

Safe working with bales in agriculture



Who is this leaflet for?

This guidance is for people involved with the handling and stacking of round and square bales. It does not address the safety risks associated with the use of machinery used to produce bales – see ‘Find out more’.

Following the guidance in this leaflet could help prevent many of the accidents and much of the ill health associated with the handling and stacking of bales in agriculture.

Accidents and ill health

Fatal and serious accidents can arise from work activities associated with bales including:

- falling from bale stacks;
- falling from vehicles and machinery used to transport or stack bales;
- being struck by falling bales;
- electrocution from contact with overhead electricity power lines (OHPLs);
- trips and falls from loose bale string;
- contact with bale handling machinery such as elevators;
- fires.

Health problems associated with handling and stacking bales can be caused by:

- lifting and carrying (manual handling related injuries, eg bad backs, pulled muscles and strains);
- exposure to dust (eg respiratory diseases and infections).

Who should stack bales?

Stacking requires skill. Anyone involved in bale stacking work, including casual, temporary or agency workers, should:

- know how to stack bales safely or be supervised directly by someone with this knowledge;
- be aware of the risks and the precautions to be followed and understand the working procedures;
- be properly trained in how to use any machinery and equipment safely;
- be medically and physically fit for the work;
- wear appropriate personal protective equipment, eg dust masks or gloves as appropriate.

Where should I build bale stacks?

- Build stacks on firm, dry, level, freely draining ground, which should be open and well ventilated, away from OHPLs.
- Use stones or crushed rock on the ground beneath a stack to make it level, which may also help trap water and stop it going into the stack.
- Select a site away from any potential fire hazards and sources of ignition.
- Good road access will help so bales can be transported to and from the stack safely.
- Provide sufficient space to allow tractors, trailers and other vehicles adequate room to manoeuvre.
- Assess the need to fence off stacks if livestock have access or if the stack is close to a footpath or boundary.
- Provide signs to warn people to keep clear of bale stacks (eg risk of falling bales, fire etc) if it is not possible to build stacks away from areas where the public have access.

Prevent falls when stacking and de-stacking by hand

Assess the risks from working at height when stacking and de-stacking bales and select and use appropriate work equipment to do the job safely.

- Use a safe means of access to and from working positions above ground level.
- Never use an elevator, tractor-mounted loader, telescopic handler bucket or bale handling attachment as a means of gaining access or to get down from a stack.
- Ladders are commonly used when bales are being stacked and de-stacked. However, you should identify the safest means of access to a stack – which may not be by ladder. Only use ladders where no other reasonably practical means of access is available.
- In some stacks it may be possible to build in bale ‘steps’ to provide safe access for stacking and de-stacking.
- Avoid working near edges or overreaching for bales.
- Keep clear of bale loading equipment to reduce the risk of being knocked off the stack.

How to stack bales

- The bottom of a stack should set up a sturdy foundation for all additional bales.
- Only use bales of sound construction, particularly for edges.
- Make sure that bales are ‘tied in’, ie stacked so that lower supporting bales are stabilised by overlapping and interlocking upper bales in alternating layers.
- Monitor the construction of the stack to ensure it remains stable during and after stacking.
- Make sure that there are no loose strings which could cause a trip hazard.

Big square/high-density bales

Stacks of big square bales are more stable than those of small conventional bales but big bales can cause fatal and serious injuries if they fall on to a person due to their weight.

Stacks should be constructed with:

- a wide base that narrows slightly as it gets higher;
- alternating layers of single or double bales that 'tie in' those below, ie there should be an overlap of half a bale width all round to add enough stability and strength to stop the stack from splitting. This is especially important if stacks are close to public roads, footpaths or in an area where people may be present.

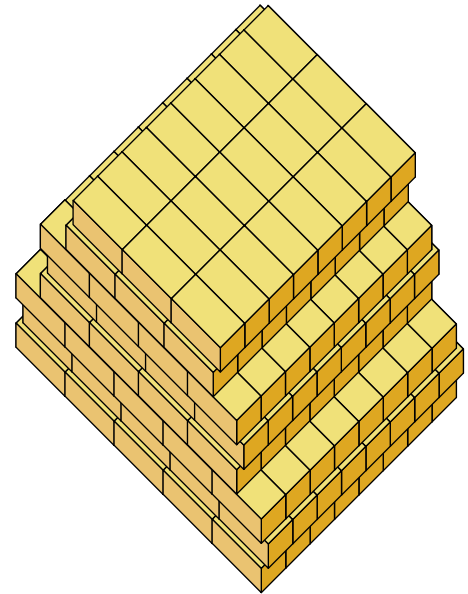


Figure 1 An example of a stacking pattern for big square bales

Big square/high-density bale stacks should not be built higher than:

- one-and-a-half times the width of the base;
- the reach of the equipment available to de-stack it;
- ten bales on hard-standing or concrete;
- eight bales on sites where no hard-standing is available.

