

4 | Housing systems

Requirements

- The Red Tractor Assurance Dairy Scheme requires that all cattle housing must be constructed to provide a safe, hygienic and comfortable environment and must be maintained to avoid injury and distress.
- The Cattle Code states that the accommodation should provide shelter with access at all times to a lying area which has either well maintained dry bedding or is well drained.

4.1 Housing options

In the UK there are three main options available for housing dairy cattle.

- Cubicles
- Straw (loose) yards
- Kennels

When selecting a system, it is important to consider the initial construction costs, ongoing management and maintenance costs as well as the animal health and welfare implications. There is also the added consideration of environmental factors, land and nutrient management.

Cubicles and/or straw yards are most commonly used in GB. There are advantages and disadvantages to both housing systems and it is, therefore, impossible to state categorically which is the best suited to the modern dairy cow. Both systems can work equally well with regard to cow welfare and productivity, with much of the variation due to management decisions and actions. In the USA, cubicles are more commonly referred to as stalls.

A brief comparison of cubicles and straw yards is illustrated in Table 4.a.

Table 4.a – Comparison of cubicles and straw yards

	Cubicles	Straw Yards
Risk of lameness/leg damage	Increased	Decreased
Risk of damage to knees and hocks	Increased	Decreased
Risk of environmental mastitis	Decreased	Increased
Stocking rate	Increased	Decreased
Quantity of bedding required	Decreased	Increased
Flexibility with bedding materials	Yes	No

4.2 Cubicles and straw-yard housing

Think about

Whatever system is used, it is important to provide as comfortable an area as possible to maximise lying time and to allow the cow to chew the cud and to rise normally.

The choice of housing system will, in part, depend on economics and availability of bedding materials, eg availability of sufficient clean, dry straw fluctuates considerably in many parts of GB and is, arguably, the main reason why the proportion of herds kept in straw yards has fallen in the past few years.

Cows in straw yards are likely to have less lameness than cows in cubicles. Less severe white line and sole lesions were identified in cows kept in straw yards compared to cubicles. However, heel erosions were greater in straw yards. Lameness is clearly of considerable concern due to the impact on both welfare and profitability. A study published in 2002 concluded that the reduction in milk yield for every case of clinical lameness was 360kg.

A study in the Republic of Ireland, found that cows housed in cubicles had more limb lesions and worse

mobility scores post calving compared to those on outdoor woodchip pads. However, 12 weeks post-partum, cows on woodchip pads that were not covered had higher sole lesions scores than on covered pads – considered to be due to the horn being softer from exposure to higher moisture levels in the open woodchip.

An observational study on 49 herds in Holland concluded that 82% of cows housed on cubicles had one or more claw disorders compared with 58% of cows housed on straw yards.

Hock and knee injuries are often more prevalent in cows housed in cubicles. This is likely to be due to the impact on the cows' joints from lying on insufficiently bedded or cushioned cubicles. Hard rubber mats with little bedding (less than 2cm) increase swollen knees as well as hock and knee lesions.

Several studies report more lameness and leg injury in cubicles than in straw yards. However, other studies have concluded that deep bedded cubicles work well for cow comfort but that one of the problems with cubicle buildings was the comfort of the standing areas. If underfoot conditions cause discomfort, cows will stand on the cubicle bases, leading to poorer cubicle hygiene and inherent udder health problems.

Cows in straw yards have a higher incidence of mastitis compared to cows housed in cubicles. In a study using herds with low cell counts, for every case of mastitis in cubicles, 1.15 cases of mastitis in straw yards were reported. However, when cows have access to less than one cubicle each, the incidence of mastitis (and lameness) is also higher.

Think about

The incidence of lameness and the number of injuries to cows and heifers due to less aggressive behaviour will be reduced by providing more lying and loafing areas.

In general, cows in the best managed straw yards lie for longer than those in most cubicle systems. However, cows in well-managed cubicle systems, with cubicles of adequate size and comfort, can lie down for periods comparable to those of cows in straw yards. Reviews conducted by the EFSA have shown that, given the

choice, cows would choose more individual space than is usually available in most dairy cow buildings.

