



Effects of pen floor on clinical and behavioural parameters of newly received beef cattle fattened under intensive rearing systems

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ABSTRACT - The study compared clinical and behavioural parameters of newly received beef cattle after one month of housing, on two different types of floor (fully slatted vs. deep litter). The assessment was carried out on 14 batches of imported French bulls reared in an intensive farm. The slatted floor increased the likelihood of occurrence of skin alterations, while it improved bulls cleanliness. The type of floor had a minor effect on cattle behaviour during the early part of fattening cycle and the observed differences were more due to the shape of the pen, rather than its type of floor.

Key words: Beef cattle, Welfare, Type of floor, Newly received beef cattle.

Introduction - In Italy, beef cattle are mainly reared by specialized finishers who buy weaned calves or young bulls and then fatten them up to commercial finishing. Beef cattle are usually housed under intensive conditions in multiple pens on concrete fully slatted floor (FS) or on deep litter (DL). Newly received animals are usually imported from foreign countries, mainly from France (Federici and Rama, 2007) and right after arrival they undergo to a set of handling procedures, such as prophylaxis and regrouping, which could stress them, impairing their welfare status. The aim of the present study was to evaluate how the pen floor type may affect behavioural and clinical parameters of newly received French young bulls, during the first month of fattening under intensive rearing conditions.

Material and methods - The study was carried out in a commercial beef farm (Eastern Po Valley) with 5500 fattening places of which a large majority is on fully slatted floor (slat width: 14 cm; gap width 3,2 cm) while one fifth of them are on wheat straw deep bedding (80 kg/pen added twice a week and a monthly complete renewal). The farm imports young bulls from France at about 420 kg LW. The research considered 14 batches, subdivided on the two type of floor reflecting the farm proportion (Table 1). Each batch was evaluated once during the period from October 2008 to January 2009 in order to assess cattle behav-

our and clinical parameters. The assessment occurred 1 month after bulls' housing and it was carried out by a trained assessor right after morning feed distribution. The protocol considered direct observation of the animals housed in 8 pens per batch and it consisted of a clinical visit, and a bulls behavioural and dirtiness assessment. Clinical parameters considered presence of symptoms such as coughing, nasal and ocular discharge, skin alterations (hairless patches and lesions) and lameness. Behavioural indicators were: estimation of bulls avoidance distance at the feeding rack (Waiblinger *et al.*, 2003), duration of lying down sequence, frequency of standing or laying and ruminating, and frequency of social interactions among pen-mates. Displacement, chasing, head-butt and fighting were summed and considered as agonistic interactions, whereas horning and social licking were summed as cohesive ones. Statistical analyses were performed to assess the effect of type of floor on clinical and behavioural measurements. All behavioural traits and coughing were analyzed by GLM procedure whereas clinical traits, recorded as dichotomous variables, were analysed by Logistic Regression procedure (SAS/STAT, 1990). For these variables, the 2 floor types were compared by Wald Chi-Square Test.

Table 1. Descriptive statistics of the animals and housing facilities (mean \pm sd).

Type of floor	Deep litter (DL)	Fully slatted (FS)
Animals, total number (batches, number)	251 (3)	2473 (11)
Animals per pen, number	9 \pm 1.9	15 \pm 1.5
Average space allowance, m ² /head	3.49 \pm 0.58	2.93 \pm 0.08
Space at the manger, cm/head	36.2 \pm 8.4	64.4 \pm 3.3

Results and conclusions - The frequency of respiratory diseases symptoms was not affected by the type of floor, even though 14% of the assessed bulls showed a nasal discharge. Newly received animals are easily exposed to stressful conditions, especially during the cold season, and this promotes the outbreak of respiratory pathologies (Salak-Johnson and McGlone, 2007). Estimated odds ratio for skin alterations was instead significantly higher for FS than DL bulls (Table 2), confirming the results of Gottardo *et al.*, 2003. Consistent with the same study were also the results of the dirtiness, which showed bulls on FS being cleaner than the DL ones. The low frequency observed for ocular discharge and lameness did not allow to perform their statistical analysis. The type of floor seemed to affect only some behavioural parameters. Bulls housed on bedded floor showed a higher avoidance distance than the FS ones (Table 3). At this regard though, it must be pointed out that DL pens were deeper and narrower than FS ones and therefore DL animals could be less used to be approached closely by humans. A further explanation for the reduced avoidance distance observed for FS bulls could come from the increased number of animals housed per single pen (Table 1). According to Waiblinger *et al.* (2003), there is a negative correlation between avoidance distance and number of pen-mates. The same authors found that social licking was increased in groups with minimum avoidance reactions and this is in agreement with our results for FS bulls, which showed more cohesive interactions (social liking and horning) (Table 3). Agonistic interactions were not affected by the type of floor, as well

as the duration of lying down sequence. Our observation was carried out at the beginning of the fattening period and it is likely that this time has been too short to cause the negative effects on the duration of lying down sequence reported by Wechsler (2007) for FS. The increased space at the manger seems the most reasonable explanation for the higher proportion of bulls ruminating and lying on FS (Table 3). For these animals, space at the manger is not limiting and it should allow a more synchronized feed intake and rumination. Results of the present study showed that in comparison with DL, FS floor is expected to increase the incidence of integument alterations in beef cattle from the beginning of the finishing period. Bulls kept on straw are exposed to a lower risk of skin alteration, but suffer of an unsatisfactory cleanliness due to the inadequate litter management. After the first month of fattening in the intensive rearing system differences observed in cattle behaviour seemed rather due to the shape of the pen than its type of floor.

Table 2. Estimation of the odds ratios for the significant ($P>0.05$) clinical parameters.

Clinical traits:	Wald test Confidence limits at 95% - Type of floor (FS vs. DL) ¹		
	Odds Ratios	Minimum	Maximum
Skin alterations	4.54	1.37	15.02
Dirtiness	0.04	0.014	0.112

Table 3. Least square means for the significant ($P>0.05$) behavioural parameters.

Behavioural traits:	DL ¹	FS ²	Significance	RMSE
Cohesive interactions ²	0.33	0.84	*	0.89
Avoidance distance, cm	74.69	58.84	***	34.24
Ruminating bull ³	7.50	15.44	*	12.86
Lying bull ³	9.91	31.56	***	26.49

¹Type of floor: DL=Deep litter; FS= Fully slatted. ²events/bull/h; ³% of bulls; ***= $P<0.001$; *= $P<0.05$.

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