

Producing clean slaughter cattle

ISSN 0142 7695

ISBN 1 85482 633 6

T468

The recent outbreaks of food poisoning from *E coli* O157 appear to have been caused initially by carcasses being contaminated with dung on the slaughter line and subsequent contamination of meat products as a result of poor hygiene.

To minimise the risk, the Meat Hygiene Service has introduced new guidelines on the cleanliness of cattle at slaughter to ensure that very dirty cattle are not slaughtered, but are returned to the farm (at the expense of the producer) to be cleaned up. It is therefore essential that finishers present cattle for slaughter in as clean a condition as possible.

In the intestinal tract of healthy cattle several different disease-producing organisms can be found. These include: *E coli* O157, *Campylobacter* species, *Salmonella* and *Cryptosporidia*. Faecal contamination of the animals' hides leads to carryover on to the surface of cattle at slaughter. The dirtier cattle are the greater the carryover and the potential for contamination of meat and meat products at processing.

The risk of *E coli* O157 food poisoning can be eliminated completely if food is adequately cooked, to a temperature above 67°C – providing it is not contaminated after cooking.

Definition of dirty cattle

The Meat Hygiene Service has developed a system for classifying cleanliness of animals at slaughter, based on a five-point scale. As well as being free from dung and dirt contamination, cattle must be dry when slaughtered – wet coats have been shown to increase microbial contamination of the carcass (see Appendix).

Losses to beef industry from dirty cattle

- Additional transport costs of cattle returned to farm, or
- Additional lairage costs, bedding, labour etc
- Cost of reducing speed of line in abattoir
- Dirty hides/skins less valuable
- Excessive trimming of carcass reducing carcass weights
- Reduced shelf life of meat.

Methods for improving the cleanliness of cattle at slaughter

Cleanliness of cattle at slaughter is influenced by many factors including diet, housing, clipping of backs, clipping at point of sale, feeding before slaughter and how they are

transported. To ensure cattle arrive clean at the slaughter line means giving attention to all these and other factors outlined in this publication.

Diet

The ration finishing cattle are given has a big effect on their cleanliness through the dry matter of the dung they produce. The more liquid the dung the greater the potential contamination. Table 1 gives a guide to the expected dry matter of the dung produced.

Table 1 Expected dry matter of dung for a range of rations

Rations containing	Dry matter of dung
High levels of roots (potatoes, fodder beet etc)	Low (wet)
High-quality silage diets	↓
High levels of moist feeds (e.g. brewers grains)	
Average-quality silage diets	
Hay rations	
Ammonia treated straw rations	
<i>Ad lib</i> concentrate diets	High (dry)

Straw is not included in Table 1 as it is impossible to finish cattle, i.e. achieve high enough growth rates, on diets containing high levels of untreated straw. Nevertheless, for all rations, allowing cattle access to untreated straw *ad lib* will significantly increase the dry matter of their dung and in many cases improve performance, even though intakes may only be around 1–2 kg of straw per head per day.

Any factor which reduces the efficiency with which an animal digests the food it is given will decrease the dry matter of the dung produced. Correct formulation of rations

based on forage analysis will ensure feed is efficiently utilised, improving both performance and cleanliness.

1. Minerals

An excess of minerals (e.g. magnesium) in the diet can cause mild scouring, increasing the risk of dirty animals. Ensuring that the correct mineral/vitamin supplement (for the ration being used) is fed so that each animal receives approximately the correct amount each day will avoid the problem. Providing minerals, salt licks etc ad libitum should be avoided as cattle will consume up to ten times more salt than they require, given the opportunity.

High levels of sodium and some other minerals will also result in high levels of urine production.

2. Caustic soda treated grain

Caustic soda treated grain contains high levels of sodium and hence can lead to mild scouring, similar to feeding excessive levels of minerals. Where caustic soda treated cereals are fed to finishing cattle, intakes should be restricted to a maximum of 2 kg/head per day and a mineral containing no salt used.

3. Protein

Excessive intakes of protein can also lead to loose dung. With a target protein content in the overall diet of around 15% (on a dry-matter basis) for finishing cattle, higher protein intakes should be avoided where possible.

4. High D and high buffering capacity silages

Both very high quality silages and acidic silages with a high buffering capacity (i.e. containing high levels of acid) will result in very low dry matter dung. Making long straw available ad libitum will help increase the dung DM and improve animal performance. However, with very acid silages it may be necessary to use sodium bicarbonate to improve silage intakes and hence animal performance and to improve the consistency of the dung.

