

Best Practice Manual

for production of poultry with reduced
Campylobacter contamination



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Preface

This document has been developed under the research project ‘Campylobacter control – Novel approaches in primary poultry production (CamCon)’, financially supported by the European Union’s Seventh Framework Programme (FP7/2007-2013) under grant agreement no. 244547.

The overall aim of the CamCon project has been to provide new scientific knowledge on prevention of *Campylobacter* at poultry farm level, and to translate and communicate these findings into guidance to broiler producers within the European Community.

While another important zoonosis in poultry production, salmonellosis, has been successfully addressed within the EU, campylobacteriosis still presents a problem to human health. *Campylobacter* is the most frequent bacterial cause of food-borne illness with diarrhea in Europe causing nine million cases of human disease annually in the EU alone.

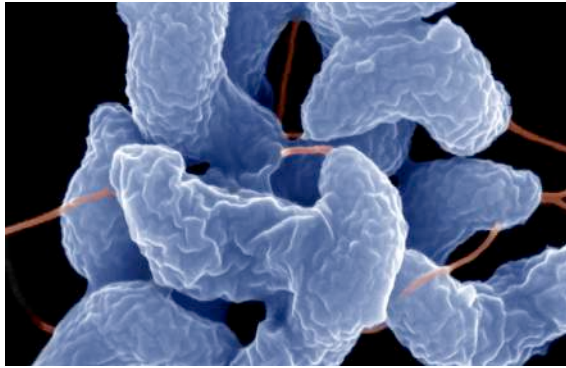
Several guidance documents on good hygiene practices at farm level have been developed at international and national levels, and have been implemented by national authorities and the poultry industry. These guidance documents will to some extent also help in preventing the introduction of *Campylobacter* to poultry flocks, but have to be upgraded in order to be effective against *Campylobacter*.

As *Campylobacter* is a very common organism in both domestic and wild animals it follows that the environment around poultry houses almost invariably provides a constant source of contamination. For this reason, biosecurity forms a central part in the procedures for *Campylobacter* prevention at poultry farms. This manual aims at highlighting and explaining these procedures in a way that can be implemented directly by the poultry industry.

It is important to stress that this manual cannot stand alone, but should be integrated in existing producer guidelines and quality programs for poultry meat production.

This manual is supported by two other outputs from the CamCon project. One is a comprehensive e-learning program on *Campylobacter* and biosecurity that may be used by poultry producers and poultry advisors to train and educate farm staff. Another is a Draft Certification Program that may be used by poultry companies and independent auditors to certify poultry farms with respect to *Campylobacter* control as part of a company quality program. Both are available at www.camcon-eu.net.

1.0 *Campylobacter* and biosecurity



Campylobacter seen in an electron microscope.

What are *Campylobacter*?

Campylobacter are tiny bacteria. They are not visible to the naked eye, nor by a magnifying glass. You need a microscope to see them.

Here you see the *Campylobacter* bacteria. They look like worms and have a length of up to 5 microns. This is only 5 thousandths of a millimeter.

Campylobacter prefer low oxygen levels, but they can survive a long time on the ground in open air and water. When eaten by a chicken conditions for

Campylobacter improve. The chicken gut with low oxygen offers the most favourable condition for growth. The chicken gut can contain a billion *Campylobacter* cells per gram of intestinal content without health effects or growth problems for the bird.

Where do they come from?

From their sources *Campylobacter* can be transmitted to places where they create a risk for infection of people.

The primary source of *Campylobacter* is faeces from livestock, in particular poultry, sheep, swine and cattle. Other sources are faeces of rodents, wild birds or insects or entire animals such as dead birds, beetles, or flies.

