

Better calf housing

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Key Messages

- Approximately 50 per cent of calf deaths are due to poor hygiene. A deep clean annually, or after a period of poor health and performance, is an essential part of the hygiene routine
- Calf housing must be dry, clean, free from draughts and easy to clean. Good hygiene must be practised to maximise calf performance
- Ensure there is a separate, cleanable area for milk preparation and that any moisture from washing or cleaning of equipment is well away from calf pens
- Sick animals present a health risk to all others in the group and good management practices for sick animals should be in place, eg use of sick pens
- Control of moisture through ventilation and drainage is essential, as dampness has a negative impact on calf performance
- Cut channels in the concrete and form 75–100mm gutters away from target area if drainage is not competent
- Providing constant fresh air through ventilation is essential in preventing respiratory diseases. Ensure the airspeed is no more than 0.5 metres per second, which would cause draughts
- During cold weather, maintain growth rates by ensuring there is plenty of dry and clean bedding, altering milk intake, and consider the use of calf jackets, heaters or blankets
- During warm weather, maintain growth rates by ensuring there is shade and cold water available, altering milk intake to provide extra energy, and consider reducing the stocking rate
- Calves should always have access to fresh, clean water which helps to increase starter intake and develop the rumen
- From eight weeks of age, calves must be group housed as this is associated with improved social development and growth rates
- Calf hutches provide an alternative housing option as, although more labour intensive, they have a lower initial investment cost
- Hutches should not be in hot, windy or wet locations and care should be taken to ensure they provide adequate ventilation, drainage and space



The information in this booklet was compiled by AHDB and Jamie Robertson MIAgrE.

Photos courtesy of Jamie Robertson.

Introduction

The first three months of a calf's life are crucial. They help determine its future health, growth and performance.

Calf housing design should support good health and welfare, which ultimately benefits the farm business financially. There are a number of different housing systems available for calves, but they must provide for the animals' needs so that performance is maximised and welfare standards met.

Basic requirements for calf systems are:

- Clean and cleanable
- Dry, with excess moisture continually removed
- No draughts (target wind speed in calf shed – 0.2 metres per second)

One of the major causes of mortality and poor performance in youngstock is pneumonia. The disease can often be avoided if buildings are well designed and managed, with good ventilation and drainage.

Further information on managing pneumonia can be found in the BRP+ document **Better management of bovine respiratory disease**.

Approximately 50 per cent of calf deaths are due to poor hygiene. A deep clean annually, or after a period of poor health and performance, is an essential part of the hygiene routine.

Hygiene

Good hygiene is very important for calf systems. Compared to older stock, a calf's immune system is not fully developed, making them vulnerable to environmental factors. Approximately 50 per cent of calf deaths are due to scours caused by poor hygiene on farm.

All components of the housing system, eg floor, drains, walls, feeders and drinkers must be cleanable and easy to keep clean. Surfaces that are porous or old are not easy to clean and are, therefore, not suitable.

Calf housing must be dry, clean, free from draughts and easy to clean. Good hygiene must be practised to maximise calf performance.

The optimum calf systems operate on an all-in, all-out basis whereby a whole building or air space is emptied of calves, cleaned, disinfected and dried before restocking.

Continuous flow systems, where calves are entering facilities without a rest period, are likely to have more disease problems so there should always be at least one pen empty so it can be effectively cleaned and dried. However, it is difficult to clean a pen within a building without increasing the risk of spreading disease pathogens in dirty water or aerosols to other calves within the same airspace, especially when pressure washing is used.

It is strongly recommended that systems should undergo a deep clean annually, or after a period of poor health and performance.

For further information, watch the **Calf house hygiene** video, available on the AHDB Dairy website.

Maintenance of floors and walls so that they can be effectively cleaned has significant benefits. It reduces the labour required for cleaning and increases the effectiveness of chemicals, which subsequently affects animal health. Surfaces with visible cracks or porous surfaces can be sealed with renders, epoxy resins and coatings.

Repair cracked floors and renders to improve hygiene. Render over cracks and, for larger gaps, use renders or cement mortar mix replacing half the water with a bonding agent. Apply epoxy resin coatings for walls in calf facilities.

Ensure there is a separate, cleanable area for milk preparation and that any moisture from washing or cleaning of equipment is well away from calf pens.