Take particular care when handling big, square bales. They can weigh up to 600 kg each and one of these falling on someone could kill them.

A stack collapsing inside a building could cause damage to its structure and in turn this may injure or kill people. Make sure that buildings in which bales are stored are suitable and of sound construction. Seek advice from the building manufacturer, designer or builder where possible.

Bale collector/accumulator stacks

Bale collectors/accumulators, used in the field as part of the baling process, transport bales to a temporary position and leave them to be collected, stacked one directly on top of another. This can be an advantage if it rains as fewer bales get ruined. However, bale collector stacks are inherently unstable and should be re-stacked as soon as possible. If the top bales have been exposed to rain, they can deteriorate and make the stack even more unstable.

Small square/conventional bales

Small bales should be interlocked closely, with alternate layers rotated and slightly offset so that each bale is locked in, eg in a pattern similar to brickwork.

The part of the stack from where bales will be removed when required for use should be built in 'steps' to allow safe access for stacking and de-stacking. However, this may also permit easy access by children and so it may be necessary to block up the steps by leaving a few bales in place until access is needed.

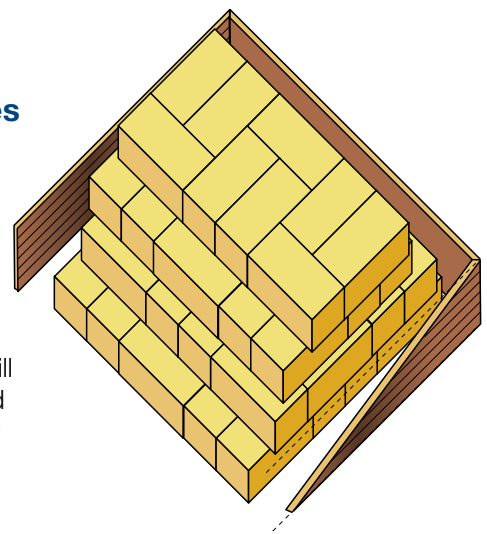


Figure 2 An example of a stacking pattern for small square bales

Round bales

Pyramid stacking

The safest method of stacking round bales is on their sides in a pyramid (see Figure 3), but make sure:

- the bottom rows of outside bales are chocked or fitted with stakes or supports;
- layers are overlapped by half a bale front to end.

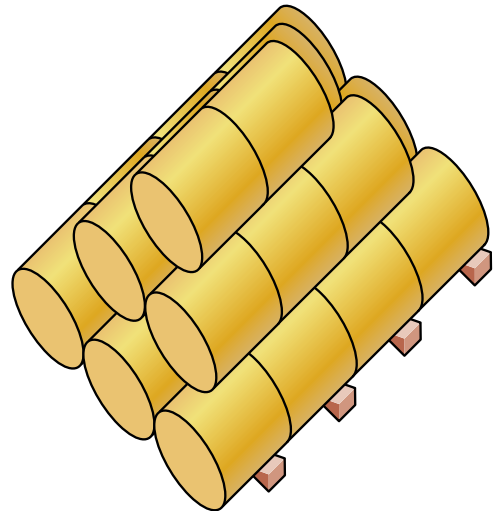


Figure 3 An example of a stacking pattern for round bales

End stacking

- Stacking round bales on their ends can lead to unstable stacks because inconsistent bale density allows bales to settle and shift.
- Only consider stacking round bales on their ends if they are to be stored within a building where the building has sides or other suitable measures are provided to reduce the risk of bales falling out.

Wrapped round or square bales

Take extra care when stacking and de-stacking wrapped bales as the plastic wrapping can make the bales slippery. The dry matter content can influence the stability of the stack so you should limit the height of the stack when using these bales. Follow these guidelines for wrapped bales:

- below 25% dry matter – stack in single layers;
- between 25–35% dry matter – stack two bales high;
- between 35–45% dry matter – stack three bales high.

