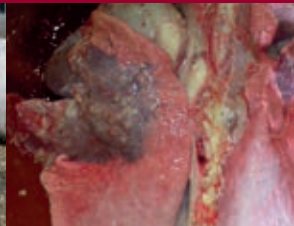


Minimising carcasse losses for Better Returns



The information in this booklet was compiled by Liz Ford and Dr Phil Hadley, AHDB Beef & Lamb, using data supplied by the Food Standards Agency.

Photography: Andy Grist, Germinal GB, Kate Phillips, Lynda Maris of Merial, Mark Dagleish of the Moredun Research Institute, University of Bristol.

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Better Returns Programme

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With increasingly tight financial margins in beef and sheep production and processing, it is vital to minimise losses throughout the supply chain.

Farmers can maximise their financial returns by concentrating on efficient animal growth, meeting target carcass specifications and minimising the losses of saleable meat and offal.

Cattle and sheep sold for slaughter are a food product and must be passed fit prior to human consumption. During post mortem inspection, conducted by Food Standards Agency (FSA) staff, any organ, part or whole carcass not meeting these requirements will be rejected. This leads to reduced returns and possible non-payment to the producer as a result of total carcass rejection. The processor will also suffer financial loss and may well incur additional costs for disposing of any rejected meat or offal.

Whilst organ rejection may not affect the weight of the carcass, it is very likely the condition that led to rejection will have affected the production efficiency of the animal making it more expensive to feed and finish than necessary.

With the increase in export demand for offal, maximising the volume of so called 'fifth quarter' elements that can be marketed and sold, will influence the overall carcass value. So, good stock husbandry, including appropriate feeding and health management, that maximises the amount of saleable meat, will most certainly pay dividends.

This new booklet along with abattoir feedback, will help minimise carcass losses and thereby generate Better Returns.



Dr Phil Hadley
Head of Supply Chain Business
Development
AHDB Beef & Lamb

Causes of rejection

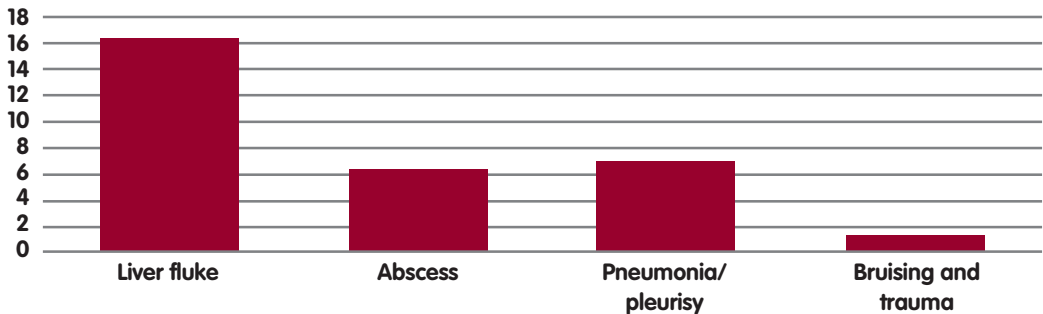
The main causes for rejection at meat inspection in 2015 were:

Cattle

- Liver fluke
- Pneumonia/pleurisy
- Abscesses
- Bruising and trauma



Figure 1: Rejection conditions for cattle slaughtered in English red meat plants in 2015 (%)



At English cattle slaughterhouses in 2015:

- **245,000** livers were rejected due to liver fluke
- **105,000** carcasses showed signs of pneumonia/pleurisy
- **96,000** carcasses had abscesses
- **22,000** carcasses showed signs of bruising and trauma

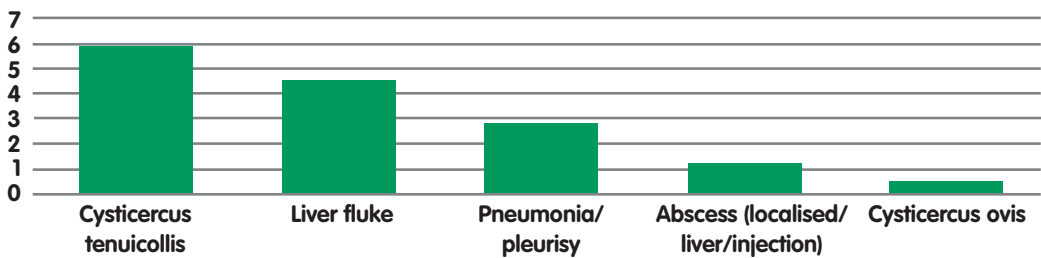


Sheep

- *Cysticercus tenuicollis*
- Liver fluke
- Pneumonia/pleurisy
- Abscesses
- *Cysticercus ovis*