There appears to be variation between sources as to the space allowance required for a 750kg dairy cow to lie down and loaf in a straw yard. The varying dimensions are shown in Table 4.b.

Table 4.b – Space allowances (m²/cow) in straw yards for a 750kg dairy cow

Source	Bedded area	Loafing area	Total
The Red Tractor (for a 700kg cow)	5.75	3.0	8.75
RSPCA	7.0	3.0	10.0
BS5502	7.5	3.0	10.5
DairyCo Mastitis Control Plan	9.4	3.0	12.4

Think about

Stocking rates should be calculated assuming a bedded area of at least 7.5m²/cow, where the design of the straw yard is optimal.

This should be increased to around 9.5m²/cow if the yard design is slightly compromised (eg narrow access, poorly located water trough, excessive bedded area width) or there are concerns about availability of clean, dry straw.

The DairyCo Mastitis Control Plan (DMCP) which promotes best practice advises that space allowances should be calculated based on milk production (eg lying area of 1.25m²/cow per 1000 litres/cow/annum). With average milk yields at around 7,500 litres/cow/annum, this equates to 9.4m²/cow, ie a 25% increase in area above BS5502. The DMCP recommends loafing area of 3.0m²/cow, providing a total space allowance of 12.4m²/cow.

Cubicle lying area, when adequately sized, will be around 2.8m²/cow. Both the Red Tractor Scheme and BS5502, recommend a further loafing area of a minimum 3.0 m²/cow. However, in practice, with a two row cubicle system, each cow shares 50% of the dunging passage (2.07m²) plus her space at the feed stance (3.22m²). This, therefore, equates to a total space allowance per cow of around 8.05m²/cow when housed in cubicles.

The selection of a particular housing system may be driven by the availability and costs of bedding materials and how these materials can be handled in an existing waste system.

With any housing system, there will be a large variation in quantity of bedding used and any quoted figures in Table 4.c need to be considered as an average. Table 4.c gives an indication of the bedding quantity which may be required in differing housing situations with cow comfort and cow cleanliness as the underlying aim.

Table 4.c – Bedding type and quantity

Bedding type	Daily use kg/cow/day	Total use (180 day winter) kg/cow/winter
Straw (bedded yard)	20	3600
Straw (chopped) mat	2.5	450
Sawdust – kiln dried	1.0	180
Sawdust – fresh	2.2	396
Sand	16	2880
Recycled paper-based material	2.2	396
Lime ash	1.0	180
Gypsum	0.5	90

The labour component of any housing system also needs to be considered. Straw yards require a daily application of straw which has to be brought to the farm, handled and stored (preferably under cover) and then dispensed onto the yard. The straw yard requires cleaning out every three weeks and the waste material stored for subsequent disposal. At the other extreme, bedded cubicles would normally have the surface of the bed raked and conditioned at each milking and fresh bedding applied twice a week.

Think about

- Regardless of what type of housing is constructed, the majority of studies stress the need for the system to be well designed, maintained and managed.

Further reading

- BS5502:40 (2005). Buildings and structures for Agriculture – Code of Practice for design and construction of cattle buildings.
- The EFSA Journal (2009) 1143, 1-38. Scientific Opinion on the overall effects of farming systems on dairy cow welfare and disease.
- EFSA (2009). Scientific opinion on welfare of dairy cows in relation to udder problems based on a risk assessment with special reference to the impact of housing, feeding, management and genetic selection.
- Phillips, C.J.C. and Schofield, S.A. 1994. The effect of cubicle and straw yard housing on the behaviour, production and hoof health of dairy cows. *Animal Welfare* 3: 37-44.
- M von Keyserlingk and D Weary. 2009. Improving the Welfare of Dairy Cattle: Implications of Freestall Housing on Behaviour & Health. *Proc. Western Dairy Management Conference*. 43-52.