Intake and Growth of Steers Offered Different Allowances of Autumn Grass and Concentrates

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INTAKE AND GROWTH OF STEERS OFFERED DIFFERENT ALLOWANCES OF AUTUMN GRASS AND CONCENTRATES.

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Abstract

The aim of this experiment was to quantify the relationship between autumn grass supply and concentrate supplementation level on grass intake and animal performance. One hundred and ten continental steers (567kg) were assigned to ten treatments in a three grass allowances: (6, 12 and 18kg dry matter (DM) per head daily) by three concentrate levels: (0, 2.5 and 5kg/head/daily) factorial design with a positive control group offered concentrates *ad-libitum.* Grass allowance was offered daily and concentrates were fed individually. The experiment began on August 22 and all animals were slaughtered after a mean experimental period of 95 days. Grass allowance increased ($P<0.001$) complete diet digestibility only in the absence of concentrates and supplementary concentrates increased ($P<0.001$) complete diet digestibility only at the low grass allowance. Both offering animals supplementary concentrates ($P<0.001$) and increasing daily grass allowance ($P<0.001$) increased their carcass growth rate. Grazed grass supported only one third the carcass growth rate of supplementary concentrates per kg of DM eaten. As a strategy for

increasing the performance of cattle grazing autumn grass, offering supplementary concentrates offers more scope than altering grass allowance.

Keywords: Autumn grass allowance, concentrates, steers

Introduction

Two strategies that could potentially increase performance of cattle grazing autumn grass (*lolium perenne*) are an increase in the supply of grass or offering additional feedstuffs such as supplementary concentrates. Previous research in which supplementary concentrates were offered to cattle grazing grass has shown that where pasture supply was adequate, there was no significant animal production response to concentrates (Steen, 1994 and Steen and Kilpatrick, 1998). Conway (1968) hypothesised that when offered supplementary concentrates with adequate grass, cattle substituted part of their dietary grass intake for concentrates while maintaining performance. These published trials evaluated supplementation in either the early part of the grazing season when grass quality is generally good, or throughout the entire grazing season, thereby not evaluating the potential advantage of supplementation in autumn when pasture supply or quality may be limiting.

An alternative strategy to concentrate supplementation for maintaining animal performance is to increase the allowance of grazed grass. Reed (1978) postulated that offering an increased allowance of grass during the autumn period would enable animals to impose a greater degree of selection on the grass consumed, maximise grass intake and thus minimise the seasonal depression in animal performance.

The objective of this experiment was to quantify the response to grass supply and level of concentrate supplementation on grass intake and steer performance in the autumn.

Material and Methods

One hundred and ten continental cross steers (mean liveweight 567kg) were blocked on weight and breed and assigned to ten treatments in a three (herbage allowances) by three (concentrate levels) factorial design plus a positive control. Initial liveweights were based on weights recorded on two consecutive days. Herbage allowances of 6, 12 and 18kg DM/hd were offered daily which approximated to 0.01, 0.02, and 0.03 of bodyweight. Concentrate allowances of 0, 2.5 and 5kg fresh weight were offered to animals individually and twice daily to those receiving 5kg /day (2 X 2.5kg). The positive control treatment, which did not have access to grass, was offered the same concentrates *ad-libitum* in an outdoor environment. The concentrate used contained barley (0.29), unmolassed beet pulp (0.29) maize gluten (0.29) soya bean(0.05) molasses(0.05) and min/vit.(0.03). Pre-grazing herbage yields were determined three times per week by cutting six strips (1.2m X 5m) from the swards about to be grazed. Based on the pre-grazing yields, treatment groups were offered a precise area to ensure the appropriate herbage allowance. Animals were offered the fresh herbage daily after being given the morning concentrate supplement. Post- grazing yield was estimated 3 times per week and grass intake was estimated for each treatment based on the difference between the pre- and post- grazing yields. Individual animal intake and complete diet digestibility was measured using the n-Alkanes C32 and C36. The experiment covered the period from August 22 to December 1.