Figure 2: Rejection conditions for sheep slaughtered in English red meat plants in 2015 (%)



At English sheep slaughterhouses in 2015:

- 548,000 livers were rejected due to *Cysticercus tenuicollis*
- 430,500 livers were rejected due to liver fluke
- 272,500 carcasses showed signs of pneumonia/pleurisy
- 114,500 sheep had abscesses
- 57,500 carcasses were rejected due to *Cysticercus ovis*



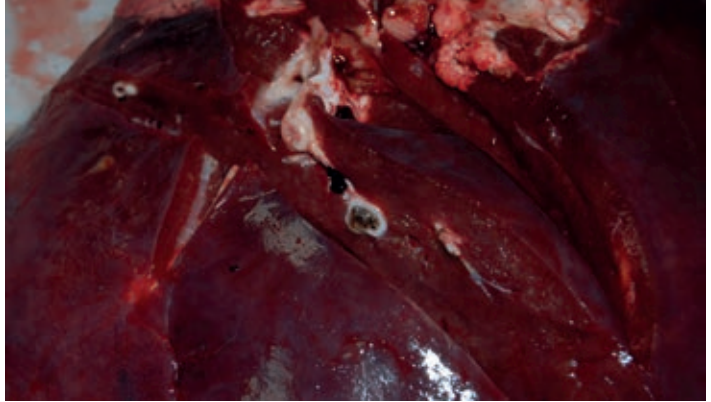
Liver fluke (*Fasciola hepatica*)

In England in 2015, over 16.5% of cattle livers and nearly 4.5% of sheep livers were excluded from the human food chain due to liver fluke infestation.

Over recent years, there has been an increase in liver rejections due to fluke infection. Milder winters and wet summers have created an ideal environment for fluke to thrive and this is now a nationwide issue.

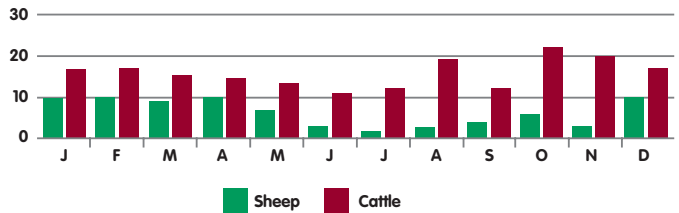
Levels of rejection can vary widely depending on the season and on the farm. More recently farms that have not historically had fluke problems are reporting their first cases.

Once infected, animals can carry liver damage all their life, resulting in reduced performance. However, this may only become evident on examination of the liver at slaughter.



Cattle liver showing infestation with fluke

Figure 3: Monthly liver fluke rejections for cattle and sheep slaughtered in England in 2012 (%)



Significant cost to producers

Liver fluke costs the beef and sheep industry millions of pounds each year, with the vast majority of this loss being suffered by producers.

It is estimated that the annual loss to the meat trade is over £1.04 million. Although substantial, this is dwarfed by the cost to the producer of each case of liver fluke, due to lower growth rates, lower feed conversion efficiencies and higher levels of death, particularly in cases of acute infection in sheep.

These on-farm costs are estimated at £87 for each case in cattle and £5.56 for each sheep case – giving an on-farm cost to English producers in the order of £24 million per year. In reality, this could be significantly higher.

Liver fluke infections can also lead to lower fertility in breeding stock and predispose animals to other diseases that affect performance.

The fluke use mud snails found in pasture as intermediate hosts, which like to live in damp, muddy areas. Wet, mild weather increases the risk on all farms, even those with no previous history of the problem.

Reducing liver fluke infection

The control of liver fluke can be difficult. However a combination of management practices and a well-planned anthelmintic programme will provide the best opportunity to reduce losses. Strategies include:

Identify a potential problem – make use of 'risk-based' warning systems such as that provided by the National Animal Disease Information Service (NADIS) and ask the abattoir if there are more liver rejections than normal.