The maximum stack height of round bales should be roughly three times the bale diameter.

Covering bales

Covering bales with sheeting or netting can create safety problems including:

- working at height; and
- manual handling (with small bales).

Sheeting bales can also increase the risk of vermin, fungal and bacterial infestations and trapped moisture, which can cause the quality of bales to deteriorate and lead to a stack becoming unstable.

Before covering a stack of bales, check:

- the stack to make sure it is structurally sound and of the appropriate dimensions;
- the sheet or net for holes, tears and stresses – repair any defects before it is used;
- the ropes to make sure they are in good condition and of a suitable length;
- attachment/securing points.

Be aware of the risks of covering bales if the ground is uneven or if the weather is windy – work may need to be moved or postponed.

Sheeting or netting bales on trailers or lorries

If road traffic and environmental laws allow it, leave bales uncovered wherever possible if they are to be transported by road.

However, if it is necessary to cover bales, then avoid the need for work at height by, for example:

- using automated sheeting systems that do not require people to climb on the load or vehicle bed;
- attaching a net to a pole, both of which are lifted by telehandler over the load;
- lifting a folded net by telescopic handler onto the load and unfolding it, using ropes, from ground level.

Stack maintenance

Having created a good stable stack, you will need to make sure it stays that way.

Check bale stacks regularly to make sure:

- the stack is still in good condition, especially following bad weather;
- the stack is not in danger of collapse;
- children are not using the stack as a play area or den;
- bales are not coming loose.

Dismantle or rebuild any stacks that have become unsafe.

De-stacking

People are at risk of falling from stacks when de-stacking by hand because they often try to:

- free jammed bales;
- remove bales from the wrong part of the stack;
- pick up bales with broken strings;
- work too closely to the edge of the stack;
- stand on a loose bale.

Removing bales from a stack or load

Follow this advice whether removing bales by hand or by machine:

- De-stack the bales in the reverse order of stacking.
- Do not dislodge or remove bales from the bottom or middle of the stack as this will cause the stack to become unstable.
- Never leave overhanging bales unsupported.
- Do not attempt to physically push big bales off a stack – always use mechanical handling equipment for big bales and de-stack from the top first.
- Be aware of the manual handling risks involved when manoeuvring small/conventional bales, which may not be suitable for lifting mechanically.
- Be aware of possible settling of the bales when de-stacking.

Moving bales

Vehicles and equipment

- Use properly designed, constructed and maintained bale handling equipment and trailers or vehicles that allow loads to be secured to them.
- Check that axles and tyres are strong enough to cope with the maximum loads imposed on them.
- Take into account the weight of any load and handling equipment attached – machinery instruction manuals will provide the relevant information but, for example:
 - telescopic handler lifting three big bales may be carrying a load of nearly 2 tonnes;
 - a lorry trailer carrying 36 big bales may be carrying a load of more than 20 tonnes.
- Do not lift or stack higher than the capabilities of the handling equipment being used.
- Do not carry a bale or bales on a loader or telescopic handler that obscure the driver's vision.
- Make sure:
 - bale/hay racks etc are securely attached to trailers;
 - loads are stable as roping an unstable load will not make it safe;
 - tyre pressures are set correctly;
 - trailers are securely connected to their tractor or towing vehicle;
 - devices for handling bales, such as clamps, grabs and spikes are suitable for the type of bale being handled.

If using bale spikes:

- it is better to use two or more spikes to ensure a bale is held securely and to reduce the risk of a bale 'spinning' on the spike or coming loose;
- longer spikes are safer for ensuring the stability of a load but bales must be fixed securely otherwise the weight of the bales on the end of the spikes may cause the spikes to snap;
- make sure spikes do not protrude so far through the bales that they are a danger to people;
- remove, fold back or cover spikes before travelling on the highway and when they are not required, so that they are not a danger to people and other road users;
- always follow the **safe stop** procedure before dismounting from a tractor or mobile machine. Fatal accidents have occurred where people did not follow **safe stop** and were impaled by a bale spike or crushed by a machine.

Remember:

- Handbrake on
- Controls neutral
- Stop engine
- Remove key

Moving bales by tractor

The centre of gravity is important when handling big bales, especially with a front-end loader.