Transmission and risk factors for chicken flocks

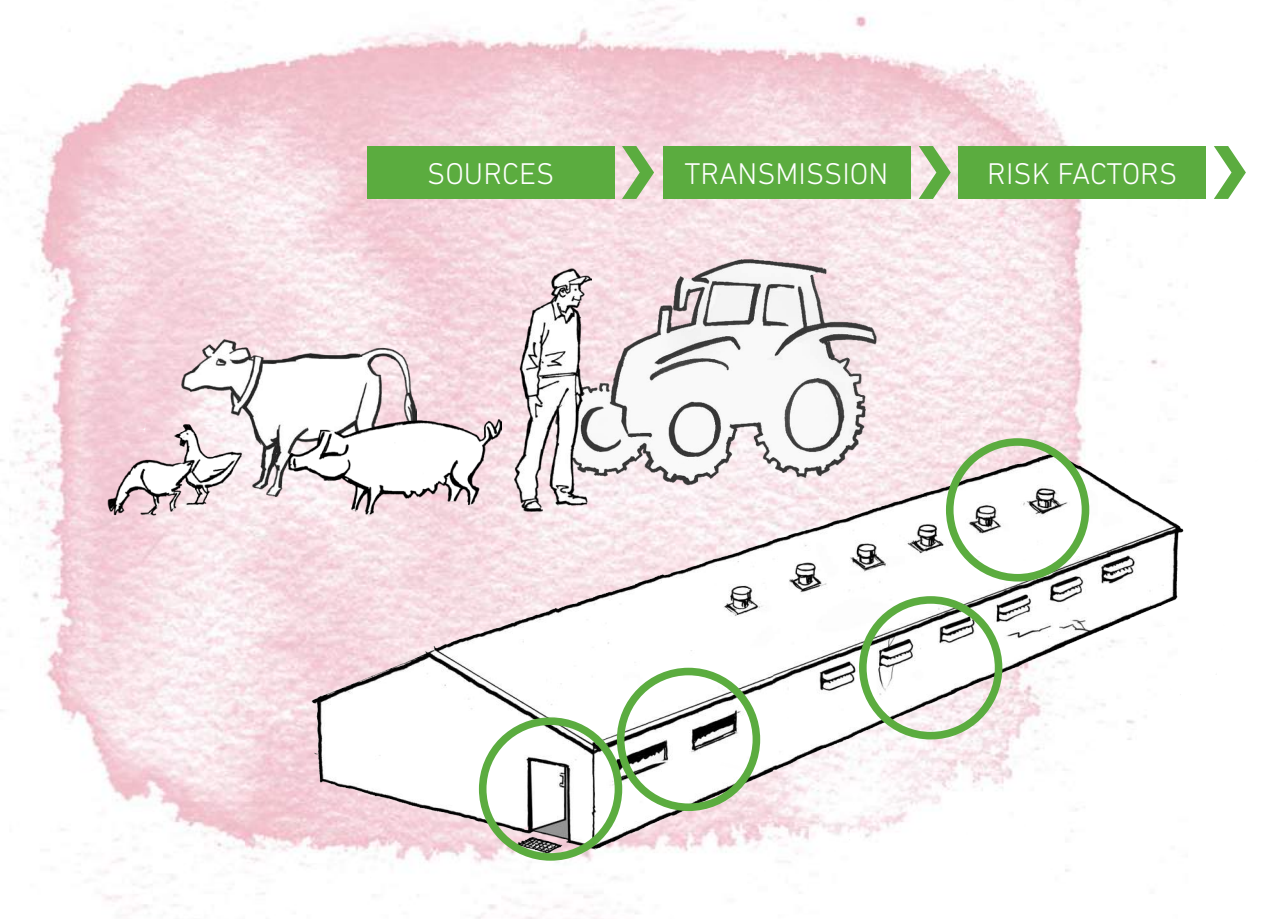
Campylobacter can be transmitted to the chickens by people, tools, equipment, the water supply, rodents or insects.

Risk factors for transmission are non-restricted person entrance, ventilation inlet areas, flaws in buildings, doors, gates and open doors and windows.

What is the problem with *Campylobacter*?

It is a serious concern from a food safety perspective if a chicken flock is colonized by *Campylobacter*.

All chickens will easily be heavily contaminated on feathers, skin and in the digestive tract. Meat will become contaminated after slaughter when it is cut. *Campylobacter* from the chickens may contaminate the chicken meat during slaughter. This creates a health risk to humans as *Campylobacter* will cause disease in people.



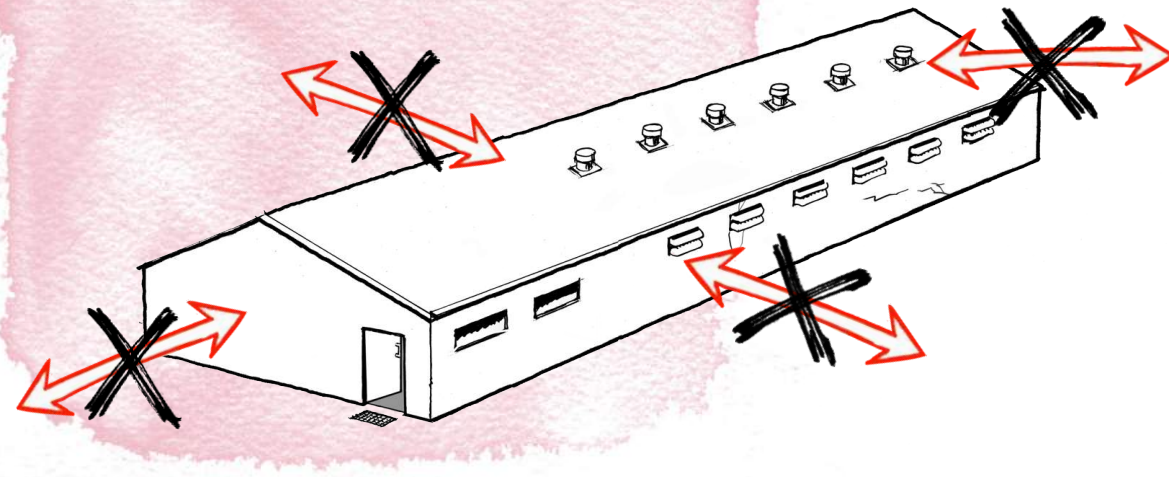
Risk factors for transmission of Campylobacter.

Consumers have to treat the chicken meat under perfect kitchen hygiene. Chicken meat should be cooked properly in order for all *Campylobacter* to be killed before consumption. If not – contaminated chicken meat can cause severe foodborne illness as diarrhea or even worse diseases among people.