Infections can also be detected by screening a group of stock for fluke eggs in the dung, or via blood testing.

Take early action – but avoid blanket anthelmintic treatment as this may not be necessary and a waste of money. It may also encourage the development of resistance to the product used.

Treat with an appropriate flukicide – use the right treatment for the right stage(s) of liver fluke. Check the details of the product selected and ask advice if in any doubt.

In autumn, where the risk is high and immature fluke are present, triclabendazole (TCBZ) is the drug of choice, unless it has been established that there are liver fluke resistant to this treatment on the farm. In this case, seek advice on suitable alternatives.

If the risk is lower, alternatives can be used, for example a post-housing treatment of cattle.

Management practices – be aware of the risk of re-infection if animals are put back on high-risk grazing areas. Use tactics such as moving to low risk areas (ie not wet and muddy), fencing off high risk areas, or housing. If animals have to remain in a high risk area, monitoring for infection is essential and further treatments may be needed.

Quarantine all incoming stock. Avoid using combination fluke and worm products unless they are absolutely necessary, to reduce selection for resistance in worms.

It is important to seek veterinary advice on product selection and timing, preferably as part of a regular testing and treatment protocol set down in the herd or/and flock health plan.

Dose with care and do not over or under dose. Be prepared to split groups if there is significant variation in the weight of animals.



A cattle liver showing the damage fluke do to the bile ducts within the liver tissue.

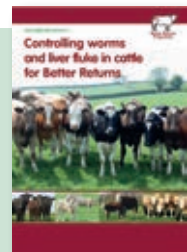
For further information:

The BRP cattle and sheep parasite control guide

Better Returns from controlling liver fluke

Controlling worms and liver fluke in cattle for Better Returns

All available to view or download from beefandlamb.ahdb.org.uk, or email brp@ahdb.org.uk or call 024 7647 8834 to request free hard copies.



Parasite infections

Carcase rejections due to parasite infections spread by dogs and foxes can lead to significant losses in sheep.

In 2015, it was calculated over £4.1 million was lost to the English sheep industry due to *Cysticercus ovis* (*C. ovis*) being found in 0.61% of sheep (57,500).

Nearly £385,000 was lost due to 5.81% (548,000) livers being rejected with *Cysticercus tenuicollis* (*C. tenuicollis*).

Cysticercus ovis

Cysticercus ovis, or sheep measles, produces small cysts typically found in the heart. In more pronounced cases it extends throughout the muscles of the carcass, particularly in the hard-working muscles, such as the diaphragm and cheek (masseter) muscles.

Infection generally has limited impact upon the health of the sheep and it cannot be detected until slaughter. However, identification generally results in rejection of the entire carcass, hence the high costs associated with this condition.

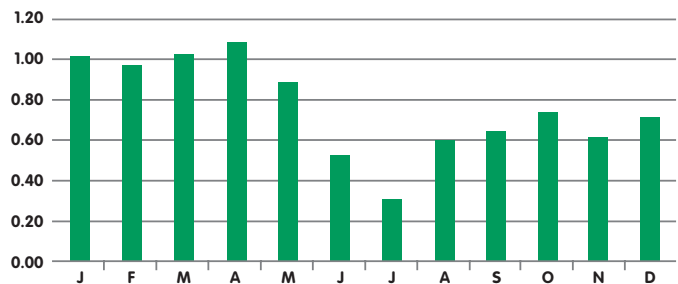
The disease stems from the canine adult tapeworm *Taenia ovis* (*T. ovis*) and is transmitted to sheep when infected dogs or foxes shed eggs via their faeces onto pasture. These eggs can survive on grass for up to six months.

Within several weeks of sheep ingesting eggs they start to develop infective cysts. If dogs eat raw meat or offal from an infected sheep they will develop adult *T. ovis* worms and shed eggs in the faeces, which continues the cycle.



