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Flooring options for housed growing and finishing cattle



afbi AGRI-FOOD & BIOSCIENCES INSTITUTE

Introduction

Different flooring options are available for housing beef cattle. Finding the right option can be a challenge to optimise animal performance, animal health and welfare, labour requirements, slurry management and ultimately profitability of the system.

A survey conducted by Agri-Food and Bioscience Institute (AFBI) on 100 beef farms across Northern Ireland (NI), which had 100 or more cattle that were over one year old and intended for slaughter, reported that the majority of farms (62%) had more than one floor type to accommodate beef cattle. Concrete slatted floors were the most common floor, with 73% of the farms surveyed having them, 45% of farms had rubber covered slats and 43% of farms had solid floors covered with a bedding substrate.

Fully slatted concrete floors are the most prevalent on NI beef farms

Reasons for use:

- No need for bedding
- Efficient slurry management
- Higher animal stocking

Thus concrete slatted floors are a labour and cost-effective system. However some concern has been raised on accommodating beef cattle on fully slatted concrete floors, in terms of animal welfare.

Beef cattle housing using straw bedding has a welfare-friendly image. Indeed, previous research at AFBI has shown that cattle prefer to lie and stand on straw bedding rather than on concrete slats. Cattle on straw bedded systems need twice the space allowance than those on slatted floors. Additionally space is required for the storage of the straw.

There is only sufficient straw grown in Northern Ireland to bed approximately 20% of our cattle. Therefore alternative flooring options are required.

Are cattle happy, healthy and productive on fully slatted concrete floors?

We need to look at the scientific evidence on what is good for animal welfare

Can we adapt the housing that is already in place for beef cattle in NI to improve welfare?

Previous research at AFBI had reported that cattle prefer to both lie and stand on rubber mats or strips rather than concrete slats, so rubber floors may have the potential to enhance animal welfare.

Within a DAERA funded programme of work, AFBI has recently evaluated the effect of overlaying slats with rubber on the performance and welfare of dairy-origin bulls.

The questions this research aimed to address were:

- What is the effect of overlaying concrete slats with rubber on :
  - Animal performance
  - Lying behaviour
  - Hoof health
  - Cleanliness
- What is the effect of changing from slats to either straw bedding or rubber-covered slats for the finishing period of bulls?

Table 1. Details of the studies in the project

Study 1	Age at start (days)	Live weight at start (kg)	Number of animals	Number of days on study	Description of study*
1	246	224	80	204	Slats v rubber and changing from slats to rubber or straw for the last 100 days of finishing
2	317	271	65	157	Slats v rubber and effect of space allowance
3	243	212	48	216	Slats v rubber and effect of diet

*Dairy origin bulls were used in all three studies.

RESULTS
Performance

Table 2. Carcass weights of dairy-origin bulls in the three studies

	Floor type			
	CS	RS	CS-S	CS-RS
Study 1	274	280	273	282
Study 2	253	265		
Study 3	270	279		

CS: fully slatted concrete slats; RS concrete slats overlaid rubber; CS-S concrete slats during growing period, followed by solid floor bedded with straw for the finishing period; CS-RS concrete slats during growing period, followed by slats overlaid with rubber.

It is interesting that bulls which were finished on straw bedding for the final 100 days did not have an increased carcass weight compared to those finished on slats or rubber. Also in study 2, space allowance had no effect on performance; bulls housed at a stocking density of 2.17m^2/bull had a mean carcass weight of 261 kg compared with those offered double space allowance, which had a mean carcass weight of 257 kg. Bulls offered ad lib concentrate diet in study 3 had a mean carcass weight of 277 kg, compared with 272 kg for those offered grass silage and 6kg of concentrate.

Combining the three studies and carrying out statistics on larger numbers of animals gave a clear picture on the positive effect of overlaying slats with rubber on performance (Table 3).

Table 3. Combined effect of overlaying slats with rubber on animal performance over the three studies

	Slats	Rubber
Slaughter weight (kg)	524	539
Daily live weight gain (kg/d)	1.48	1.54
Carcass weight (kg)	266	275
Carcass gain (kg/d)	0.75	0.78

In other studies in Ireland and throughout Europe an improvement in performance on slats overlaid with rubber has been reported in bulls, but not in steers or heifers.



Animal Cleaniness

Cattle in the studies were scored for dirtiness, whereby a higher score represented a dirtier hide

A similar pattern of animal cleanliness was observed in all studies, independent of the floor, whereby there was a rapid increase in dirtiness of cattle after housing, followed by a gradual decline as the bulls shed their winter coat (Figure 1). There was some evidence in these experiments that cattle accommodated on rubber-covered slats were cleaner than those on fully slatted concrete floors during the winter housing period, but by the time of slaughter there was no effect of floor type on cleanliness in studies 1 and 3. Cattle accommodated on rubber-covered slats in study 2 remained cleaner at the end of the study than those on slats.