Campylobacter are the most frequent bacterial cause of food-borne illness with diarrhea in Europe. *Campylobacter* cause nine million cases of human disease annually in the EU alone which imposes an economic burden on the European society of 2.4 billion € a year.

How can we prevent the problem?

Biosecurity measures can prevent the introduction of *Campylobacter* to chickens reared for meat production contained in houses. These practices and procedures aim to prevent or block all transmission routes of *Campylobacter* to and from broiler houses.



Biosecurity measures aim to block all transmission routes.

Biosecurity definition

Biosecurity is the sum of comprehensive preventive measures instituted at farm, environment and house level in order to prevent unintended entry of *Campylobacter* into poultry flocks reared in containment houses.

These measures shall prevent release of *Campylobacter* from already infected flocks to the environment (air, soil, or water) and to other poultry houses.

Biosecurity measures will reduce the possibility of introducing *Campylobacter* to the live chickens in poultry houses. Thereby, the risk of contaminating the poultry meat during slaughter and processing will be greatly reduced.



Biosecurity measures reduce the risk of transmitting *Campylobacter*.

2.0 Risk factors

2.1 Animals

Livestock are the primary sources of *Campylobacter*

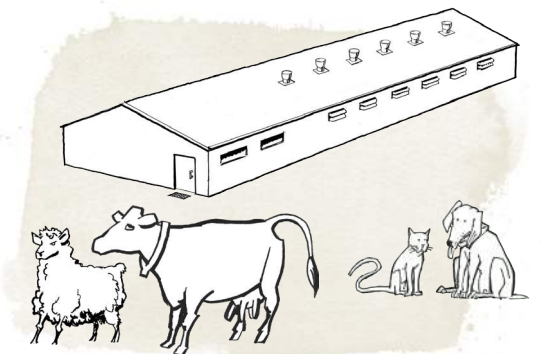
Livestock like poultry, sheep, swine and cattle frequently carry *Campylobacter* in their intestinal tract. They excrete the bacteria with their faeces. This contaminates their living environment. Other animals occupying the same areas such as wild birds, rats, mice, flies, beetles, dogs and cats may also get the infection. They then also excrete *Campylobacter* and further contaminate the environment.

However, *Campylobacter* requires a transport vehicle to overcome the distance between their location in the outer environment and the chickens in the broiler houses. This transport can be accomplished in many ways. Small animals are able to penetrate flaws in buildings and can transport *Campylobacter* into the broiler house. They can also enter through open doors. Flying or crawling insects can pass into the house with ventilation air or through windows.

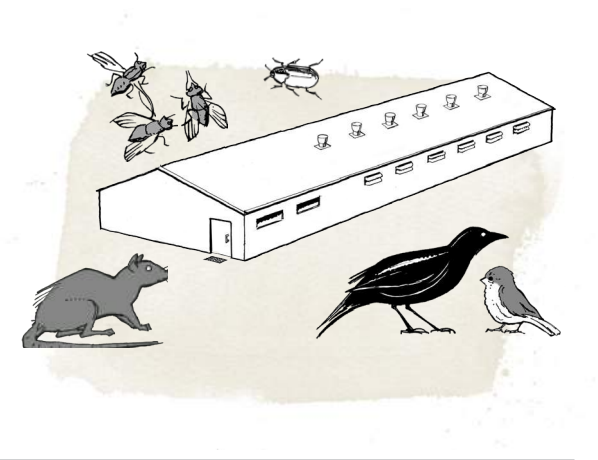
Another important possibility of *Campylobacter* transport is that by environmental water or streams, which may contaminate the water supply to the broiler house if the water is not properly treated. *Campylobacter* may also enter the broiler house through heavy rain if the house base cannot keep the rainwater out.

WHAT SHOULD BE DONE?

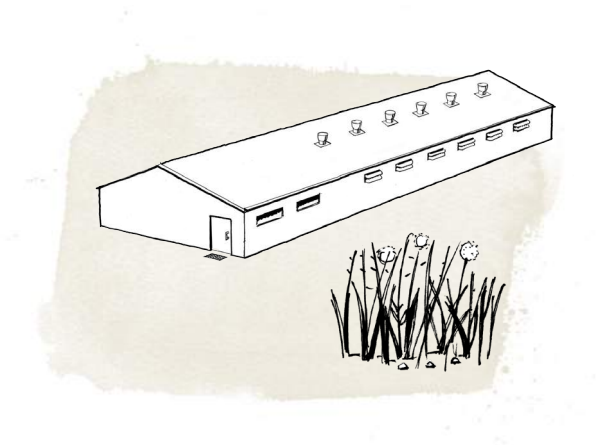
- Livestock should not be kept in the immediate vicinity of the broiler house.
- Dogs and cats should not be allowed inside the broiler house.



- Wild birds should not have access to the broiler house.
- Rodents should be controlled by bait stations.
- Flying insects should be controlled by insect screens on ventilation openings, if possible.
- Beetles inside the broiler house should be controlled in the empty period between flocks.



- The area around the house should be kept free from vegetation because this creates hiding places for mice, rats, small birds and insects.