5. Overall quality of the ration

The overall D value of the finishing diet will have a direct effect on the total amount of dung dry matter produced. The higher the overall D of the ration, the less dung dry matter produced, as the more digestible the diet, the higher the proportion of the food eaten which goes into the animal's body and the lower the proportion which passes straight through. For example, on a barley beef diet, a 550 kg animal may be producing only 1 kg of dung dry matter per day whereas on an average quality silage, rations supplemented with 3 kg of concentrates up to 3 kg of dung dry matter could be produced.

6. Changes to ration

Rapid changes in the ration can cause mild scour as the microbes in the animal's rumen adjust to the new diet.

Ensure any changes to the ration are made gradually.

Housing

1. Slats

Stocking rate is the single most important factor influencing the cleanliness of cattle on slats. Table 2 shows the correct stocking rate for a slatted pen for different weights of animal.

Table 2 Target space allowance per head on slats

Live weight (kg)	Pen area (m ² /head)	Number in 10 ft x 20ft (3.0 m x 6.1 m) pen
300	1.5	12
400	1.8	10
500	2.1	9
600	2.4	8

For cattle housed in the autumn for finishing in late winter this will generally mean reducing stocking rates slightly at the turn of the year to allow for the increased weight of the cattle. However, more importantly, it is essential to maintain stocking rates as individual animals are drawn out from the pen for sale, e.g. by reducing pen size with moveable gates etc.

Slats should be checked for areas where dung builds up and is not trodden through. Examples of this would be:

- Underneath divisions, gates etc on the slats. In general the bottom rail of gates, divisions etc should be at least 0.2 m above the level of the slats.
- Areas of solid concrete, e.g. the end of slats. In many slatted pens there is a build-up of dung along walls, feed troughs etc where the end of the slats form a continuous solid floor. Filling in these areas with a sloping strip of concrete or wooden strips can eliminate this problem.
- Other obstacles in slatted pens, the most common being water troughs. Any obstacle which prevents cattle standing on an area of slats will result in a build-up of dung, a common cause being water troughs in the pen. One way of eliminating this problem is to replace water troughs with nipple drinkers.

2. Straw-bedded pens

Low stocking rates are obviously not a problem in straw-bedded pens but high stocking rates will significantly increase

the bedding requirement and increase the risk of dirty cattle. The following table shows the maximum stocking rates for cattle in straw-bedded pens.

Table 3 Target space allowance per head in bedded courts

Live weight (kg)	Pen area (m ² /head)	Feed trough (mm/head)
300	3.4	500
400	3.8	550
500	4.2	600
600	4.5	650

The most important point influencing the cleanliness of cattle bedded on straw is the amount and quality of straw used to bed them. Using wet, rotten straw for bedding will do little to keep cattle clean regardless of how much straw is used. Ideally all bedding straw should be stored dry in sheds or wrapped. Only dry, clean straw should be used to bed finishing cattle with wet, poorer quality straw being used to bed other stock.

A common cause of wet areas in straw-bedded yards is leaking water troughs, gutters and surface water coming in from outside the shed. Rectifying these problems can significantly improve the cleanliness of cattle and reduce the amount of bedding straw required.

A lot of dung and urine is produced while cattle are eating so the area along the feed fence quickly becomes dirty, wet and unable to carry the weight of the cattle. As the dung builds up, the cattle sink further into it while they are eating with resultant contamination of their legs and eventually their bellies. One way to minimise this problem and reduce the amount of bedding straw required is to put in a concrete strip along the feed barrier which can be scraped two to three times a week. For finishing cattle the strip needs to be a minimum of 2.5 m wide and should have a kerb of either railway sleepers secured by steel pins or of cast concrete between the scraped stance and the bedded area (see Figure 1). To avoid slurry contaminating the food, it is important that the base of the feed fence is waterproof.

Straw shredders

Straw shredders which chop bales and blow straw into pens

are becoming increasingly common to minimise the labour involved in bedding. One of the claims for shredders is that they reduce the amount of straw required. In reality, however, while shredders do give a very uniform covering of a pen with a small amount of straw, it quickly becomes dirty again as the cattle move around. Where shredders are used for bedding cattle, it is essential that the normal amount of straw is used.

