NS

¹ EUROP carcass classification: Conformation: P+=1 and E=7, Fat class: 1=1 and 5H=7.

Table 2 Feed use, Feed Conversion Ratio (FCR) and Feed cost per kg gain

	120	140	160
Crude protein (g/kg)	120	140	160
Daily feed intake (kg)	9.22	8.90	8.89
Total feed intake (kg)	1,895	1,825	1,834
FCR (kg feed: kg LWG)	6.94	6.80	6.75
FCR (kg feed: kg carcass gain)	12.57	12.31	12.17
Feed cost (p/kg LWG)	74.5	74.7	75.8
Feed cost (p/kg carcass gain)	134.5	135.2	136.7

The bulls fed the 120 g/kg CP ration recorded the highest daily and total feed intake and the worst FCR. The FCR's (kg feed: kg LWG) appear to be relatively high compared to the target of 5:1 for cereal beef production. It must be noted that the trial did not include the period of growth from 120kg to 280kg. During this rearing phase Holstein bulls at Harper Adams typically record a DLWG of 1.75kg with an FCR of 3.2.

Conclusions There were no significant differences in animal performance between the treatments. The highest slaughter and carcass weights were achieved by the bulls fed the 120g/kg CP ration however this was not statistically significant. It has been suggested that feeding a higher protein ration could increase slaughter weight or help produce leaner carcasses but this was not evident from this trial. The excess protein from the 140 and 160 g/kg CP diets would have to be converted to urea by the rumen micro-organisms, absorbed across the rumen wall and excreted in the urine. This will demand energy which would otherwise be used for growth. The bulls reared on the 120 g/kg CP recorded the highest carcass value and lowest feed cost per kg LWG. From the experiment it can be concluded that increasing the protein content of the ration above 120g/kg CP for 280kg bulls does not improve physical or financial performance.

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