2.2 Manure and used litter

Manure and used litter contain *Campylobacter*

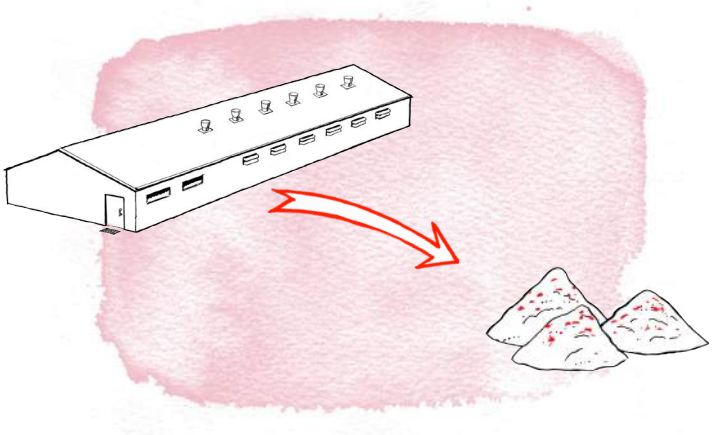
After depopulation the used litter with droppings and other remains from the broilers is removed from the house. If the broiler flock had *Campylobacter* the manure and used litter will be heavily contaminated with *Campylobacter* which can survive for extended periods.

Manure or used litter placed outside the broiler house will attract many small animals. They feed on the moisture content and nutrients in the remains of chicken faeces. Flies and rodents are also attracted to such material.

Campylobacter can survive easily in these carrier animals during the down period between broiler flocks. They can reinfect the next broiler flock if they are able to enter the house through flaws in the buildings or through ventilation openings. Ventilation air brings a lot of flies into the house.

WHAT SHOULD BE DONE?

- Manure has to be removed or disposed of as far from the chicken house as possible.



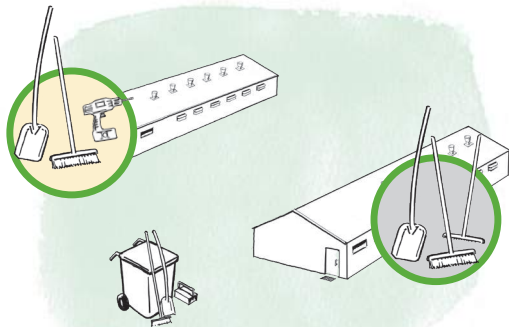
2.3 Tools, equipment and machines

Tools, equipment and machines spread *Campylobacter*

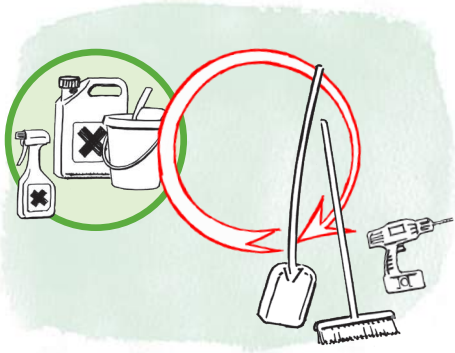
Tools, equipment and machines used in and around the broiler house get easily contaminated with dirt from for example, the ground, floors, chickens and litter. This dirt may contain faecal material with *Campylobacter* from animals. Machinery like tractors and catching machines may get contaminated with manure and litter on tyres and belts when used. *Campylobacter* can survive on tools and machinery for only hours or a few days, but long enough to allow them to act as a transmitter for the bacteria.

WHAT SHOULD BE DONE?

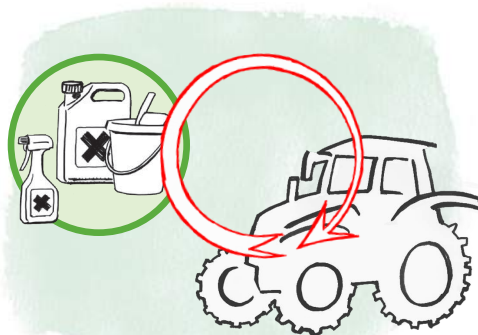
- Have separate tools and equipment for EACH broiler house, and for use outdoors.



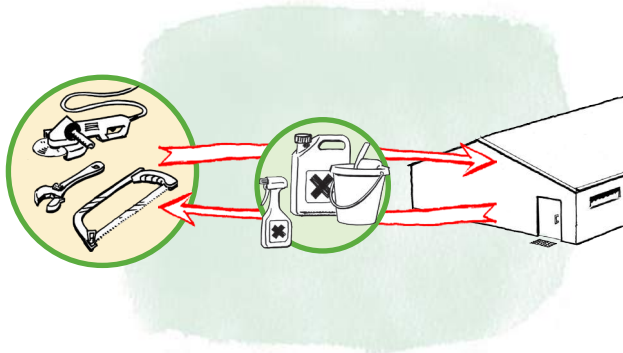
- Disinfect all tools and equipment at cleaning during the down period.



- Machinery should be cleaned and disinfected, especially on parts like tyres and belts that come into contact with the ground and litter.



- If for some reason other tools HAVE to be brought into the broiler house during a rotation for repair work or similar activities, take care to disinfect these tools before entry and again on exit from the broiler house.



