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Animal Science Research Centre - Beef Unit Trial Results – 2017 (g)

Evaluation of 125 and 160g crude protein/kg DM rations for 8 month old 300kg Continental heifers finished on maize silage

Introduction and Objective:

Recent evidence suggests that AFRC (1993) may underestimate the protein requirement of continental bred beef cattle. Current recommendations (EBLEX, 2016) are to feed finishing cattle a diet containing 120-140g/kg DM crude protein (CP). However there is anecdotal evidence to suggest that heifers should be finished on diets with an elevated level of CP to encourage frame growth and delay fat deposition. With the increased costs of protein feedstuffs relative to cereals and the requirement to determine the optimum protein content of finishing rations for young heifers it is appropriate to evaluate different protein levels for silage finished beef heifers. The objective of this experiment at Harper Adams University was to compare the performance of dairy bred beef heifers finished on maize silage based diets containing either 125 or 160g CP/kg DM.

Animals & Timing:

32 Jan-Feb 2016 born British Blue x Holstein (n = 26) and Hereford x Holstein (n = 6) heifers weighing approximately 300kg at 8 months old were allocated into two balanced treatment groups in a randomized block design according to live weight and breed.

Management:

1. 160

A*d libitum* good quality maize silage (31.4% DM, 8.2%CP, 11.6 ME & 29.6% starch) plus 3.2kg 27% CP (as fed) concentrates formulated from 21% barley, 21% wheat, 9% NIS, 42% Hipro soya, 5% distillers, and 2% minerals to supply a TMR containing 160g CP/kg DM and 11.9 M/D.

2. 125

A*d libitum* good quality maize silage plus 3.2kg 19% CP (as fed) concentrates formulated from 30% barley, 30% wheat, 9% NIS, 22% Hipro soya, 7% distillers, and 2% minerals to supply a TMR containing 125g CP/kg DM and 11.9 M/D.

The above diets were formulated by an independent nutritionist, David Hendy, of 'Rumen development: Rumen management', Blackbrook Farm, Great Horkesley, Colchester, CO6 4EJ. The rations were originally formulated to contain 140 and 170g CP however subsequent analyses of the feeds showed they contained 125 and 160gCP. The cattle were selected for slaughter at a target fat class 3=/3+ and slaughtered at ABP, Shrewsbury.


Heifers being fed their trial rations via a TMR

Results:

Table 1: Animal performance (kg)

Treatment	160	125	s.e.d	P Value	Sig
Start wt	303	304	3.9	0.946	NS
Slaughter wt	539	523	8.9	0.105	NS
Days to slaughter	215	226	6.5	0.098	Trend
DLWG	1.10	0.98	0.044	0.026	*
Age at slaughter (days)[1]	462 (15.1)	474 (15.5)	6.4	0.082	Trend

[1.] Age in brackets = months
NS = not significant, * = P<0.05, ** = P<0.01, *** = P<0.001

The carcasses were classified by Video Image Analysis (VIA). The fat colour of the carcasses was noted to be an 'off white, creamy colour with a slight yellow tinge'.

Table 2: Carcase characteristics

Treatment	160	125	s.e.d	P Value	Sig
Carcase wt (kg)	277.1	268.4	5.62	0.139	NS
Kill out (%)	51.5	51.3	0.43	0.665	NS
Carcase DG (kg)	0.60	0.55	0.015	0.008	**
Conformation[1] (1-15)	7.30 (R-)	6.92 (R-)	0.301	0.299	NS
Fat class[1] (1-15)	8.85 (3+)	8.55 (3=/3+)	0.433	0.411	NS
Liver score[2] (1-5)	1.44	1.33	0.21	0.669	NS

[1] EUROP carcase classification: Conformation: P-=1 and E+=15, Fat class: 1- =1 and 5+=15.
[2] Liver assessment: 1= Healthy liver and 5 = Severe abscesses (due to acidosis).