Cysts characteristic of *C. ovis*

Figure 4: Prevalence of *Cysticercus ovis* in sheep slaughtered in England in 2012 (%)

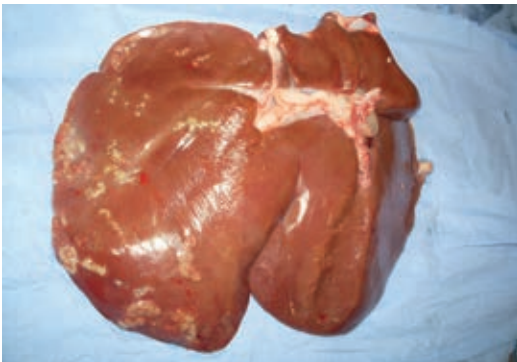
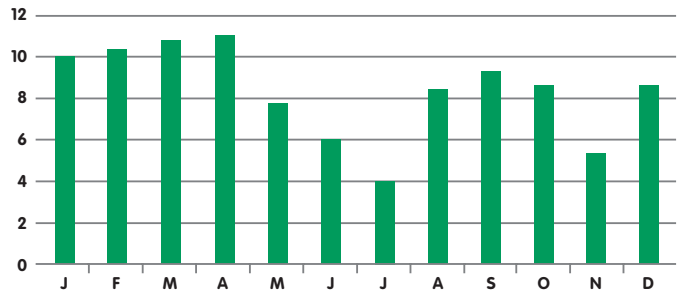


Cysticercus tenuicollis

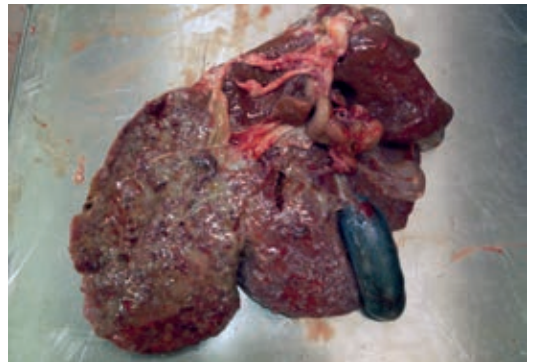
Cysticercus tenuicollis, or bladder worms, originate from another canine tapeworm known as *Taenia hydatigena* (*T. hydatigena*). This parasite has a similar lifecycle to *C. ovis* and the larvae develop and penetrate the sheep's intestine before spreading to various tissues surrounding the abdominal organs and liver.

Aside from liver rejections, heavy infestation in lambs can cause haemorrhages or peritonitis. Moderate to heavy infections can result in loss of appetite, leading to longer finishing periods, increased feed costs and loss in value due to not reaching target specification. Sheep may also become weak, leaving them prone to other infections.

Figure 5: Prevalence of *Cysticercus tenuicollis* in sheep slaughtered in England in 2012 (%)



Serpentine tracks indicative of *C. tenuicollis*



Liver with *C. tenuicollis* or bladder worm cyst

Strategies to minimise parasite infections

Once a sheep is exposed to tapeworm eggs, it is impossible to prevent cysts developing. So preventing sheep being exposed to the tapeworm is essential.

Producers are advised to:

- Ensure all farm dogs are routinely wormed at the correct dose with a product specifically for tapeworms
- Ensure dogs visiting farm premises are wormed appropriately, or ensure they do not access sheep grazing areas
- Consider fencing off public footpaths to keep other dogs from accessing sheep grazing where practical
- Ensure deadstock are removed quickly and disposed of correctly to prevent scavenging of carcasses by dogs or foxes

Abscesses

In England in 2015, over 1.2% of sheep carcasses (114,500) and almost 6.5% of cattle carcasses (96,000) contained abscesses.

One of the common causes is injecting livestock. Abscesses can form at injection sites and can be exacerbated by the use of dirty needles, or where administration technique is careless.

Abscesses have to be cut out of the carcass, taking time and also reducing meat yield, as well as potentially devaluing the primal cut or carcass. This is particularly the case in lamb carcasses, where trimming often results in downgrading.

Most abscesses are avoidable if injections are carried out with care, paying particular attention to good hygiene practice.



Examples of abscesses in the flank of cattle

Injection best practice

Products should be stored and injections administered, according to the manufacturers' instructions.

