



Growth performance, cleanliness and lameness of finishing Charolais bulls housed in littered pens of different design

G. Cozzi, R. Ricci, M. Dorigo & D. Zanet

To cite this article: G. Cozzi, R. Ricci, M. Dorigo & D. Zanet (2005) Growth performance, cleanliness and lameness of finishing Charolais bulls housed in littered pens of different design, Italian Journal of Animal Science, 4:sup2, 251-253, DOI: [10.4081/ijas.2005.2s.251](https://doi.org/10.4081/ijas.2005.2s.251)

To link to this article: <https://doi.org/10.4081/ijas.2005.2s.251>



© 2005 Taylor & Francis Group LLC



Published online: 03 Mar 2016.



Submit your article to this journal [↗](#)



Article views: 52



View related articles [↗](#)



Citing articles: 1 View citing articles [↗](#)

Growth performance, cleanliness and lameness of finishing Charolais bulls housed in littered pens of different design

G. Cozzi, R. Ricci, M. Dorigo, D. Zanet

Dipartimento Scienze Zootecniche, Università di Padova, Italy

Corresponding author: Giulio Cozzi. Dipartimento Scienze Zootecniche. Viale dell'Università 16, 35020 Legnaro, Italy – Tel: +39 049 8272620 – Fax: +39 049 8272669 – Email: giulio.cozzi@unipd.it

RIASSUNTO – Performance di crescita, pulizia e lesioni agli arti di vitelloni Charolaise allevati su lettiera permanente in diversi tipi di box. *Lo studio ha posto a confronto due tipi di box su lettiera permanente destinati all'allevamento di vitelloni Charolaise. Un box dotato di pavimentazione piana che garantiva uno spazio/capo di 5 m² (Controllo) è stato confrontato con una soluzione (Partially Sloped Floor; PSF) che forniva uno spazio/capo di 6,4 m² e in cui la metà della superficie più lontana dalla mangiatoia presentava un'inclinazione del 4%. È stato monitorato il ciclo d'ingrasso di 1338 animali stabulati in 43 box (20 Controllo e 23 PSF). Le prestazioni di crescita degli animali non hanno risentito del diverso tipo di box, mentre l'indice di pulizia dei vitelloni è peggiorato nel controllo a causa del minore spazio/capo. L'analisi logistica dei dati relativi alle patologie podaliche ha visto un aumento significativo del rischio incrociato nel caso del PSF. L'aggiunta di polvere di segatura alla lettiera in paglia ha migliorato la pulizia degli animali, aumentando però la manifestazione di sindromi respiratorie.*

Keywords: beef cattle, housing system, cleanliness, lameness.

INTRODUCTION – The fattening of beef cattle in Italy is mainly carried out under intensive rearing conditions. The main features of the Italian beef farms are the high stocking rate and the loose housing of the animals in multiple pens indoors. The pen with fully slatted floor is the most frequent housing solution because it does not require any bedding material and it has a lower labour cost to remove slurry. However, the use of littered pens is particularly recommended for the fattening of Charolais bulls which are more sensitive to lameness when reared up to heavy slaughter weight. Besides the greater comfort, cattle housed on straw have shown to be cleaner than on slatted floor (Lowe *et al.*, 2001), but the pen design and the schedule of the litter renewal can severely affect the cleanliness of cattle in bedded pens (Scott and Kelly, 1989). The present trial compared growth, cleanliness and lameness of Charolais bulls fattened in two types of littered pens provided with different bedding material.