Calf systems should have a separate, easy-to-clean area for the preparation of milk feeds. There should be an adjacent area for the washing and drying of feed buckets, teats and troughs, with drainage out of the building. Washing and cleaning creates a lot of moisture which should be kept well away from calf pens.

Table 1. Recommended equipment cleaning procedure

Step	Solution	Temperature	Result
Rinse	Water	32–38°C	Removes dirt and milk residues
Soak	Chlorinated alkaline detergent solution	54–57°C	Kills bacteria and lifts milk proteins
Scrub	To remove residues		
Wash	Water	>49°C	Prevents particles reattaching to equipment
Rinse	Acid sanitiser	Follow manufacturer's instructions	Prevents growth of any remaining bacteria
Dry	Equipment raised onto drying racks		



Clean feeding buckets are essential to minimise disease spread

Further information on milk feeding can be found in the BRP manual **Better Returns from calf rearing**.

The location of the calf pens relative to the location of other stock on the unit can have a significant impact on the likelihood of cross-infection between batches of animals of different ages. Ideally, the calf house should be located in the most predictable flow of clean air, so on the predominant wind side of the farm. Where this is not the case and calves are downwind from older stock or even sharing the same airspace, there is an increased risk to health. Air hygiene is more important to calves than to any other livestock on the farm.

Sick animals within groups present a health risk to other animals. They also recover faster if they are removed and isolated to ensure their particular needs are met. A sick pen should be available in all group-housed systems, either located within the group pen or within the building so that visual and aural contact can be maintained. Sick pen requirements include:

- Easy to clean, into well-defined drainage
- Dry bed, possibly straw over slats, no draughts and fresh air
- Direct pen drainage with no leakage onto passageways
- Solid pen division adjacent to other stock
- Individual food and water
- IP66 (Ingress Protection 66 – ensuring socket is dust tight and watertight to powerful water jets) standard socket for heat lamps and good lighting

Sick animals present a health risk to all others in the group and good management practices for sick animals should be in place, eg use of sick pens.

Design for cleaning

It is easier to effectively clean and remove all organic matter from housing when it is empty. It is also advisable to remove pen divisions and feeders. A primary wash or pressure wash should be followed by a detergent soak, a water rinse, and application of disinfectant at the recommended concentration. Note that a wet pen will reduce the effective concentration of disinfectants, so either remove excess water with a squeegee or increase the concentration of the disinfectant. Steam cleaning should be used annually or after specific health issues such as *Cryptosporidium*. After cleaning, it is essential to allow the shed to dry before use. Do not add new bedding until it is completely dry.

Further information on cryptosporidiosis can be found in the factsheet **Controlling cryptosporidiosis in calves** available on the AHDB Dairy website.

Protecting your herd against infection with bovine TB in high risk areas – requirements for housing livestock

The Animal & Plant Health Agency (APHA) recommends the following:

Animal housing should be made wildlife-proof as far as is practical. Sides, doors and gates of buildings should be of a smooth and solid construction and more than 1.5m high to prevent wildlife from gaining access. Sides should not be open and gaps at the sides or under doors and walls should be no greater than 7.5cm and must not be able to be enlarged by digging or chewing. Solid sheets of metal can be added to barred gates. Raise feeders, troughs and mineral licks at least 75cm off the ground.

Floors and drainage

Control of moisture through ventilation and drainage is essential as dampness has a negative impact on calf performance.

Dampness in a building at any level has a negative impact on animal performance. Humidity in youngstock buildings reduces the temperature felt by the stock and increases survival and contamination from pathogens. Control of moisture in calf houses is essential and requires good drainage and effective ventilation.

A calf should always have a dry bed. Concrete floors should have a minimum slope of 1.6 per cent (one in 60) across the whole pen and 5 per cent (one in 20) for areas with expected high moisture levels, to allow effective drainage of water and urine from under straw. A drainage channel at the front of the pen will also help to remove water and urine.

Calves feeding on automatic systems will consume significant volumes of milk, so pen drainage is essential to remove urine and keep the bedded area dry. The pen should be designed so that calves can only drink from a concrete standing, away from the bedded area, to assist in bed cleanliness.