2.4 Water

Campylobacter can survive in water for a very long time

If the drinking water supplied to chickens contains even small numbers of *Campylobacter* it poses a high risk for infection. Water supply to broiler houses can originate from either surface water resources or a ground water reservoir.

Surface water

The risk of drinking water is related to areas where its main source is surface water originating from lakes and rivers. Surface waters are frequently contaminated with *Campylobacter* originating from wild animals or livestock on grazing land close to reservoirs. Surface water must always be treated at the waterworks and/or locally on the farm to be free of live *Campylobacter* before being supplied to the broilers.

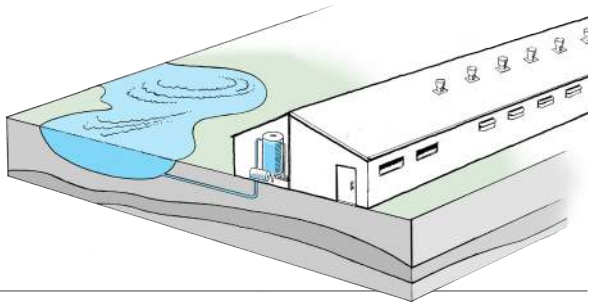
Ground water

If the water source is ground water of drinking water quality, the water itself is almost certainly free of *Campylobacter* if supplied in closed pipes all the way to the broiler house. However, *Campylobacter* infections in broilers may occasionally be seen even in areas with ground water supply. The reason is not the water as such, but is due to leaks in the mains system. In agricultural areas, *Campylobacter* contaminated drainage from pasture with grazing livestock can penetrate into such damaged water pipes.

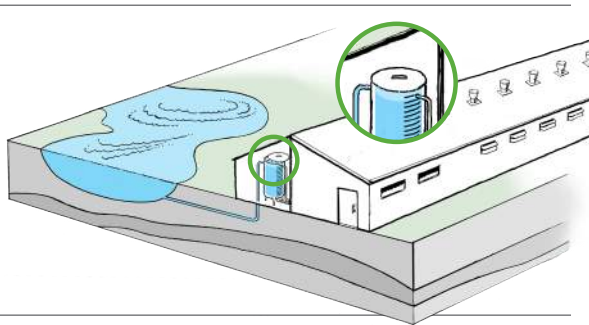
Broiler farms often have local water tanks or water reservoirs. These tanks must be closed or tightly covered to prevent contamination by dirt, bird droppings or insects. A few dead flies with *Campylobacter* in the water tank would provide enough bacteria to infect the whole chicken flock.

WHAT SHOULD BE DONE?

- Surface water must always be treated in the waterworks and/or locally on the farm to be free of live *Campylobacter* before supplied to the broilers.



- Local water tanks must be closed or tightly covered and the water treated appropriately.



2.5 Feed

Feed distribution spreads *Campylobacter*

Compound feed for chickens does not contain *Campylobacter* as it is heat treated before delivery. Home grown grain – wheat and corn – also pose no problem in themselves. Problems concerning feed and *Campylobacter* relate to the delivery, handling and storage on the farm and the final distribution to the chickens.

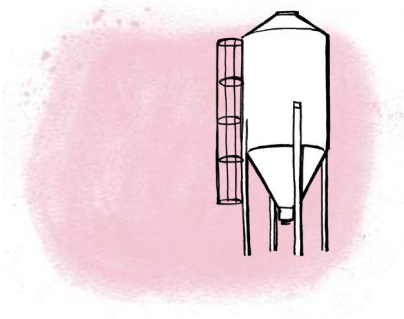
Feed from production companies is delivered by a truck. This poses a risk of contamination by *Campylobacter* as the truck with its hoses moves around to many farms each day.

Home grown feed stocks are often seen as open piles on the floor. Such piles are very attractive to mice, rats and wild birds that commonly defaecate in the feed.

All kinds of feed need a certain storage capacity on the farm - preferably in closed silos. It is very important that the silo platform is kept free of spilled feed that will inevitably attract mice, rats and wild birds to the platform.

WHAT SHOULD BE DONE?

- Keep feed in closed silos and keep the silo platform clean and tidy.



- If there is not sufficient space in silos store feed in closed rooms or a covered stock space with no access for rodents and birds.



2.6 People

People are important transmitters of *Campylobacter*

Campylobacter can be present nearly everywhere in the environment. It is extremely important that farm workers are aware of this. Unintentionally, people are very important as transmitters as people working on broiler farms touch several items and places that may be contaminated by *Campylobacter*. For example picking up dead birds and placing them in carcass containers, touching the litter, and using tools and equipment.

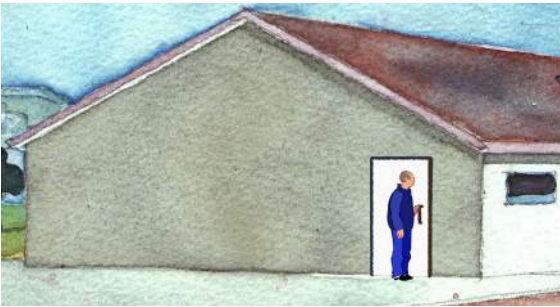
Campylobacter survives well on the skin of human hands and under nails. In this way *Campylobacter* can be transferred from one touched place or item to others. Another important cross-contamination risk is material under peoples' footwear, as footwear covers large areas of ground during a day and soles can collect much dirt underneath.