MATERIAL AND METHODS – The study was carried out in a commercial beef farm during the period May-November 2004. The farm has 2 types of straw bedded pens for the housing of finishing Charolais bulls. The former (Control) is a 8x10 m pen with a flat concrete floor and it was compared with the latter (Partially Sloped Floor; PSF) in which the pen surface of 8x16 m is divided in two areas. The space of 8x8 m next to the feeding trough has a flat concrete floor while in the back of the pen an equal surface has a concrete floor with a slope of 4%. Both types of pen were bedded with 200 kg/month of straw given in a weekly distribution and the entire litter was fully renewed every 60 days. During late summer and autumn along with the straw there

was an additional distribution of 100 kg/month/pen of sawdust powder. The Control pens housed 16 bulls with a space allowance of 5 m² and a manger space of 50 cm/bull respectively. The Partially Sloped Floor pen housed 20 bulls with 6.4 m² of surface and 40 cm of manger space per animal respectively. The study recorded the growth performance of the 1338 bulls housed in 43 pens (Control = 20; Partially Sloped Floor = 23). The animals had an initial average live weight of 426.5±24.5 kg and were fed *ad libitum* a total mixed ration until they reached the commercial finishing. Bull cleanliness was assessed by a visual evaluation in two observation sessions at days 50±18 and 130±25 of the fattening period. Each session was carried out the day before the litter renewal in the pen. Two scoring methods were used to assess the average cleanliness of the animals within each pen, the one of MAFF (1998), which considers the entire body, and that of Gottardo *et al.*, (2003) which scores the hind legs and the ventral part of the body separately. Bull health status was monitored daily by recording any pathological event occurred throughout the fattening period. A linear model within PROC-GLM (SAS, 1989) was used to statistically process the growth performance data testing the effects of pen type, litter type (straw *vs.* straw + sawdust) and their interaction. The non parametric test of Wilcoxon within PROC NPAR1WAY (SAS, 1990) was performed for the statistical analysis of the cleanliness scores to evaluate the effects of pen and litter types. A logistic analysis of events/trials type was performed within PROC LOGISTIC of SAS (1990) to calculate the odds ratio estimates for lameness due to pen type, litter type and time of observations. The pen was the experimental unit for all the variables and differences were considered significant at P<0.05.

RESULTS AND CONCLUSIONS – The pen design as well as the addition of sawdust to the straw as bedding material did not affect the growth performance of the bulls (Table 1).

Table 1. Effects of pen design and litter type on the growth performance of finishing Charolais bulls housed in bedded pens.

	Pen design (D)		Litter type (L)		P value			SEM ¹
	Control	PSF	Straw	Straw + Sawdust	D	L	DxL	
Number of pens	20	23	17	26				
Live weight (kg):								
- initial	418.3	434.8	425.1	427.9	n.s.	n.s.	n.s.	20.9
- final	648.7	643.6	627.8	654.4	n.s.	n.s.	n.s.	35.0
Fattening days	170	164	167	167	n.s.	n.s.	n.s.	10
Average daily gain (g/d)	1324	1271	1282	1313	n.s.	n.s.	n.s.	213

¹Standard error of the mean.

The cleanliness evaluation carried out according to the scoring method of MAFF (1998) showed the bulls housed in the Control pens being dirtier than those in the Partially Sloped Floor ones (Table 2). A similar trend between the two types of pen was observed for the ventral part of the body using the method of Gottardo *et al.* (2003), while no difference was detected for the hind legs (Table 2). The positive effect of the Partially Sloped Floor pen on bull cleanliness must be related to the greater space per head allowed by this housing solution in comparison to the Control one. The addition of sawdust to the straw bedding improved the cleanliness of the ventral part of the body but did not affect significantly the MAFF score which considers the entire body of the animal (Table 2). Body cleanliness, besides being an important trait for the evaluation of beef cattle welfare, has also being related to the food safety. Nowadays, a cleanliness assessment is mandatory in cattle prior to slaughter and in United Kingdom, animals can be rejected at the abattoir if they are classified as ≥ 3 using the MAFF scale (Lowe *et al.*, 2001). In the present study, 33% of the Control pens were scored above this threshold at the observation session closer to time of slaughter of the bulls.

Table 2. Effects of pen design and litter type on the cleanliness evaluation (means \pm SD) of finishing Charolais bulls housed in bedded pens.