When feeding calves on automatic systems, there are a variety of options to ensure sufficient drainage:

- In straw-bedded systems, ensure there is a 1 in 20 floor slope for a two metre radius surrounding the feeders
- Mount the feed station on a concrete plinth surrounded by gully drains
- Mount the feed station and immediate surrounding area over slats

There should be easy access to the feeder for operators to clean and service the machine. The surrounding area needs to have sufficient drainage to deal with the waste water produced during the daily cleaning cycle.



Focused drainage around automatic feeders

Cut channels in the concrete and form 75–100mm gutters away from target area if drainage is not competent.

Where existing floor drainage is not competent, cut channels in the concrete and form 75–100mm gutters away from the target area. If the overall floor slope does not make it easy to slope a gutter to the exterior of the building, create a sump in the floor. Use a submersible electric pump to remove collected dirty water from the building.

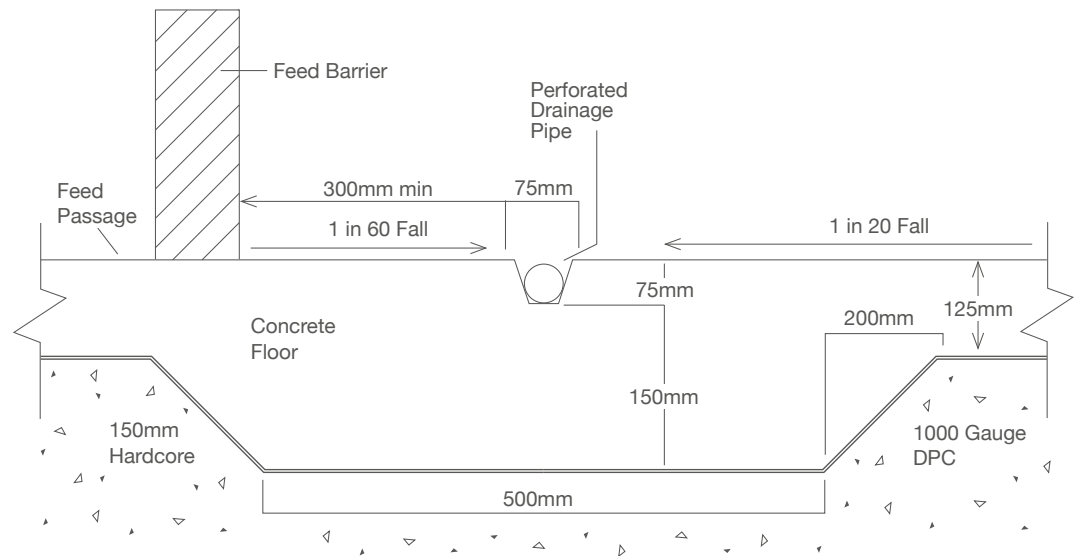


Figure 1. Construction of a drainage channel
Source: Department of Agriculture, Food and the Marine, Ireland (2016)

Providing constant fresh air through ventilation is essential in preventing respiratory diseases. Ensure the airspeed is no more than 0.5 metres per second, which would cause draughts.

Ventilation

A constant supply of fresh air is essential in preventing respiratory and other diseases, together with improving production. Good ventilation removes stale, damp air, which helps ensure viruses and bacteria cannot survive for long outside the animal. Cobwebs in buildings and condensation on the underside of roofing are signs of poor ventilation.

While fresh air is essential, it is important to avoid draughts at calf level. A draught is when the airspeed is greater than 0.5 metres per second. Airspeed can be measured in calf housing using an anemometer.

The use of large-volume or general-purpose buildings is not recommended for calves. This is because young calves will not generate enough heat energy to generate the stack effect, which drives warm air up and through outlets in the roof. When the airspeed drops, is at zero, or where calf pens are shut off from the influence of the wind, there will be no ventilation.

Many calf houses in the UK can be improved by modifying the sidewall cladding to get the most benefit from the wind, without losing control of airspeed inside the building. This is best achieved using ventilated cladding sheets or Yorkshire boarding on all sides of the building, including the gable ends. Standard space boarding is not always effective because it does not eliminate wind-driven rain or reduce higher wind speeds.

Mechanical ventilation is required in most calf houses to ensure air flow at all times. Mechanical ventilation should be designed to the height and requirements of specific buildings. It should specify duct diameter and length, fan capacity and diameter of outlet holes in the duct. Seek advice from an expert in housing.