Results and Discussion

Increasing the daily grass allowance increased grass intake and at the unsupplemented high grass (18 kgDM/head/day), allowance equivalent to 30 g DM/kg bodyweight animals achieved 0.97 of the DM intake of the positive control offered concentrates *ad-libitium.* Offering 4.4 kgDM concentrate at this grass allowance increased total DM intake by only 0.81 kg DM. At the low grass allowance, grass intakes were approximately 5.5 kgDM and there was no effect of offering animals supplementary concentrates on their grass intake. At the medium and high grass allowances, supplementary concentrates reduced grass intake by 0.43 and 0.81 kgDM respectively per kgDM concentrate offered.

Offering animals supplementary concentrates at the medium and high grass allowance increased their complete diet OM digestibility even though offering supplementary concentrates also increased total OM intake. At the low grass allowance there was no effect of concentrate supplementation on grass intake so therefore an evaluation of the effect of concentrate supplementation on grass digestibility can be made. When these animals were offered 2.5 kg concentrate, their complete diet OM digestibility was higher than the additive values of the grass (estimated from the unsupplemented animals) and concentrates (estimated *in-vitro*) even though total DM intake was significantly increased. This would imply that the supplementary concentrates increased the grass DM digestibility.

Relative to the animals offered the low grass allowance and no concentrate, supplementing with concentrate increased carcass growth by 116 g/kg concentrate DM eaten whereas increasing the grass allowance, increased carcass growth by 38 g/kg DM grass eaten. The carcass weight response to concentrates of these groups of grazing animals was twice that of the treatment offered concentrates *ad-libitum* which gained 57 g

carcass per kg concentrate DM eaten. This data supports our previous assumption that there was more than an additive effect by supplementing autumn grass with concentrates on diet digestibility.

Although there was a much larger (double) carcass growth response to supplementary concentrates than to additional grass DM eaten, increasing grass intake significantly increased carcass fat scores whereas offering supplementary concentrates did not. This would imply that relative to concentrates, increasing allowance of autumn grass led to a change in partitioning of energy, from muscle, towards subcutaneous fat.

Per kg of DM eaten, grass supported only one third the carcass growth of supplementary concentrates. In conclusion, as a strategy for increasing the performance of cattle grazing the type of autumn grass used in this study, offering supplementary concentrates offers more scope than altering grass allowance.

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Table 1 - The effect of grass allowance and concentrate level (kg/head/day) on intake, diet digestibility, feed efficiency, animal growth, and carcass and plasma characteristics

	Grass allowance (kg/hd/day) G													
	6			12			18							
	Concentrate level (C)			Concentration level (C)			Concentration level (C)			Control	G	C	G x C	s.e. [1]
	0 kg	2.5 kg	5 kg	0 kg	2.5 kg	5 kg	0 kg	2.5 kg	5 kg	14.4 kg				
Grass organic matter (OM) intake	4.49	4.59	4.45	7.89	6.78	6.00	10.67	7.73	7.78		***	***	*	0.520
Diet OM digestibility (g/kg)	684	773	788	829	807	831	853	840	851		***	*	***	14.4
Liveweight gain (g/day)	140	540	940	530	780	1060	750	1050	1140	1430	***	***	n.s.	64.2
Carcass weight (kg)	304	332	352	323	348	361	330	355	363[a2]	371	***	***	n.s.	5.49
Carcass gain (g/day)	88	393	617	290	551	695	360	631	727 [a]	809	***	***	n.s.	24.0
Kill-out proportion (g/kg)	522 [a]	537 [a]	538 [a]	521 [a]	541 [a]	540 [a]	515 [a]	532 [a]	538 [a]	528	n.s.	***	n.s.	4.0
Fat score[3]	3.73	3.79	3.79	3.85	4.15	3.91	4.03	3.97	4.14	4.64	*	n.s.	n.s.	0.108
KCF (kg) [4]	5.05	7.35	8.82 [a]	6.79	7.57	8.93 [a]	7.93	9.19 [a]	10.25 [a]	10.69	**	***	n.s.	0.301

[1]s.e for G x C interaction, [2]values with superscript [a] were not significantly different (P<0.05) from ad-libitium concentrate group, [3] 1= leanest 5 = fattest; [4]kidney plus channel fat,