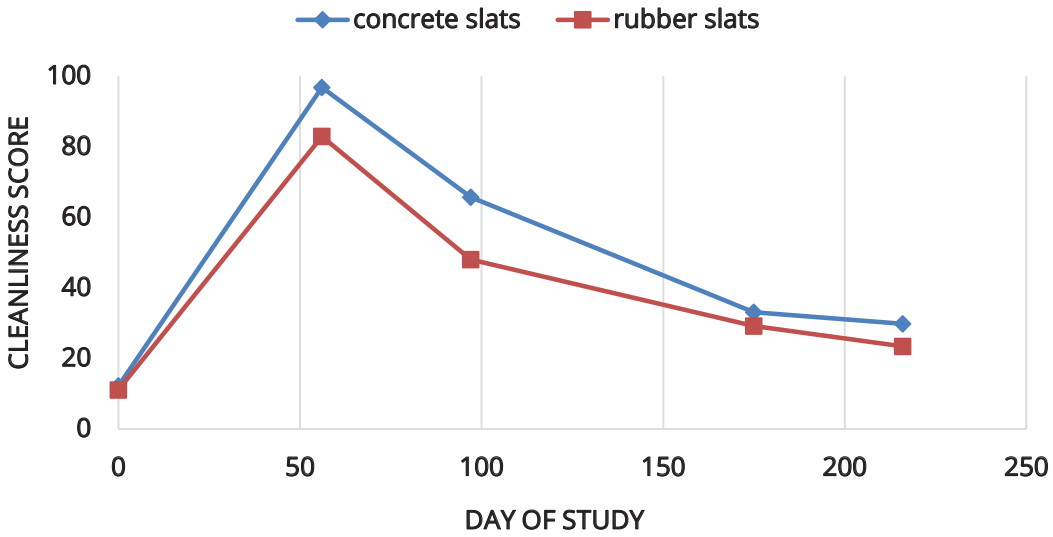
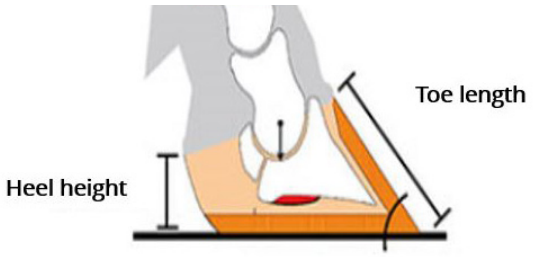


Figure 1 Dirtiness scores of bulls accommodated on concrete slats or slats overlaid with rubber (study 3)

- Cleanliness of cattle has been reported to be linked to the relative drainage area of slats and slats overlaid with rubber. In the current studies the drainage area was reduced from 24% to 18% when the slats were overlaid with rubber.
- The design of the rubber overlay is likely to be even more important. The rubber slats used in this study were curved on the upper side of the rubber slat to assist removal of faeces and urine into the slurry tank below.

Hoof health

One of the concerns raised previously about accommodating beef cattle on slats overlaid with rubber is overgrown hooves if the floor is not abrasive enough. Therefore claw dimensions and hoof bruising was assessed in these studies.



- Higher toe length was found in cattle at slaughter which had been accommodated on rubber-covered slats compared with those on slats
- Higher heel height was found in cattle finished on straw compared with those on concrete or rubber slats
- Bruising score was lower in cattle accommodated on slats overlaid with rubber than on concrete slats
- Floor had no effect on locomotion score

Lying behaviours

In a further study in this series of experiments, suckler-origin bull behaviours on concrete slats or solid floors bedded with straw were studied, which confirmed that bulls accommodated on fully slatted concrete floors don't express the same lying and standing behaviours as those on straw-bedded systems.

For example, cattle on straw:

- got up and down more often
- had a greater number of steps per day than those on slat

Interestingly, accommodating finishing bulls on rubber resulted in standing and lying behaviours in-between those exhibited on concrete slats and straw bedding.

Finances

A key question must be "Is it economically viable to overlay concrete slats with rubber?"

The average of the studies was a **9kg increase** in carcass weight for bulls on rubber compared with concrete slats, **@£3/kg= £27**.

If the rubber overlays works out to be **£100/animal**, it would take **3-4 years** to pay off, even if only one batch of bulls went through the system per year.

Recommendations on floors for housing beef cattle

- Cattle accommodated on straw bedded systems is considered to be high welfare, but only if sufficient bedding is available
- Concrete slatted floors are a practical option where straw is not an economically viable option, in terms of labour and slurry management
- Improvements in performance are likely to be found in bulls accommodated on slats overlaid with rubber
- This increase in performance will offset the expenditure of overlaying concrete slats with rubber within **3-4 years**
- For the winter housing period of beef cattle (an average of 191 days in the AFBI studies) overgrowth of the claw on rubber-covered slats is not a concern
- Additionally overlaying slats with rubber provides:
  - more comfortable floor, allowing bulls to get up and down more easily
  - cleaner cattle
  - less hoof bruising

Research Team

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