Visitors and repair workers, coming from other farms may also transfer *Campylobacter* from one site to another or between houses on the same farm.

In order to act appropriately to avoid the transfer of *Campylobacter* staff should receive appropriate training.

WHAT SHOULD BE DONE?

- Establish proper entry procedures to prevent *Campylobacter* being transferred to the broiler house (see 3.0 Proper broiler house entry procedures).



- Establish proper exit procedures to prevent *Campylobacter* spreading to other broiler houses or farms (see 4.0 Proper broiler house exit procedures).



- Educating staff is essential in order to avoid transmission of *Campylobacter*.



2.7 Management

Proper management reduces *Campylobacter* risk

Down period

A down period for mucking out, cleaning, disinfection and drying of the broiler house must follow the production period. It is important that the broiler house has enough time to dry out before the new bedding is placed. In houses with cracks and crevices in floors and walls moisture and dirt can create fine survival places for beetles and *Campylobacter*. Disinfection and heating of the house kill *Campylobacter* before stocking with new chicks. This minimizes risk for infection with *Campylobacter* at the start of the rearing period. If beetles are observed, a control programme should be carried out during the down period.

Removal and disposal of dead birds

The daily removal of dead chickens has to be done without violation of the biosecurity procedures for entry and exit of the broiler house. If dead birds are disposed in containers, these should be tightly closed. This would avoid flies foraging and breeding in the decaying bird material. Place containers as far as possible from the broiler houses.

Ventilation

To provide enough air flow into the house, ventilation air is forced through windows or valves in walls or roofs. When insects are in season the ventilation air brings them in large numbers into the house. This is a big risk for *Campylobacter* infection - the flies may carry the bacteria and many flies are eaten by the chickens.

Thinning

Thinning a broiler flock is an extremely risky procedure. It increases the risk of *Campylobacter* being brought into the broiler house via open doors and gates. Large machines are driven in and the catching crew is moving in and out of the house. Material from the cars, machines, crates and dirt can bring in *Campylobacter*. Furthermore insects can enter in large numbers. Thinning will often introduce *Campylobacter*.

Training

All personnel should be conscious about their behavior, and be properly trained in all procedures aimed at minimizing the risk for spread of *Campylobacter*. Knowledge and understanding is the best way to keep *Campylobacter* away from your broilers.

WHAT SHOULD BE DONE?

- The down period should be sufficient for thorough mucking out, cleaning, disinfection, and drying.



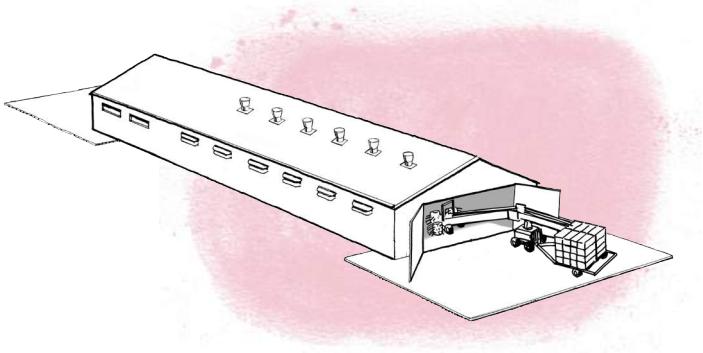
- Find a way to remove dead chickens without violation of the biosecurity procedures for entry and exit of the broiler house.



- If feasible, use fly screens at ventilation inlets.



- Avoid thinning because thinning will often introduce *Campylobacter*.



- Educate and train the farm personnel.



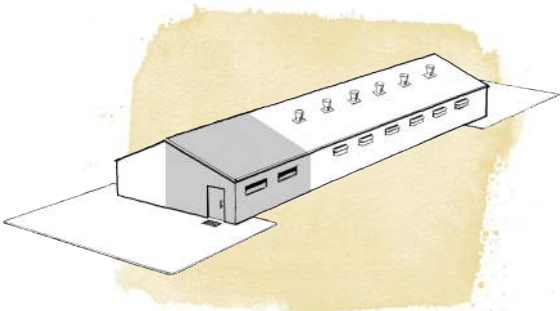
2.8 The broiler house

Necessary facilities in and around the broiler house

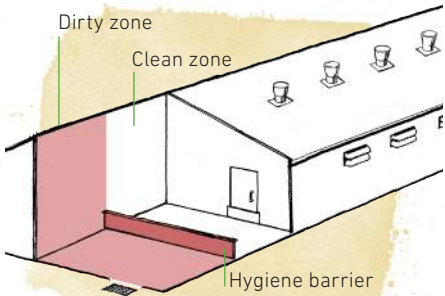
The broiler house should have an outside area with a concrete apron in front of entrances. The aprons will reduce the transport of dirt into the broiler house. The broiler house must be an enclosed area separate from the outside surroundings.

WHAT SHOULD BE DONE?