Table 3: Feed intakes (kg/heifer) and feed conversion ratio (FCR)

Treatment	160	125
Total silage intake (kg)	2,843	3,055
Daily silage intake (kg)	13.2 (4.1kg DM)	13.5 (4.2kg DM)
Total conc intake (kg)	689	723
Daily conc intake (kg)	3.2	3.2
FCR (kg feed DM: kg carcase gain)	11.07	12.65

Table 4: Financial performance (£)

Treatment	160	125	s.e.d	P Value	Sig
Carcase price (£/kg)[1]	3.43	3.24	0.082	0.034	*
Carcase value (£)	950.86	876.40	36.05	0.044	*
Total feed cost per head (£)[2]	253.35	235.21			
Daily feed cost (£/head)	1.18	1.04			
Margin over Feed (£/heifer)	697.51	641.19			
Feed cost/kg live wt gain (£/kg)	1.07	1.06			
Feed cost/kg carcase gain (£/kg)	1.96	1.89			

[1] Carcase price standardised to the ABP price grid with a base price of £3.50/kg. Penalties applied to light weight carcasses as follows: 250-260kg -20p/kg, 240-250kg -40p/kg.
[2] Feed costs as follows: Maize silage @ £103/t DM, 27% CP ration @ £234/t, 19% CP ration @ £188/t.

Overall the heifers returned a gross margin of £321 and £265 per head for the 160 and 125g CP treatments respectively when calculated from being reared as calves through to slaughter.

Some 30.1% of the carcasses on the 125g treatment were under 260kg and therefore incurred significant penalties compared to just 11.1% with the 160g CP treatment. Some markets do not penalise light weight carcasses so the effect on margins if there aren't penalties for light weight carcasses is shown below:

Table 5: Financial performance (£) – no penalties for light weight carcasses

Treatment	160	125
Carcase price (£/kg)[1]	3.43	3.36
Carcase value (£)	950.86	908.31
Total feed cost (£)	247.50	232.66
Margin over Feed (£/heifer)	703.36	675.65

[1] Carcase price standardised to the ABP price grid with a base price of £3.50/kg. No penalties for light weights.

Discussion & Conclusions:

- Overall performance of the heifers was good with them being slaughtered at 15.3 months old with carcase weights of 273kg meeting the recognised target for intensively finished heifers of 15 months and 270kg respectively.
- The heifers fed a TMR containing 160g CP/kg DM recorded significantly higher DLWGs (+0.12kg) carcase daily gains (+0.05kg) and were finished 11 days earlier. Slaughter (+16kg) and carcase weights (+8.7kg) were also heavier which was not statistically significant.
- Carcase classifications were similar. The low liver scores indicate minimal issues with acidosis.
- With the earlier slaughter of the heifers fed a TMR containing 160g CP/kg DM resulted in a reduced feed use and marked improvement in FCR.
- Based on the costs prevailing at the time of the study carcase value was significantly increased by £74 with the 160g CP/kg DM treatment. However despite incurring higher feed costs of £18 per head the Margin over Feed Costs was increased by £56. Hipro soya bean meal is regarded as the benchmark protein with higher levels of CP and DUP compared to other commonly used protein straights. An investigation is required to evaluate alternative lower cost protein supplements such as rapeseed meal and distillers.

- If the heifers could have been marketed to a processor that does not penalise light weight carcasses (under 260kg) then the Margin over Feed differential is reduced from £56 to £28.
- It must be noted that the heifers involved in this trial were only 8 months old and still growing frame. A diet containing 160g CP/kg DM is therefore recommended for this type of animal. A diet containing 120g CP/kg DM would probably be more appropriate for 18-24 month old heifers that have grown adequate frame.

Acknowledgement:

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References:

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2. AHDB Beef & Lamb, BEEF BRP MANUAL 7 (2016) Feeding growing and finishing cattle for Better Returns. Huntingdon: AHDB.

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