Yorkshire boarding



Positive pressure ventilation providing adequate air flow in the calf shed

Temperature



Max/min thermometer

The temperature in nearly all calf houses in the UK is the same as the outside temperature, apart from when it is sunny outside, in which case it is colder inside the calf house. Regardless of housing type, a newborn calf will feel cold when the temperature is between 10–15°C. By one month of age, a healthy calf can comfortably withstand temperatures around freezing point. This is why the design requirements for a dry, draught-proof environment at calf level, without decreasing the ventilation and fresh air, is extremely important.

To maintain desired growth rates during periods of cold weather:

- Monitor and record daily temperature in the calf shed using a max/min thermometer
- Be vigilant for calves shivering or with raised hair
- Supply plenty of dry bedding to allow calves to nest (see bedding tips on page 7)
- Increase the volume of milk or the concentration of milk powders to provide calves with enough extra energy to maintain their body temperature, to help them grow and to remain healthy

Further information on milk feeding can be found in the BRP manual **Better returns from calf rearing**.

During cold weather, maintain growth rates by ensuring there is plenty of dry and clean bedding, altering milk intake, and consider the use of calf jackets, heaters or blankets.

Calf jackets

Calf jackets, coats or blankets can be used to help keep calves warm, dry and healthy when temperatures fall below 15°C. Before investing in these products, ensure your calves are receiving sufficient energy and have dry bedding to keep warm.

Calf jackets must be breathable, water-resistant (or waterproof) and machine washable. Different types of adjustable straps and fasteners are available. Plastic fasteners are preferable, as velcro will clog and require additional cleaning and maintenance.

Calf jacket protocol

1. Ensure there is a max/min thermometer in the calf house.
2. Reset thermometer every morning during autumn/winter housing.
3. Decide on the set temperature in calf shed for your system, eg 10°C.
4. Agree protocol with staff that initiates the use of calf jackets, eg three consecutive night-time temperatures below minimum limit eg 10°C.
5. Calves must be dried off before using a jacket.
6. Place clean jacket on every calf under one week old and on entry to calf house.

Removing calf jackets

Deciding when to remove calf jackets depends on energy dynamics, such as the condition and appetite of the calf and expected weather. The standard protocol to consider is listed below, but you can keep a calf jacket on the calf until four weeks of age.

Calf jacket removal protocol

1. Know the weather forecast – steady or rising temperatures may require jacket removal but beware of removing jacket too early if temperatures are falling.
2. Agree with staff a temperature for healthy calves where jackets can be removed, eg one week old >10°C, two weeks old >5°C, more than three weeks old >2°C.
3. Refer to recent night-time minimum temperatures.
4. Consider individual calf condition, feed intake, health and growth rate.
5. Remove jacket in the morning to allow calf to adjust throughout the day.
6. Remove dirt from jacket with a hose/light power wash or pre-soak.
7. Wash jacket at 40–50°C with detergent and dry.

Further information on using calf jackets can be found in the Dairy factsheet **Calf jackets** available on the AHDB Dairy website.



Calf jackets are a good option to offer warmth to calves during cold weather

Heaters

Quartz linear heaters are useful for group pens and especially sick pens as they don't heat the air, only the surfaces that are within range. The calf facilities should have an IP66 ring circuit and sockets so that lamps can be used where required.

Calf heater protocol

1. Provide waterproof ring circuit main and sockets (IP66 standard) above pens.
2. Provide a frost stat on the circuit and ensure power rating can accommodate all heaters on a circuit.
3. Use 250w infrared bulbs over individual pens (one for every two pens).
4. Use 1500w linear heater (IP55 standard) wall-mounted or hanging above group pens.
5. Hang linear heater at height recommended by manufacturer.
6. Agree set temperature, as above, for frost stat override for sick calves.



Heaters are another good option to offer warmth to young or sick calves



Calf nesting

Bedding tips

When nesting, the calf's legs should not be visible. Dry bedding will keep jackets relatively clean and dry. While sand, sawdust or shavings are suitable bedding choices for summer months, these are poorer choices for winter, since they provide no thermal protection to the calf. Straw is the ideal bedding for winter.