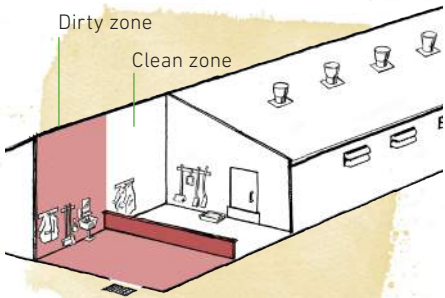
- Establish an entry room
The broiler house should have an entry room creating a biosecurity barrier between the outer area and the inside room with the chickens.



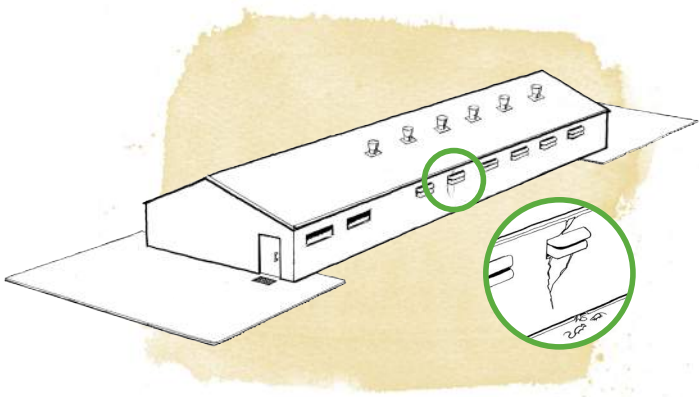
- The entry room must be designed to meet the requirements of correct and safe entry and exit. The entry room has a dirty zone and a clean zone. A hygiene barrier should be established.



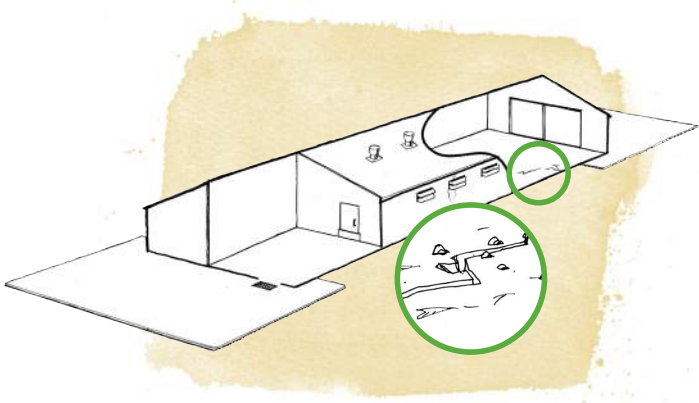
- Furnishing the entry room
There shall be facilities for hand wash and hand disinfection. Separate hangers for outdoor and indoor clothes. Separate tools for the dirty and clean zones and a boot dip in the clean zone.



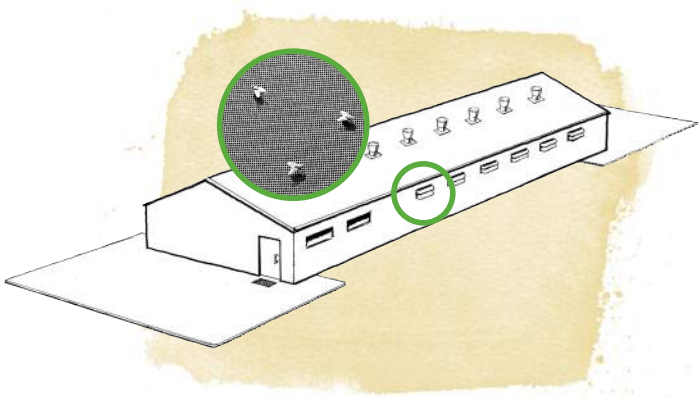
- Repair openings in outer walls
Openings and cracks in the outer walls, windows and gates should be repaired and closed to prevent rodents from entering the broiler house.



- Repair cracks in the floor
Inside the broiler house cracks in the floor should be repaired during the down period to allow effective cleaning and disinfection, and to eliminate hiding places for beetles,



- Use fly screens to avoid insects
If possible, special fly screens should be mounted in front of the ventilation inlets to prevent entry of flies and insects. Flies should also be avoided in the entry room, for example, by having a screen door or an insect curtain at the door to the entry room.

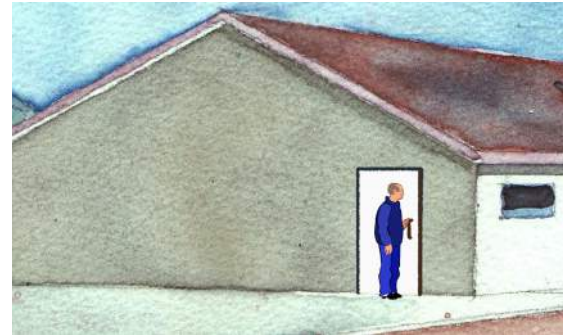


3.0 Proper broiler house entry procedure

Safe broiler house entry and exit procedures are important because they prevent *Campylobacter* spreading to your broiler house

WHAT SHOULD BE DONE?

- The entry room is important for biosecurity. To avoid the spread of *Campylobacter*, it must be your only access route to the chickens.



- The entry room has a dirty zone and a clean zone.