- Keep the load as low as possible – a top-heavy load could lead to a backward or side overturn.
- Use controls smoothly, avoiding jerky movements.
- Do not travel too fast.

- Make sure there is adequate ballast on the front and rear to counterbalance the load. Insufficient ballast can make steering and braking difficult and could be dangerous in the field and on the road.

Roll-over and falling object protection

Equipment such as tractors with fore-end loaders used to move bales should have approved, well-maintained and enclosed cabs incorporating a rollover protection system (ROPS) and falling object protection (FOPS). Seat restraints should be fitted (and worn) if the machine is used for work where there is a risk of overturning.

An enclosed cab will also help protect the operator from any bales that might become dislodged and roll or slide down the loader arms. A tractor fitted with a roll bar rather than a fully enclosed safety cab may not provide adequate protection on its own against bales free falling back over the loader arms.

Arrangement of loads on vehicles

- Don't overload the trailer.
- Be aware that high loads are more likely to overturn.
- Don't stack bales beyond the edge of the trailer.
- Secure loads with straps or ropes and double-strap bales at the rear, as these tend to sway the most.
- Moving a number of large bales at one time can cause braking, steering and stability problems.
- Check the load at regular intervals and after heavy braking or sudden changes of direction.

Routes over fields

- Plan these in advance and instruct drivers accordingly.
- Take into account the effects of rough ground, tracks and gateways.

Routes by road

Movement of agricultural equipment and bale loads on public roads requires special care. Make sure you are aware of your duties under road traffic legislation. If in doubt, check with the police, Department for Transport and your local council.

Safety of pedestrians

- Check around before moving off, particularly for children and young people.
- Ensure all people are well clear of the driving route before setting off.
- Never carry passengers on loads or bale transporters.
- Never allow anyone to ride on any machinery, particularly the drawbars of trailer units.
- Keep non-essential people away from stacks during stacking and de-stacking, particularly when vehicles and machinery are being operated.
- Ensure mirrors on tractors and telescopic handlers are fitted and properly maintained and adjusted.

Other problems associated with bales

Fire

- Your local fire and rescue authority should be able to provide you with guidance concerning clearance distances to be maintained between stacks and occupied buildings. You may also wish to ask your insurance provider and local council for advice.
- Where several stacks are sited together outside, they should be built, if possible, in a line across the prevailing wind.

- Plan stacks away from public access if possible. If this is unavoidable, then be aware that stacks next to roads and public footpaths are vulnerable to fires – either from discarded cigarette ends from passers-by or by deliberate arson.

Sources of ignition

- Once stacks have been built, ensure combustible materials or those that might be a source of ignition, such as fertilisers or fuel, are not stored nearby.
- Ensure any electrical wiring inside barns is suitable, safe and correctly insulated so that it does not act as a source of ignition.
- Keep bale elevator engines free of straw and other debris to avoid causing a fire – fit a protective shield or guards if possible to prevent bales and loose material falling onto the engine.
- Do not allow smoking near stacks.
- Be aware that hay bales can sometimes catch fire through spontaneous combustion.
- Do not carry out any work that might create a risk of fire in the vicinity of stacks, eg welding, using a blow torch etc.

Overhead power lines (OHPLs) and underground services

- Do not work or build stacks under or within 10 m horizontal distance of OHPLs.
- If you cannot avoid carrying out this work within 10 m of an OHPL you should assess the risks, consult the electricity distribution network operator for advice, and follow a safe system of work.
- Where possible avoid operating loading equipment below OHPLs.
- If you cannot avoid operating loading equipment below OHPLs make sure that drivers know about the risks and precautions to take.
- Make sure loading equipment, such as telescopic booms and the masts of fork-lift trucks etc, is lowered when passing under OHPLs.
- Do not build stacks over underground services such as gas pipes or water hydrants, as the stack could cause an obstruction if emergency repair work needs to be carried out.
- For more guidance on working safely near OHPLs – see 'Find out more'.

Manual handling

Careful planning can reduce the risk of health problems associated with lifting and carrying:

- Arrange the work to avoid hazardous manual handling where you can, eg switch to a big bale system to fully mechanise the task.
- Where manual handling is necessary, reduce the risks by using mechanical handling aids and other equipment, eg bale elevators, and handling aids such as bale trolleys, pitchforks or bale-hooks.
- Ensure that people carrying out the work are physically capable and have been properly trained in manual handling techniques.