	Pen design		χ^2	Litter type		χ^2
	Control	PSF		Straw	Straw + Sawdust	
Observations (n)	34	41		41	34	
MAFF score ¹	2.63 \pm 0.25 ^A	2.28 \pm 0.57 ^B	8.11	2.51 \pm 0.36	2.35 \pm 0.60	1.12
Hind legs score ²	2.29 \pm 0.46	2.27 \pm 0.50	0.03	2.22 \pm 0.42	2.35 \pm 0.54	1.68
Ventral part score ³	2.97 \pm 0.17 ^A	2.29 \pm 0.75 ^B	22.00	2.80 \pm 0.51 ^A	2.35 \pm 0.73 ^B	10.32

¹1 = clean and dry to 5 = filthy and wet; ²1 = clean, to 3 = very dirty; ^{A, B} = P < 0.01.

According to the British regulations, these animals should have been clipped prior to slaughter to avoid the rejection. In the case of the Partially Sloped Floor, the percentage of rejected pens was decreased to 22%. According to Murphy *et al.* (1987), lameness is one of the most important diseases of beef cattle housed intensively and in the present study, in spite of the use the permanent bedding, 107 bulls were recorded as lame animals. Based on the experimental data, the relative risk of the occurrence of lameness was significantly higher in the pens with the partially sloped floor (Table 3) confirming the previous findings of ITEB (1983). The risk of lameness occurrence did not change according to the type of litter used for bedding while, considering the duration of the fattening period, it was significantly lower in the final part of it when bulls are heavier and the hierarchy within the pen is more stable.

Table 3. Relative risk of occurrence of lameness in finishing Charolais bulls housed in bedded pens.

		Odds ratio estimate	χ^2	P value
Pen design:	Partially Sloped Floor <i>vs.</i> Control	2.34	9.57	<0.001
Litter type:	Straw + Sawdust <i>vs.</i> Straw	0.83	0.20	n.s.
Fattening day:	50 <i>vs.</i> 130	4.62	31.33	<0.001

Eleven bulls were treated for respiratory syndromes and, since 10 of them came from pens where sawdust powder was added to the straw for bedding, it is likely that the outbreak of this disease was promoted by the increased dust. In summary, lameness data advise the use of the pen with a flat floor for the housing of finishing Charolais bulls. However, in order to ensure a proper cleanliness to the animals at the time of slaughter, this housing solution must be provided with a greater amount of litter than that provided in the present study, avoiding the use of dusty materials which have shown to increase the occurrence of respiratory syndromes.

REFERENCES – Gottardo, F., Ricci, R., Fregolent, G., Ravarotto, L., Cozzi, G., 2003. Welfare and meat quality of beef cattle housed on two types of floor with the same space allowance. *Ital. J. Anim. Sci.* 2: 243-253. **ITEB**, 1983. Le Taurillon, Paris, France. **Lowe**, D.E., Steen, R.W.J., Beattie, V.E., Moss, B.W., 2001. The effects of floor type systems on the performance, cleanliness, carcass composition and meat quality of housed finishing beef cattle. *Livest. Prod. Sci.* 69:33-42. **MAFF** - Ministry of Agriculture, Fisheries and Food, 1998. Clean Beef Cattle for Slaughter – A Guide for Farmers. MAFF Publications, London, UK. **Murphy**, P.A., Hannan, J., Moneghan, M., 1987. A survey of lameness in beef cattle housed on slatts and on straw. In: H.K. Wierenga and D.J. Peterse (eds.) *Cattle Housing Systems, Lameness and Behaviour*. Martinus Nijhoff, Dordrecht, The Netherlands, 73-86. **SAS**, 1989. User's Guide: Statistics, Version 6. SAS Institute Inc., Cary, NC, USA. **Scott**, G.B., Kelly, M., 1989. Cattle cleanliness in different housing systems. *Farm Build. Prog.* 95:21-24.