High temperatures

At environmental temperatures above 25°C, calves will become heat stressed. To counter this, they will start to sweat to lose some of the excess heat. Feed intake will be reduced, while energy will be directed away from growth and the immune system to aid with cooling of the core temperature. This will reduce the growth rate of the animal and increase the risk of disease. If monitoring rectal temperatures, any animals above 39.4°C are heat stressed.

To maintain growth rates during warm weather:

- Monitor and record temperature in the calf shed daily, using a max/min thermometer
- Be vigilant for calves sweating, panting or drinking excessively
- Consider reducing the stocking rate
- Keep water out of direct sunlight and change often
- Provide shade
- Increase the volume of milk or milk solids to provide calves with enough extra energy

During warm weather, maintain growth rates by ensuring there is shade and cold water available, altering milk intake to provide extra energy, and consider reducing the stocking rate.

Roof lights are beneficial in reducing the need for artificial lighting, therefore reducing lighting costs. However, they can increase heat within a building when fitted on the south-facing aspect. Roof lights on a south-facing roof will be highly beneficial to youngstock in the winter months, but may need to be washed out with water-based paint for the summer months to prevent high temperatures.

Further information on managing calves during warm/hot weather can be found in the factsheet **Managing calves in warm/hot weather**, available on the AHDB Dairy website.

Feed and water

Calves should always have access to fresh, clean water which helps to increase starter intake and develop the rumen.



Clean bowl drinker

Calves should always have access to fresh, clean water, even when on milk. Drinking water increases starter intake and rumen development. Calves perform best with fresh drinking water available to them from birth, drinking up to two litres per day over and above the milk-fed ration. Drinkers are best located above or near drainage, with clear access for stock and easy access for staff to provide regular cleaning. Calves on automatic milk feeders still require a separate ad-lib water source.

Calves that are bucket or teat-fed will feed simultaneously and so clear access is required for every calf. Any restriction on access to feed and water will restrict the growth of at least some stock in a group.

Housing

Calves kept in individual stalls, pens or hutches (except those in isolation) must be allowed direct visual and tactile contact with other calves. Calves must have sufficient space to stand up, lie down, turn around, stretch and groom.

Table 2. Space requirements for individual calf pens

Calf weight	Pen size per calf
<60kg	1m x 1.5m
60–80kg	1m x 1.8m

Source: Red Tractor Assurance Standards (2017)

It is recommended that calves are group housed from three weeks of age and, unless an animal is kept in isolation on the advice of the vet, it is compulsory they are group housed from eight weeks of age. While individual pens help limit the spread of disease, they also limit social interaction and learning, eg taking to dry feed. Keeping young calves in small groups can increase feed intake and growth rates compared to individual pens.

From eight weeks of age, calves must be group housed as this is associated with improved social development and growth rates.



Calves in group housing

Group sizes are mostly defined by the feeding system. When calves are fed in groups, it is important to ensure animals that drink slowly are consuming what they need and fast drinkers are not consuming too much. It is recommended that the maximum number of calves in a group is 12 so that it is easy to observe animals and identify and treat any sick calves.

Group pens improve social development and are associated with improved weight gains after three weeks. There are also benefits in labour efficiency. However, there is increased risk to the group from sick animals and the recommendation is to have clear guidance for the management of sick calves.

Table 3. Space requirements for group housing

Calf weight	Space requirements per calf
50–84kg	1.5m ²
58–140kg	1.8m ²
140–200kg	2.4m ²

Source: Red Tractor Assurance Standards (2017)

It is good husbandry practice to minimise the number of times a calf is mixed with others, so that, as animals progress through the farm system, they can be kept in same-size batches.

Air space is as important as floor space. Chapter 16 in the **AHDB Dairy Housing – a best-practice guide** recommends that, from birth, calves should have six cubic metres of air space, increasing to 10 cubic metres by eight weeks of age and 15 cubic metres by six-to-seven months of age.

There are many calf housing options available, each having advantages and disadvantages. All calves should be raised in an environment that is clean, dry, well drained, well-bedded, draught-free and well ventilated.

Calf housing doesn't have to be elaborate to be effective. Even the very best facilities will not succeed without proper management.