- On entry, immediately close the door behind you to avoid flies entering the broiler house. You are in the dirty zone.



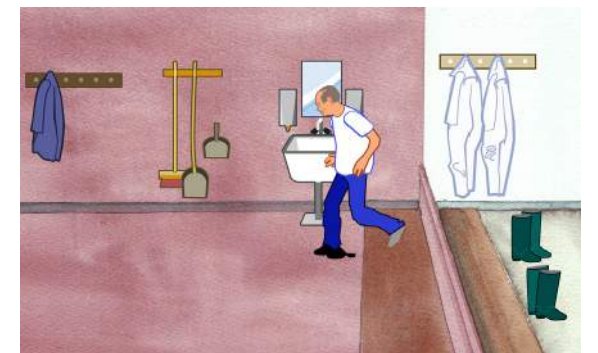
- Hang your outerwear on a peg.



- Wash your hands and then apply disinfectant. It is important that you do it in this order because disinfectant is useless with dirty hands.



- Remove your footwear without using hands and cross the barrier.



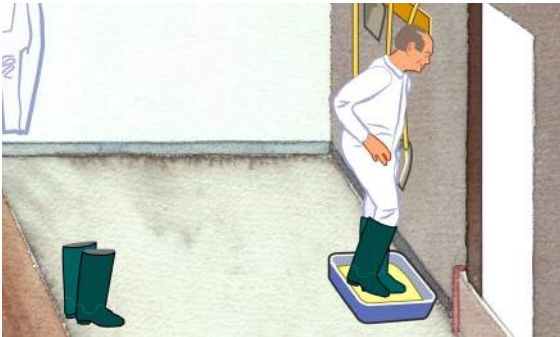
- You are now in the clean zone.



- Put on a boiler suit and step into the boots that are only for use inside the broiler room.



- Before entering the broiler room from the clean zone, stand in the boot dip to disinfect the boots.



4.0 Proper broiler house exit procedure

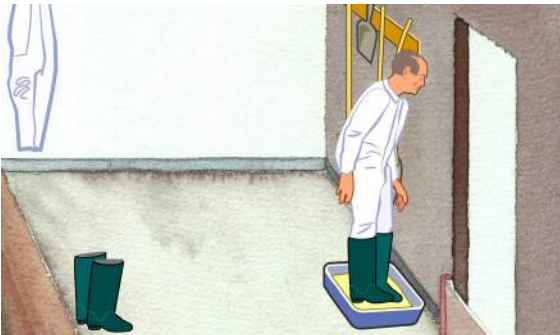
To prevent *Campylobacter* from spreading to other broiler houses or to other farms, it is important that no material or clothing is moved from one broiler house to another

WHAT SHOULD BE DONE?

- When leaving the broiler room, clean the soles of your boots with either a brush or a boot grate to prevent bringing dirt and dung into the entry room's clean zone.



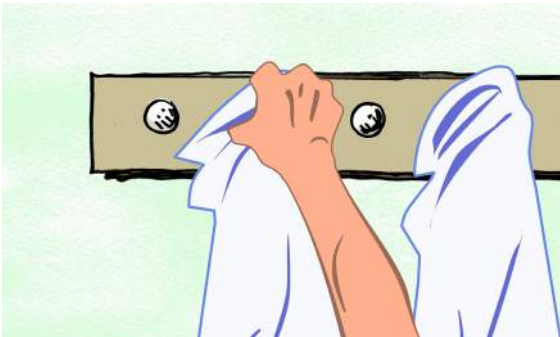
- Stand in the boot dip to disinfect the boots.



- Remove the boots and boiler suit. These particular items may only be used in this broiler house.



- It is important that boiler suits and boots remain in the clean zone at all times.



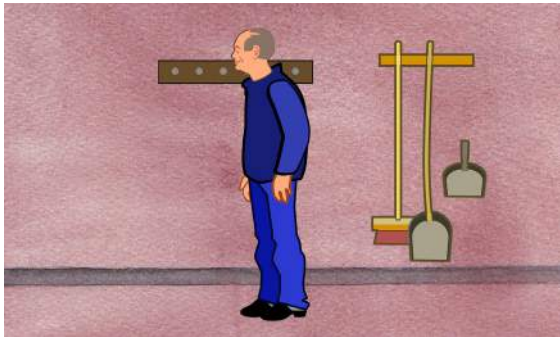
- Cross the barrier to the dirty side and step into your outdoor footwear.



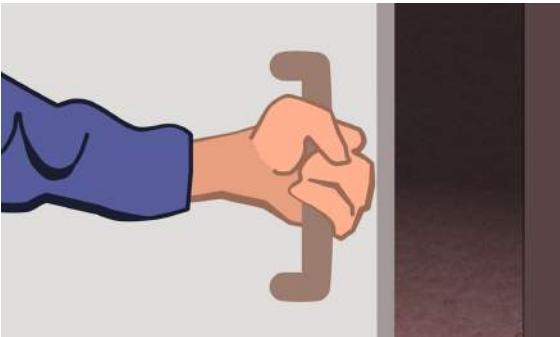
- Wash and disinfect hands.



- Put on your outerwear.



- Exit the entry room and remember to immediately close the door behind you.



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