Dust

Dust can cause respiratory (breathing) problems.

- Whenever possible, use mechanical equipment for handling bales.
- Keep doors and windows closed on tractors and loaders etc to reduce exposure.
- Avoid shaking out bales or bedding animals with bales that are mouldy or particularly dusty.
- Avoid working with bales within a building or other enclosed space without adequate ventilation.
- Wear a suitable respirator where you are likely to be exposed to high levels of dust. If using a disposable respirator, ensure it is to the standard EN 149 with a

filter of FFP2 or above. This standard should be visibly marked on the mask. Disposable masks that are not produced to this standard (eg nuisance dust masks) will not offer adequate protection.

Vermin

Good vermin control is essential, as vermin such as rats can destroy 20% of a stack. They like the shelter, warmth, food and water provided by a bale stack and also have a preference for chewing through, rather than going around, bale string. As well as causing stacks to become unstable, rats can also cause illnesses such as leptospirosis which is caught through contact with their urine.

Children

Children are attracted to bales and stacks as a place to climb and play. They are also particularly at risk where farm machinery and vehicles are being used to move or transport bales to or from the stack.

- Prevent children from playing with bales, climbing onto stacks and making dens inside them.
- Look for tell-tale signs of children in stacks, eg bales built to make a den, tunnels through the stack or toys or clothes lying on bales.
- Do not allow children to be present during stacking and de-stacking work.
- Do not allow children to ride on a stack of bales being carried on a trailer or on bale handling equipment

Checklist: Steps to take before starting work with bales

People

- Do not allow children to be present during stacking/de-stacking work
- Use signs or barriers to keep away members of the public or anyone not involved in bale handling
- Make sure all workers, including employees, the self-employed and contractors, are:
 - properly trained
 - aware of the dangers
 - aware of safe working procedures
 - equipped with, and wear, appropriate personal protective equipment
 - medically and physically fit for the work being carried out
 - aware of what to do if working on their own
 - aware of what to do if there is an accident or emergency

Workplace

- Make sure the working environment is:
 - suitable for the work to be done, eg stacking, loading, unloading etc
 - away from OHPLs or underground services
 - free from holes, ditches etc
 - free from loose or trailing strings
- Plan routes, particularly if travelling by road (eg avoid OHPLs, overhead obstructions, roundabouts, sharp turns, heavy braking)

Equipment

- Use the correct equipment and make sure it is securely fitted, eg handling attachments
- Make sure equipment is suitable for the task and the load is within the safe working load limits

- Make sure:
 - hydraulic hoses are secure and free from leaks
 - equipment is moving/operating freely
 - equipment is well-maintained
 - sheeting/netting is in good repair
- ROPS and FOPS are fitted

The activity

- The work should be properly assessed and planned
- Make sure there are safe systems of work established for:
 - stacking, de-stacking and other bale handling activities described in this leaflet
 - lone working
 - what to do if something goes wrong, eg accident or emergency
- Secure barns and take other protective measures to reduce the risk of access by unauthorised people, in particular children

Find out more

HSE's agriculture web pages: www.hse.gov.uk/agriculture/index.htm

Working safely near overhead power lines Agricultural Information Sheet AIS8(rev2)
HSE Books 2000 www.hse.gov.uk/pubns/AIS8.pdf

Preventing accidents to children on farms Leaflet AS10(rev3) HSE Books 2008
(Priced pack ISBN 978 0 7176 6313 2) www.hse.gov.uk/pubns/AS10.pdf

Safe use of round balers Agricultural Information Sheet AIS4(rev1) HSE Books 2011
www.hse.gov.uk/pubns/AIS4.pdf

Guidance on loading arrangements for vehicles on the road can be found in the Department for Transport publication *Code of Practice: Safety of loads on vehicles* (ISBN 978 0 11 552547 6).

Further information

For information about health and safety, or to report inconsistencies or inaccuracies in this guidance, visit www.hse.gov.uk/. You can view HSE guidance online and order priced publications from the website. HSE priced publications are also available from bookshops.

This document contains notes on good practice which are not compulsory but which you may find helpful in considering what you need to do.

© Crown copyright 2012 If you wish to reuse this information visit www.hse.gov.uk/copyright.htm for details. First published 05/12.

Thanks to Anglian Straw Limited and the Safety Company Limited for their help with this leaflet.