For best results follow these key guidelines:

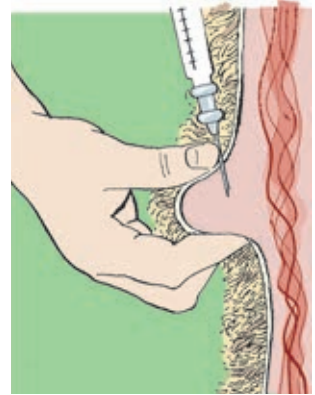
- Always use a clean, sterile syringe and needle. If using a multiple injection gun, ensure the needle is disinfected between injections with a recognised sterilisation system. Never insert a used needle into a medicine bottle
- If the site to be injected is dirty, clean the skin and swab with an alcohol impregnated wipe or cotton wool. Avoid injecting animals that are wet
- Before injecting, check the expiry date and read and follow the directions of the product to be used. Some products need to be shaken first. Adhere to the stated withdrawal periods to ensure stock are not marketed too soon after the injection has been given
- Use the correct size of needle according to the size of the animal and site of injection
- Ensure the animal is adequately restrained before attempting the injection

Subcutaneous injections

Subcutaneous injections are administered in areas where the skin is loose (mainly the neck or behind the shoulder). Grasp a fold of skin and slide the needle through the skin parallel to the animal's neck or trunk. This method will avoid penetration of underlying muscle.

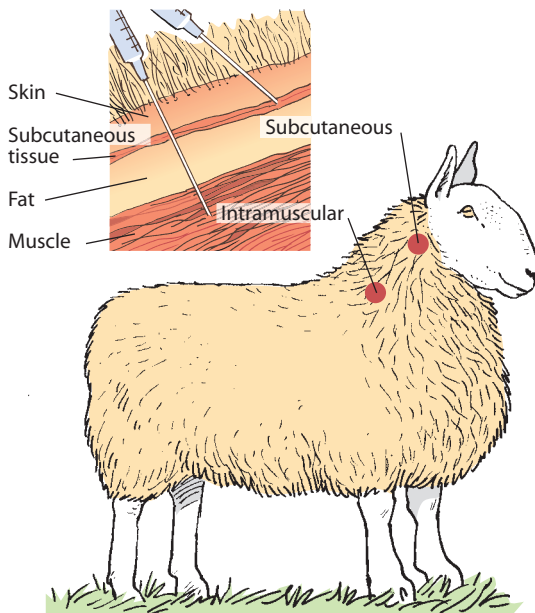
The needle should be inserted several inches from the operator's hand to avoid accidental self-injection. The plunger of the syringe should always be pulled back after entry to ensure the needle is not located within a blood vessel.

If a large dose is to be delivered, it may be advisable to split it between two injection sites. After the injection, briefly massage the site to improve the dispersal of the injected material.



Intramuscular injections

The main site for intramuscular injection is the muscle mass of the neck for which the animal must be adequately restrained. This ensures no valuable cut of meat is damaged, particularly the hindquarter cuts and the constant movement of the neck ensures good dispersion of the product.



Draw up the solution for injection into the syringe. Disconnect the needle and hold the hub firmly between thumb and middle finger. Insert the needle into the muscle to the hub with a sharp slap action. Connect the syringe to the needle, draw back to check there is no blood and then slowly inject the contents of the syringe over ten seconds. Do not inject too quickly as this may cause the animal pain.

Never insert the needle when connected to the syringe, as this makes it more difficult to insert to the correct depth with a single movement. The syringe hub is the weakest point and will often snap if the animal moves, rendering the contents of the syringe useless and creating potential animal welfare and meat safety issues. After the injection, gently massage the injection site.

For further information and guidance see the **BRP cattle and sheep parasite control guide** at beefandlamb.ahdb.org.uk, or email brp@ahdb.org.uk or call **024 7647 8834** to request a free copy.

Liver abscesses

Acidosis in cattle can lead to abscesses forming in the liver. The risk of acidosis increases when the starch and rapidly fermentable carbohydrate content of the ration rises. This leads to conditions in the rumen becoming too acidic and causing digestive upset and damage to the liver wall.

The presence of abscesses in the liver will lead to rejection of the liver at the abattoir, as well as affecting productivity on farm through lower liveweight gains.

