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5 | Building construction and design

Requirements

Other than complying with local planning regulations, there are no further specific legal animal requirements which have a direct impact on building construction. Careful consideration should include what will best suit the site, cattle and staff.

5.1 Building construction

BS5502 provides recommendations and principles for buildings which are to be used for housing dairy cattle. The basic building structure used in GB, whether for housing cattle in straw yards or cubicles has remained relatively unchanged for a number of years.

In recent years, the importance of good building design has been highlighted particularly as a result of the collapse of thousands of agricultural buildings due to heavy snowfall over winter. While the age and structural weaknesses of some of the buildings was a factor in their collapse, there were also some newer buildings that failed due to inherent poor design features that could so easily have been avoided. The BS5502 standard allows certain farm buildings to be designed to a reduced standard compared with other buildings in terms of snow loading due to their limited human occupation and consequent reduced risk to life.

If buildings may potentially be used for other purposes, or have additions fitted such as solar panels then it would be sensible to establish the requirements of such fittings prior to construction.

Think about

Following recent heavy snowfalls, when repairing or replacing damaged buildings it is advised that additional advice be sought from a structural engineer and to consider applying a more demanding snow loading.

Think about

The Rural & Industrial Design and Building Association (RIDBA), has detailed knowledge of the function and environmental requirements of modern agricultural and industrial buildings. They provide information on siting, planning, design and construction of new buildings. Along with conversion and diversification of existing buildings.

Most common is metal span building with side walls constructed of blocks, wood or concrete. The side walls should be completed with some form of ventilation, most commonly space boarding or Yorkshire boarding.

Metal span building

The degree of complexity of the building will ultimately depend on the end use. If a building is to be utilised solely for dairy cow housing for 12 months of the year, it is easier to justify a specialist building. If the building is to house cattle for two or three months and will then fulfil other roles, the design is likely to be more general purpose. However, often this involves compromise, especially to the ventilation of the building, which can have adverse impacts on cow health and welfare.

If the decision is taken to provide shelter at minimal cost then a simple pole barn, utilising straw yards and large bales of straw for walls may have an attraction.

For example, using figures from the 2010 SAC Farm

Buildings cost guide, the difference in costs of different building types can be assessed. This is illustrated in Table 5.a.

Table 5.a Building type and associated building costs

Building Type	Cost £/m²
Timber pole barn	46
Kennel Building	100
General purpose building	185
Straw bedded yard building	194
Straw bedded yard building (drive-through feed passage)	219
Cubicle house	271

The cost of wooden frame buildings compares favourably with a metal frame building although wooden frame buildings tend to have a greater ongoing maintenance requirement. In addition, some farm systems do not suit kennel buildings with cubicle partitions with rear legs, which may make cleaning the back of the cubicle bed more difficult and also restrict the type of cubicle base fitted, ie no mattresses.

Wooden kennel building

The previous generation of kennel buildings had narrow feed and scrape passages but modern kennel buildings are now available with dimensions more suited to systems with larger cows and machinery.

At Wageningen in Holland, a plastic-coated building has been constructed over an aluminium framework. The framework forms a series of domes over which tensioned plastic has been fitted. The environment within the building is extremely light and airy although they have had significant problems with ingress of solar radiation and rising summer temperatures.

The sides of the building consist of tarpaulin curtains which can be lifted and lowered depending on external weather conditions. The building cost is around 70% of the cost of a conventional span building.

Other types of buildings are available, farmers may erect forms of shelter for their animals in various structures. An example is illustrated below.

Roundhouse

5.2 Example layout options

While it is impossible to provide an outline layout for every scenario, there are a number of basic fundamental designs which can be used to prepare example layouts. The example layouts which follow in subsequent sections describe cubicle layouts and straw yard layouts for lactating cattle and youngstock.

These layouts should be considered as examples and should not be used for detailed designs, working drawings or construction. To standardise building dimensions, layouts are prepared to accommodate typical herd sizes of between 150 and 240 cows.

The dimensions used in the various example layouts are above the minimum dimensions described by some of the standards but would be considered to be best practice.

5.3 Adaptations to existing buildings

Often existing buildings are adapted to serve either a different or dual purpose or to adopt a change of management system. Attention should be made to the dimensions of buildings to establish whether the proposed changes can be practically implemented.

It is advisable to safely assess the structure of the building, adapting a structurally unsafe building is not recommended.

Not all animals' requirements are the same, so care should be taken when designing adaptations. For example, ventilation is critical to the health of youngstock.

The location of buildings on the site should be considered when planning adaptations, for example, if new builds may be erected in the vicinity, air speed and movement are likely to be affected.

Further reading

- The Farm Buildings Handbook: A Source of Information for Anyone Involved in Farm Constructions, 2009, by Richard Langley.