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The XX International Grassland Congress took place in Ireland and the UK in June-July 2005. The main congress took place in Dublin from 26 June to 1 July and was followed by post congress satellite workshops in Aberystwyth, Belfast, Cork, Glasgow and Oxford. The meeting was hosted by the Irish Grassland Association and the British Grassland Society.

Proceedings Editor: D. A. McGilloway

Publisher: Wageningen Academic Publishers, The Netherlands

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Effects of supplementary concentrate level and separate or mixed feeding of grass silage and concentrates on carcass tissue colour traits in steers

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Keywords: concentrates, grass silage, fat colour, muscle colour, steers

Introduction The level of supplementary concentrates fed with grass silage and the method of feeding (separate or mixed) may affect carcass tissue colour in steers. The objectives were to determine the effects of (1) supplementary concentrate level with grass silage, and (2) separate or mixed feeding of silage and concentrates, on muscle and fat colour.

Materials and methods The experiment had 6 feeding treatments with 14 steers per treatment as follows:

1. Silage only (SO)
2. Silage + 3kg concentrate dry matter (DM) per day fed separately (LS)
3. Silage + 3kg concentrate DM per day fed mixed by feeder wagon (LM)
4. Silage + 6kg concentrate DM per day fed separately (HS)
5. Silage + 6kg concentrate DM per day fed mixed by feeder wagon (HM)
6. Concentrates *ad libitum* + 1kg silage DM per day (AL)

The animals were individually fed for a mean period of 132 days and the concentrate allowance was fed once daily to the animals fed separately. After slaughter the 6th -10th ribs joint was separated into its component tissues and fat and muscle colour values were measured using a Minolta chromometer. In the statistical analysis, the 5 degrees of freedom for treatment were partitioned into 5 orthogonal contrasts, one for the effect of mixing, one for the concentrate level x mixing interaction, and one each for the linear, quadratic and cubic effects of concentrate level.

Results There was a significant linear effect of concentrate level on muscle brightness (L value) which increased with increasing concentrate level (Table 1). There were significant linear and quadratic effects of concentrate level on muscle redness (a value) and yellowness (b value). Both of these values increased up to the high concentrate level but not beyond. There was no significant effect of concentrate level on fat brightness but there were significant quadratic effects on fat redness and yellowness. Fat a and b values were highest for the low and high concentrate levels and lower for the silage only and concentrates *ad libitum* treatments. There was no significant effect of mixing and no concentrate level by mixing interaction for any of the muscle or fat colour variables.

Table 1 Effects of concentrate level and separate or mixed feeding on muscle and fat colour measurements

	Treatment						s.e.	Significance	
	SO	LS	LM	HS	HM	AL		L ¹	Q ²
Colour measurements									
Muscle "L"	34.2	36.0	35.6	36.5	35.7	36.2	0.50	**	NS
Muscle "a"	11.1	13.6	13.1	14.1	13.6	13.5	0.48	***	**
Muscle "b"	6.7	8.2	8.0	8.7	8.2	8.3	0.29	***	**
Fat "L"	66.9	64.3	65.3	65.8	64.5	66.0	1.04	NS	NS
Fat "a"	8.1	11.1	9.3	9.9	10.6	9.2	0.67	NS	**
Fat "b"	18.2	18.7	18.7	18.5	18.8	17.5	0.42	NS	*

¹Linear effect of concentrate level; ²Quadratic effect of concentrate level.

There was no significant effect of mixing and no significant concentrate level by mixing interaction.

Conclusions The main difference in muscle colour was between the silage only group and the concentrate supplemented groups. Differences amongst the latter were small. Similarly, fat a value was lowest for silage only and differed little between the concentrate supplemented groups. Fat yellowness was least for the concentrates *ad libitum* group. The relatively low yellowness of the silage only group may be a reflection of the low fat level of this group. There was no effect of mixing and no concentrate level by mixing interaction for any of the colour measurements.