3. Ventilation

Good ventilation is essential to produce clean cattle. A rapid air change through the building will help reduce the dampness (relative humidity) of the air so that the bedding/slats dry quickly and it will also reduce animals sweating. Good ventilation will therefore improve the cleanliness of cattle by both giving them a dry lie and keeping their hair dry.

Due to the importance of keeping the cattle themselves dry, clipping the backs of finishing cattle when they are housed will also help improve their eventual cleanliness. Clipping a strip approximately 5 cm wide either side of their backbone helps cattle maintain their body temperature without extra sweating and, as a bonus, will also minimise any risk of pneumonia and improve winter growth rates. An extra 0.05 kg/day gain would be expected, i.e. around 10 kg over the winter, more than sufficient to cover the cost of clipping.

Clipping cattle

Clipping the belly and back end of cattle is one way to improve cleanliness when they are slaughtered. **Clipping the bellies of cattle can be extremely dangerous for the operator and should only be undertaken with the correct handling facilities.** Crushes with sloping slides and side panels which can be opened to give full access to the belly, on both sides of the animal, are possibly best. An alternative might be to use a foot trimming crate which fully restrains the animal by tipping it on to its side.

1. Belly clipping

For cattle which will be finished within one to two months of housing, it may be beneficial to clip their bellies at housing to reduce dung sticking to their hair. However, for cattle targeted for finishing at the end of the winter, it may be better to delay clipping so any contamination will collect on the winter coat which, as it gradually grows out in the spring, can be easily clipped off when the animal is sold.

2. Clipping tails

Some finishers claim that complete clipping of cattle tails when they are housed can help reduce contamination of the hide. As clipping the tail is simple and safe, it would appear sensible to clip the tail of cattle at housing.

Clipping cattle at point of sale

Although the objective must be to manage/house finishing cattle to minimise contamination, it still must become standard practice to clean cattle further when they are sold. Although the immediate objective is to avoid heavily contaminated cattle in categories 3, 4 and 5, the long term objective for the industry **must be that every animal sold should be in contamination category 1 - no contamination**

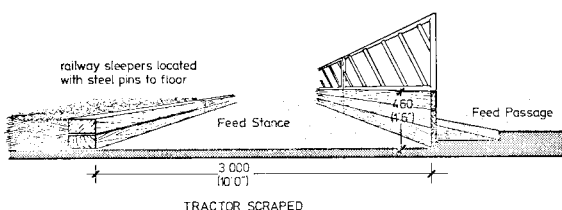


Figure 1 Scraped feed stance

of the coat. (Handling facilities must be adequate to minimise the risk to the operator when clipping cattle.)

Washing cattle

Washing cattle may help remove visible dirt but is unlikely to reduce any bacterial contamination on the animal. Hence, washing cattle close to the point of slaughter will simply spread the organism over the whole of the animals' bodies so that although they may appear clean, in terms of *E coli* O157, they will still be contaminated – particularly if they are still wet when slaughtered. **Power hoses must NOT be used, as they will cause bruising on the carcass, reducing its value.**

Transport

Cattle can become contaminated during transport to the abattoir. To minimise this risk, cattle should be loaded dry and at the correct stocking rate, which avoids individuals falling over during the journey. Lorries/trailers should be thoroughly cleaned between journeys with particular attention given to multi-tier vehicles to ensure animals on upper tiers cannot contaminate the animals underneath them. It is recommended that vehicles are bedded, preferably with straw, which adheres to the coat of cattle less than sawdust or shavings. Finally, finished cattle should be allowed the maximum ventilation possible to reduce sweating – wet cattle being as big a problem as dirty cattle.

Do not mix cattle from different groups/farms.

Water must **NOT** be restricted prior to transport. Intakes of low dry matter feeds can be restricted overnight, prior to slaughter and animals allowed to fill up on dry feed, e.g. straw.

Practical system for winter-finishing cattle

At present the ideal situation would appear to be taking as many precautions as possible when the cattle are housed, e.g. worming them, clipping their tails and backs, checking the pens are clean, and making a 'pre slaughter' pen in which animals within 2–3 weeks of slaughter can be housed and specially handled to ensure they are as clean as possible when sold.

1. Identify a small pen which can be kept well bedded to hold cattle for 2–3 weeks before they are sold. This is particularly important for cattle wintered on slats.