Tips to avoid acidosis in cattle:

- Do not grind cereals into fine particles – crack the grain
- Offer moist cereals like crimped or treated grains
- Always have a source of long fibre, eg straw, available in racks to provide structural fibre – intakes are likely to be 0.5-1.5kg/day
- Never let *ad-lib* feed hoppers run out so animals gorge on high energy feeds when they are filled up
- If not feeding cereals *ad-lib*, feed in small meals throughout the day. Avoid individual meal sizes greater than 2.5kg/head/feed for dry cereals

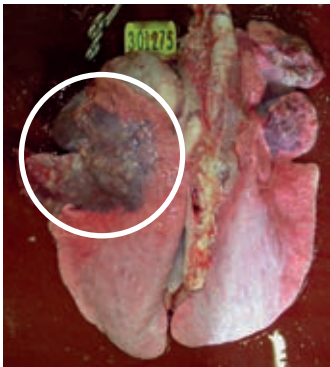


Liver showing severe abscesses likely to be due to acidosis

Pneumonia/pleurisy and *Pasteurella*

In 2015, 2.89% of sheep carcasses and 7.08% of cattle carcasses slaughtered in England showed evidence of pneumonia/pleurisy.

Stock that have suffered respiratory diseases during their life can show lesions or infected lobes in the lungs, leading to rejection of these organs at slaughter.



Lungs with evidence of pneumonia infection (circled)

Pneumonia in cattle and *Pasteurella* in lambs pose a significant risk of death. Research has shown that cattle with infected lungs have a reduced daily liveweight gain, lower carcass weight and poorer carcass classification, compared to cattle with healthy lungs.

Vaccination programmes for *Pasteurella* in lambs and Infectious Bovine Rhinotracheitis (IBR) and Bovine Respiratory Syncytial Virus (BRSV) in cattle, should be considered as part of the farm health plan. Building design, which promotes good ventilation and air flow, is critical to preventing respiratory diseases in stock.

Bruising and trauma

More than 22,000 cattle carcasses slaughtered in England in 2015 showed signs of bruising and trauma.

Bruised carcasses can be visually unappealing which may deter buyers, particularly in the lamb carcase trade. They may also require trimming depending on severity. This not only reduces carcase weight, but may also exclude it from certain high value markets.

Handling stock potentially carries a significant risk of bruising, so it is important to ensure handling systems are well designed and regularly maintained to minimise the risk.

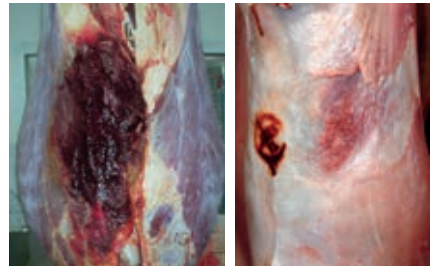
Inappropriate use of sticks can cause severe bruising in cattle, as can wool-pull in sheep, particularly spring lambs which bruise very easily. Care should also be taken in loading, transit and unloading, ensuring appropriate stocking densities are followed.

Other factors to consider

Hide and skin damage

Skin price can have a large effect on lamb value. Quality affects the skin price so ensure stock are handled and clipped or dagged carefully to reduce the risk of damage.

Consider the impact of poorly designed handling systems, holding pens and fences and prevent injuries from any horned cattle within a group. The presence of ectoparasites such as lice, ticks and flies can also reduce the quality of hides and skins.



Obvious bruising on the side of a cattle carcase (left) and lamb carcase showing bruising due to wool-pull (right)

Stress

Cattle carcasses from agitated cattle, particularly young bulls, are susceptible to a meat quality condition called Dark Firm Dry (DFD), sometimes referred to as 'Dark Cutters'.

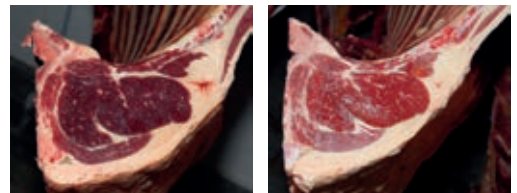
Stress in the 24-48 hours prior to slaughter depletes the muscles glycogen stores, resulting in meat with an abnormally high pH and a dark red colour. Appearance is an important factor when consumers buy meat, with a bright cherry red colour being most sought after.

Although not a safety issue for consumers, DFD meat will be sold at a discounted price. It also has a lower storage life than meat of normal pH.

It has been estimated this condition can reduce carcase value by as much as 50p/kg or £160 per carcase, however, this is considered to be a conservative estimate.

Avoid stressing cattle by:

- Handling them quietly and calmly
- Not mixing animals from different groups
- Taking special care with bulls



The meat on the left has come from an animal that suffered pre-slaughter stress

Carcase contamination

Dirty fleeces and hides increase the potential for carcass contamination and potential risk to human health from food-borne illnesses.

