

EFFECT OF SPACE ALLOWANCE AND FLOOR TYPE ON PERFORMANCE AND WELFARE MEASUREMENTS OF FINISHING BEEF HEIFERS

M.P Keane^{1, 2}, M. McGee¹, E. G. O'Riordan¹, A. K. Kelly² and B. Earley^{1*}

¹Animal & Grassland Research and Innovation Centre, Teagasc, Grange, Dunsany, Co. Meath, Ireland. ²School of Agriculture and Food Science, University College Dublin, Belfield, Dublin 4, Ireland.

*Corresponding author email: bernadette.earley@teagasc.ie

Abstract – The study objective was to investigate space allowance and floor type on performance and welfare of heifers. Four treatments were used; i), 3.0 m², ii), 4.5 m² and iii), 6.0 m² /animal on concrete-slats and, iv), 6.0 m² per animal on straw. Heifers housed at 4.5 m² had a greater average daily gain (ADG) than those at 3.0 and 6.0 m²: carcass weight was not affected. Heifers on straw had greater ADG and dirt scores ($P < 0.05$) at slaughter than heifers on concrete-slats. It was concluded that a space allowance of 3.0 m² /animal on concrete-slats was sufficient for animal performance. Housing heifers on straw instead of concrete-slats did not affect carcass weight but did increase lying duration.

Key Words – Space allowance, floor type, beef cattle

I. INTRODUCTION

The conventional system for housing finishing beef cattle in Ireland is a fully slatted concrete floor with a space allowance of 2.5 m² [1]. There have been suggestions that the space allowance for finishing cattle on concrete slats needs to be increased above 3.0 m² per animal or that the use of concrete slats should be phased out and replaced with an alternative floor type [2]. Therefore, the objective of the current study was to investigate the performance and welfare of beef heifers at three different space allowances (3.0, 4.5 and 6.0 m² per animal) on concrete-slats and one space allowance (6.0 m² per animal) on straw.

II. MATERIALS AND METHODS

Two-hundred and forty crossbred beef heifers were randomly assigned to one of four treatments; 3.0, 4.5 and 6.0 m² on slatted concrete floors and 6.0 m² on straw. Heifers were weighed and dirt scored [3] on day 0 and at 21 day intervals until slaughter at day 105. Post-slaughter, carcass weight, kill-out proportion, hide weight and carcass conformation and fat score (1-15) was determined. Behaviour was recorded using infrared cameras. Statistical analysis was done using SAS (version 9.3; SAS Institute, Inc.).

III. RESULTS AND DISCUSSION

Performance results are shown in Table 1. Feed intake was not affected by space allowance or floor type.

Table 1: Effect of space allowance and floor type on heifer intakes and performance characteristics

	3	4.5	6	6.0 (straw)	SEM	P-value
DM intake (kg/animal/day)	11.1	11.1	11.1	11.2	0.11	NS
Initial weight (kg)	505	506	504	504	2.0	NS
Slaughter weight (kg)	631 ^a	642 ^{ab}	633 ^a	648 ^b	4.3	<0.05
ADG (kg)	1.18 ^a	1.28 ^b	1.19 ^a	1.34 ^b	0.03	<0.05
Feed conversion ratio	9.43 ^a	8.74 ^b	9.45 ^a	8.42 ^b	0.18	<0.05
Carcass weight (kg)	343	344	341	347	2.7	NS
Kill-out proportion (g/kg)	544	536	539	537	3.1	NS
Carcass conformation score (1-15)	8.5	8.5	8.2	8.6	0.2	NS
Carcass fat score (1-15)	10.1	10.2	10.1	10.4	0.2	NS
Hide weight (kg)	38.5 ^{ab}	38.5 ^{ab}	37.6 ^a	39.5 ^b	0.4	<0.01

The ADG of heifers housed at 4.5 m² per animal was greater than those at 3.0 m² and 6.0 m² per animal which did not differ, in contrast to the findings of Hickey [4] and Gupta [5]. Despite this difference, carcass weight did not differ between space allowances. Heifers housed on straw had a greater ($P < 0.05$) ADG than those on slats at 6.0 m²

per animal. However, no difference in carcass weight was observed. Similarly, Hickey et al. [4] observed no difference in carcass weight between the two floor types. Heifers housed at 3.0 m² on concrete slats were dirtier than those on the other two concrete slat treatments by the day of slaughter (Fig. 1). This is consistent with the findings of Hickey et al. [4]. Heifers on straw were significantly dirtier than those on concrete-slats (Fig. 1) which is in agreement with Gottardo et al. [6]. Space allowance had no effect on the animal behaviour in the present study; however, heifers housed on straw had longer lying durations than those on concrete-slats. Conversely, Absmanner et al. [7] observed no difference in the lying time of cattle between the two treatments.

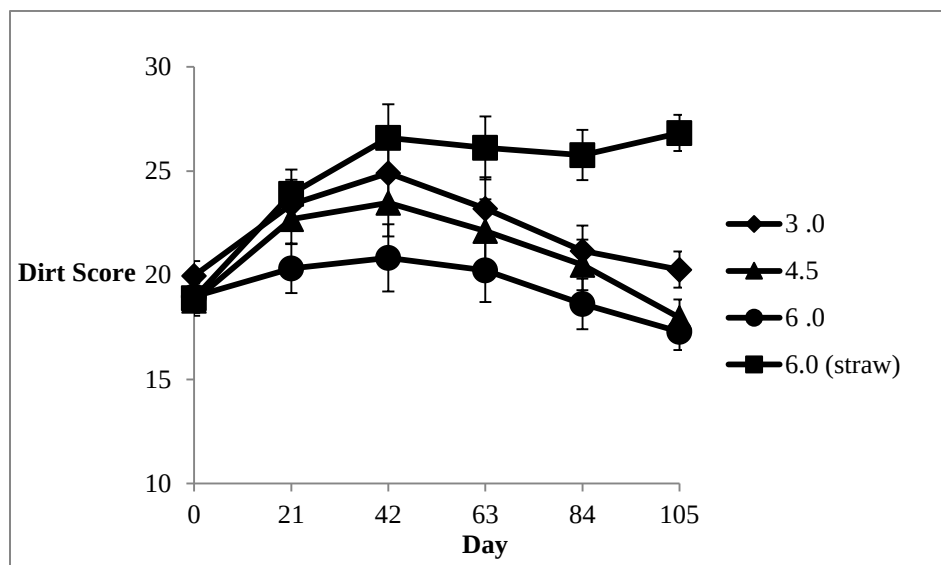


Figure 1. Effect of space allowance and floor type on the dirt scores (0-80) of beef heifers.

IV. CONCLUSION

The lack of a difference in carcass weight between the three space allowances suggests that 3.0 m² is sufficient for finishing beef heifers in terms of performance; however, animal cleanliness did improve as space allowance increased. With regard to floor type, straw bedding had no effect on carcass weight; however, heifers on straw had longer lying durations.

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