Purpose-built calf sheds

A purpose-built calf shed may have high start-up costs and planning permission will be required. However, it is likely to be efficient to operate. A purpose-built shed could include:

- A storage area for feed, medications and equipment
- Feed preparation and washing area
- A hospital area for sick calves
- An area for handling calves
- Weighing equipment
- A loading ramp

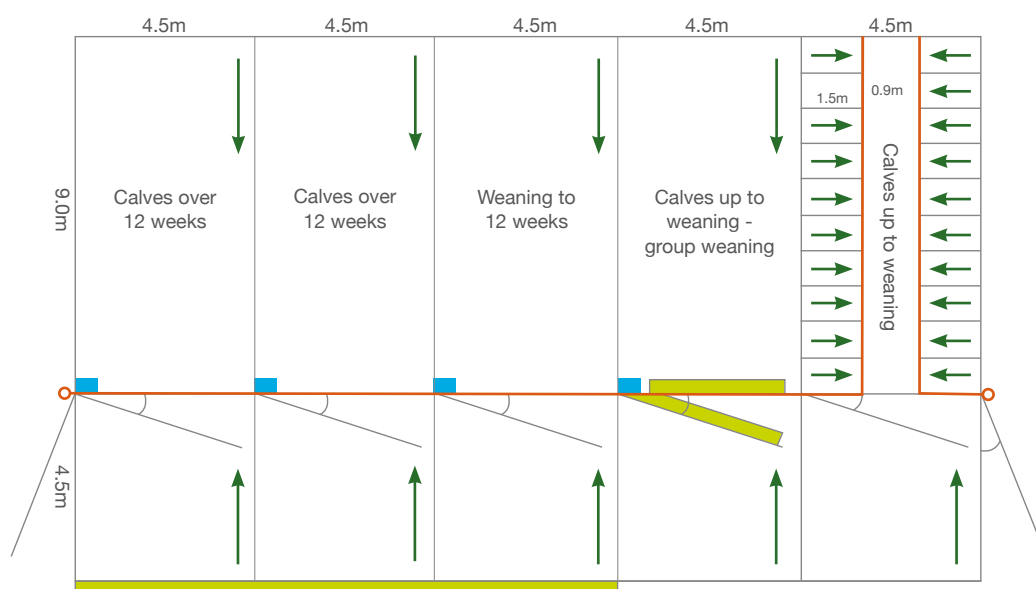


Figure 2. Example design of a purpose-built shed

- ➔ Direction of drainage (minimum slope of 1 in 60. Optimum slope of 1 in 20)
- Drainage channels located outside pens
- Sump/link to external drainage
- Water trough
- Feed trough

Figure 2 shows an example design of a purpose-built calf shed. Drainage channels are located immediately outside pen fronts. The slope of the channels should be a minimum of 1 in 40 and a maximum of 1 in 60. Where the drainage channel crosses the access to the individual calf pens, it should be covered with a grid. The green arrows indicate the direction of the floor slope towards drainage channels. Floor slope should be a minimum of 1 in 60 but, for optimum drainage, 1 in 20 is advised. Sick pens can be set up for individual animals in the area housing calves up to weaning. For groups of calves, a sick pen can be set up in a corner of one of the larger pens.

There are a number of considerations for the feed preparation and washing area. It is good to have a lean-to area on the gable end of the shed. It should have running cold water, a water heater, a mixing tank for milk, a sink and drying area raised from the ground, adequate drainage to eliminate all water and a storage cabinet. Weighing equipment and a loading ramp may also be incorporated into a purpose-built calf shed.

Table 4. Benefits and considerations of a purpose-built calf shed

Factor	Benefits	Consideration
Disease control	Good if building is run on an all-in, all-out system	Group housing can allow spread of disease, particularly when constantly stocked
	Solid surfaces are easy to clean	
Ventilation	Can be located to maximise wind-driven ventilation	Will not ventilate when wind speeds low or zero, particularly if high volume building
		Will need mechanical ventilation, which is easy to install and good value long-term
Shelter	Excellent shelter provided if draughts are avoided without preventing fresh air access	Building can exaggerate weather conditions, creating wind tunnels or no airflow
		Some materials will make cold temperatures colder and hot temperatures hotter
Location	Good building design can accommodate any location	N/A
Hygiene	Can achieve good hygiene levels if building structure is well maintained and drainage competent	Hygiene can be compromised if there is poor drainage and surfaces are hard to clean
Costs	Lower running costs as can be designed to calf and business needs	Temptation to build a general purpose building which compromises on calf requirements
		Relatively high capital costs compared to other systems
Labour	Good logistics	Requires staff to work indoors all year round
	Working indoors during harsh weather	

Calf hutches provide an alternative housing option as, although more labour intensive, they have a lower initial investment cost.