(Marketing pens must not be used for entire bulls if it means mixing bulls who have previously been kept in different pens. Fighting will be a major problem, possibly even resulting in deaths.)

2. Where cattle have matted dung on their coats and tails they should be clipped as they are moved into the 'marketing' pen.
3. If possible cattle should be changed over gradually to dry feeds when they are moved into the marketing pen rather than be kept on silage diets. Straw based rations will produce drier dung compared to even hay diets but will obviously need a significant increase in the level of concentrate supplement compared to ad lib silage diets. However, this could have a further benefit with fast-growing cattle on high-concentrate diets tending to lose hair more rapidly (and possibly higher levels of growth pre slaughter also improving eventual tenderness of the meat).
4. If cattle are clean (category 1 to 3) it may be sufficient to change them over to dry feeds just 3–4 days before sale to firm up their dung.

Cattle finished off grass

In general cleanliness is not a problem for cattle slaughtered off grass. Nevertheless some points to consider would be as follows.

1. Worms. A sensible worming programme will eliminate scouring due to a worm infection. However it is essential that the withdrawal periods for the anthelmintics used are followed.
2. The high digestibility of spring grass and some aftermaths can result in dirty cattle due to their very loose dung. Making straw available *ad lib* in these situations can help 'dry up' the dung as well as allowing the cattle to utilise the grass more efficiently even though they will probably only eat around 1 kg/head per day of straw.

As well as keeping the cattle clean while they are at grass it will also help reduce contamination during transport. If this should become a real problem then it might be necessary to house the cattle 24 hours before they are to be transported and to put them on dry feed.

Appendix: Meat Hygiene Service cattle cleanliness classification

Category 1

- Dry

It should be noted that in some instances a coat which is wet, but also clean, does not necessarily mean the animal is hygienically unacceptable for slaughter.
- Clean with regard to dung/dirt
- Very minor amounts of loosely adherent straw/bedding

Action

- Process as normal



Category 2

- Dry/damp
- Light contamination, i.e. dirt/dung
- Small amounts of loosely adherent straw/bedding

Action

- Process as normal



Category 3

- Dry/damp
- Significant contamination with dirt/faeces and/or
- Significant amounts of adherent straw/bedding

Action

- Decrease line speed
- Decrease the number of carcasses on the line at any one time, e.g. by leaving alternative spaces between carcasses
- Pay particular attention to dressing stations at which contamination of the carcass is likely to occur
- Pay particular attention to 'in-rolling'
- Consider using 'aids' to assist in hygienic dressing
- Ensure diligence with regard to hygiene practices
- The MHI should detain contaminated carcasses. Health marks should only be applied when the MHI considers the hygienic standard of the carcasses to be acceptable



Category 4

- Dry/damp
- Heavy contamination with dirt/dung
- Heavily clogged (clagged) and/or
- Significant amounts of adherent bedding

Action

- Decrease line speed
- Decrease the number of carcasses on the line at any one time, e.g. by leaving alternative spaces between carcasses
- Pay particular attention to dressing stations at which contamination of the carcass is likely to occur

- Pay particular attention to ‘in-rolling’
- Consider using ‘aids’ to assist in hygienic dressing
- Ensure diligence with regard to hygiene practices
- The MHI should detain contaminated carcasses. Health marks should only be applied when the MHI considers the hygienic standard of the carcasses to be acceptable.



Category 5

- Very wet
- Very heavily contaminated, e.g. with dirt/dung and/or
- Very heavily clogged (clagged) and/or
- Much bedding adherent to the coat

Action

- Reject for slaughter
- Return to producer if feasible or lair overnight
- Carry out further ante-mortem inspection and reassess, ensuring the animals are hygienically fit for slaughter



Notes

In all cases, contamination of the animal with dirt, dung or bedding is of most significance in the following areas:

- brisket
- abdomen
- flank
- ribcage – lower areas and underside
- hind legs– posterior surface of the hock
- fore legs– anterior surface of the knee
- neck
- rectal area

‘Aids’ which may be used to assist in hygienic dressing include:

- pinning back the hide/fleece
- paper towels
- polythene sheets

Clipping of the coat may be carried out at the abattoir **but only** if a separate room is available between the bleed area and the point at which dressing commences.

B G Lowman
B Syngé
G Caldwell