Faeces can carry pathogens such as *E. coli* O157:H7, *Clostridium perfringens*, *Salmonella* and *Campylobacter* which, if transferred to the carcass surface during dressing, can result in food-borne illness.

Producers consigning animals to the abattoir have a duty to ensure stock are presented in a clean and dry manner. Equally, abattoir operators have to implement cleanliness standards for incoming stock as part of their Food Business Operators legal responsibility. Animals are assessed for cleanliness on arrival at the abattoir and any animal deemed too wet or dirty cannot be killed unless extra steps are taken to ensure slaughter and dressing can be carried out hygienically.



Beef and sheep categorised as dirty which will need special attention at the abattoir.

Delivering dirty stock to the abattoir can also increase processing costs, elements of which may be passed back to the producer.

Costs include:

- Cleaning/clipping dirty animals
- Reduced slaughter-line speed
- Reduced carcass value due to any additional trimming required
- Reduced value of by-products, ie hides and sheep skins
- In extreme cases, loss of the entire carcass

Preventing animals becoming dirty in the first place is ideal, but cannot always be achieved, particularly in wet weather and when finishing sheep on roots and forage crops.

Steps should be taken to reduce the amount of loose dung produced and where possible to prevent fleeces and hides from getting excessively muddy. Plan an appropriate parasite control programme with your vet, provide free-access straw or hay if stock are on lush grazing or during wet spells and move ring-feeders often to prevent poaching of the soil.

Management considerations for slaughter cattle

- **Ration** – consider changing animals on a 'wet' silage or brewers' grain based ration to a drier ration pre-slaughter. Alternatively, provide cattle with free access to straw fed from a ring-feeder, or include long chopped straw in mixer wagon rations

Where cattle are being finished on intensive cereal diets, ensure the ration is correctly balanced for protein, energy, vitamins and minerals and use cereals that have been lightly rolled, not ground



- **Bedding** – provide adequate straw and bed-up frequently
- **Clipping** – to remove visible signs of dirt. This should only be carried out as a last consideration as it can be stressful for the animal, damage and devalue the hide and be dangerous for the producer
- **Reduce dung contamination during transit** – research has shown that contamination is reduced in cattle fed on straw and water only for up to 36 hours prior to slaughter

Management considerations for finished sheep

- **Ration** – for sheep approaching finishing and being fed on a 'wet' diet of silage, roots or brewers' grains, consider changing to a drier ration, eg a higher cereal mix

Where sheep are grazing roots and forage crops, ensure the land is light and free-draining and dag before turning out. Provide hay at all times, move racks, troughs and feeders often to avoid creating boggy areas and leave large enough dry lying areas and sufficient shelter, for the whole flock in poor weather



- **Housing** – bed-up sheep regularly with adequate clean, dry straw. For animals being finished off grass, house overnight prior to sale if possible, to reduce gut fill
- **Weather** – try to ensure sheep are dry prior to slaughter, as wet fleeces increase the spread of bacteria
- **Belly clipping** – particularly relevant if sheep are coming off roots or dirty/wet ground. However, over-zealous clipping can damage and devalue the skin. Leave belly clipping as close to sale as possible and keep on clean, dry bedding

The Food Standards Agency with ADAS has produced two booklets: **Clean Beef Cattle for slaughter – A guide for producers** and **Clean Sheep for slaughter – A guide for producers**, which contain practical advice on how to present clean animals for slaughter. For further information visit: www.food.gov.uk/foodindustry/farmingfood/cleancattleandmeatsafety/

Other BRP publications available

Joint Beef and Sheep BRP

- Manual 1 – Improving pasture for Better Returns
- Manual 2 – Assessing the business for Better Returns
- Manual 3 – Improving soils for Better Returns
- Manual 4 – Managing clover for Better Returns
- Manual 5 – Making grass silage for Better Returns
- Manual 6 – Using brassicas for Better Returns
- Manual 7 – Managing nutrients for Better Returns
- Manual 8 – Planning grazing strategies for Better Returns
- Manual 9 – Minimising carcass losses for Better Returns
- Manual 10 – Growing and feeding maize silage for Better Returns

See the AHDB Beef & Lamb website beefandlamb.ahdb.org.uk for the full list of Better Returns Programme publications for beef and sheep producers.

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