Hutches should not be in hot, windy or wet locations and care should be taken to ensure they provide adequate ventilation, drainage and space.

Single and group hutches

The many causes of reduced health and performance from some buildings have led to the development of alternative systems based around much smaller, modular designs of housing, such as single and group hutches.

Hutches should not be placed in excessively hot, windy or wet locations, but a sunny location in winter will allow the run and part of the bedding to dry out. Light-coloured, reflective hutch materials will reflect sunlight and prevent the hutch from heating up too much.

During hot summer conditions, hutches should be placed in a shady area, or extra shade may need to be provided. Fold-down or removable ventilation panels may be used and hutches can be raised on concrete blocks to increase airflow underneath.

A disadvantage associated with some hutch systems is labour costs. This can be addressed by providing greater amounts of automation, such as milk carts. The cost of investment in automation is offset by saved labour time.



Single pen calf hutch

Single hutches

Each hutch must have an outside run for calves to move around and get fresh air. The hutches should be situated on either a free-draining concrete slab, or a 15cm porous base such as chalk, ensuring that any effluent goes to a suitable site for disposal. The outdoor run should slope away from the hutch. Securing the feed and water buckets outside the hutch is labour efficient and helps keep the lying area dry.

Plenty of clean, dry bedding (normally straw) needs to be provided and should be disposed of after each batch of calves. Ideally, the hutches should be moved after each batch of calves to minimise disease risks. Although hutches are considered to be a good form of housing for calves, there are downsides, including staff having to feed and check the calves in all weathers.

Table 5. Advantages and disadvantages of single calf hutches

Factor	Advantages	Disadvantages
Disease control	Good for disease control with limited contact between calves	Disease control can be a problem if there is poor drainage or the area is not rotated
	Easy observation of all calves	
Ventilation	There is excellent ventilation in some hutch designs	Some designs have a limited roof outlet
Shelter	The inside is dry and protected from the weather and outside the calf is able to get limited exercise and sunlight	Extra shade may need to be provided in summer
	The calf is able to choose its preferred environment	Adjacent structures can create wind tunnels
Location	Hutches can be orientated towards the sun, or moved to locations that are most suitable according to the season	Wind chill can occur unless the hutches are protected from all directions
Hygiene	Synthetic materials are easy to disinfect	Cleaning can be very labour intensive and cleaning porous bases presents a hygiene problem
	Hutches can be moved to clean ground	
Costs	Cheaper than purpose-built sheds	Can be costly, depending on source and when all set-up costs are considered
	Modular design means scale can be increased slowly	
Labour	Better work environment, with less air pollution, in good weather	Staff work outdoors in all weathers
		Feed and water may need to be carted some distance, unless automated systems can be designed



Calves in group hutches

Group hutches

Group hutches and igloos are designed for groups of calves and allow the calf to choose between a sheltered warm environment and an outside area for exercise and play.

Table 6. Advantages and disadvantages of group hutches

Factor	Advantages	Disadvantages
Disease control	Small groups are better than large groups	Group housing can allow spread of disease
Ventilation	Good access to fresh air	Some designs restrict ventilation, although this can be easily fixed
	Ventilation inside is variable	
Shelter	Excellent shelter with calves able to choose their preferred environment	Outside runs can become very damp
Location	Can be orientated towards the sun	Poor location can leave hutches very exposed to high wind speeds
Hygiene	Synthetic materials are easy to disinfect	Poor drainage can be the biggest weakness
	Hutches can be moved to clean ground	
Costs	Cheaper than purpose-built sheds	Running costs can be higher due to labour and straw
Labour	Suited to group feeding systems, for ease of management	Staff work outdoors in all weather

Conclusion

There is no single best way to rear calves and there are endless variations within each system. Any calf housing system will need to be tailored to the individual farm's particular circumstances (budget, labour, facilities, etc). Remember that the aim of all calf housing systems is to protect the calves' welfare by providing a clean, safe and comfortable environment.

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