

Safe working with bales in agriculture



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How could this leaflet help you?

Following the guidance in this leaflet could help prevent many of the accidents and much of the ill health associated with working with bales in agriculture. It may also help with any other problems associated with bales, such as fire, vandalism or access to your land by members of the public.

Accidents and ill health

Accidents linked with handling and stacking bales include:

- people falling from bales or from the vehicles and machinery used in stacking bales;
- bales falling onto people;
- electrocution from work carried out on bales stacked near overhead power lines;
- loose string from bales causing people to trip and fall, or becoming entangled in bale-handling machinery;
- damage caused by fire, children and young people, vandals, vermin and the weather.

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

- lifting and carrying (manual handling), eg bad backs, pulled muscles and strains;
- 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 about safe bale-stacking techniques or be supervised directly by someone with this knowledge;
- be aware of the dangers and precautions to be observed and understand the working procedures for both the actual work to be done and what to do if there is an emergency;
- be properly trained in how to use machinery and equipment safely;
- be medically and physically fit for the work;
- wear appropriate personal protective equipment, eg dust masks or gloves as appropriate;
- ideally, be trained in first aid. A first-aid kit should be available to those involved in bale-handling and stacking work.

Where should I build stacks?

- Build stacks on firm, dry, level, freely draining ground, which should be open and well ventilated, away from overhead power lines and underground services.
- 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.
- Be aware of any potential fire hazards.
- Good road access is advisable if bales need to be transported to other sites.
- Keep non-essential people away from stacks during stacking and de-stacking, particularly when vehicles and machinery are being operated.
- Fence off stacks if livestock have access or if the stack is close to a footpath or boundary fence.
- Provide signs to warn people of the hazards from bale stacks, eg falling bales, fire etc, if it is not possible to set stacks away from where the public have access.

Prevent falls when stacking and de-stacking

Assess the risks of working at height when stacking and de-stacking bales and select and use appropriate work equipment.

- Use a safe means of access to and from working positions above ground level and **never** use an elevator or loader/telehandler bucket.
- 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.
- Avoid working near edges or over-reaching for bales.
- Keep clear of bale-loading equipment.
- Mark stack edges or limit the stack height to reduce the risk of someone falling.

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.

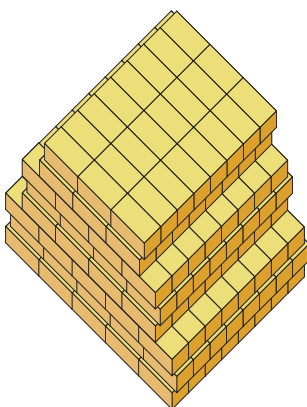


Figure 1 An example of a stacking pattern for big square bales

Big square/high-density bales

Stacks of big square bales are more stable than those of small conventional bales but big bales can cause a lot more damage if they do fall.

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.

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 have been designed and manufactured by qualified people who have taken these factors into account.

Bale-collector/accumulator stacks

Bale-collectors/accumulators, which are now used quite often in the baling process, transport bales to where they are to be stacked and leave them stacked one directly on top of another. This can be an advantage if it rains as then only one bale gets ruined. However, bale-collector stacks are inherently unstable and should be re-stacked as soon as possible. If the top bale has been exposed to rain, it can deteriorate and make the stack even more unstable.

Small square/conventional bales

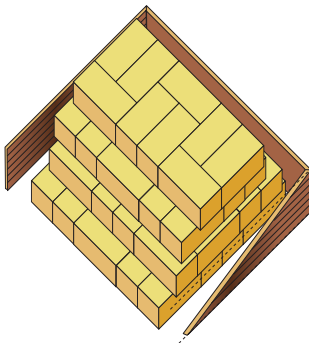


Figure 2 An example of a stacking pattern for small square bales

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 mean easy access for children and young people.

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.

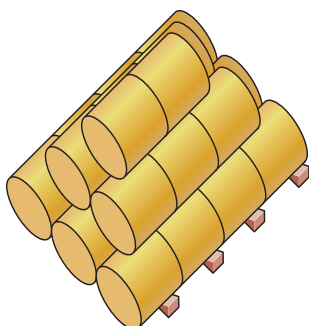


Figure 3 An example of a stacking pattern for round bales

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.
- Fill any spaces between the columns with small bales.

Wrapped round or square bales

If bales are:

- 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.

Take extra care when stacking and de-stacking wrapped bales as the plastic wrapping can make the bales slippery.

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

Covering bales

Covering bales with sheeting or netting can cause problems including:

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

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 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 access 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 telehandler onto the load and unfolding it, using ropes, from ground level.

If you cannot avoid work at height, then you must take steps to prevent falls:

- assess the risks of activities involving work at height;
- make sure all work at height is planned, organised and carried out by competent people;
- choose the right work equipment;
- choose collective measures to prevent falls (eg guard rails and working platforms), rather than measures that may only reduce the distance and

consequences of a fall (eg nets or airbags) or that may only provide personal protection from a fall and will require specialist training (eg gantry and harness systems).

Stack maintenance

Having created a good stable stack, you 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 and young people 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; or
- work too closely to the edge of the stack.

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:
 - a telescopic handler lifting three big bales may be carrying a load of nearly 2 tonnes;
 - a wagon 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 that obscure vision.
- Make sure:
 - hay racks etc are securely attached to trailers;
 - loads are stable. Roping an unstable load will not make it safe;
 - tyre pressures are set correctly;
 - trailers are securely connected to their tractor or towing vehicle.
- There are many securing devices for handling bales, such as clamps, grabs and spikes. Select these to suit the type of bale being handled.

If using 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.

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 used to move bales should have approved, well-maintained and enclosed cabs or safety frames, ie a rollover protection system (ROPS). This should be:

- a protective enclosed cab or a roll bar with a canopy; and
- designed to withstand the dynamic forces that would result as a consequence of a rollover.

Seat restraints should be fitted (and worn) if the machine is used for work where there is a risk of overturning in which the driver could be crushed between the machine and the ground.

Arrangement of loads on vehicles

- Build loads to suit the journey to the storage site:
 - 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.

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 0 11 552547 5).

Routes over fields

- Determine 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.

Plan road travel routes to try to avoid:

- overhead obstructions, such as bridges and trees, which can dislodge loads or rip netting or sheeting off bales;
- roundabouts, particularly mini-roundabouts, around which vehicles with loads could become unstable;
- steep hills; and
- sharp turns.

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.

People

- 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.

Other problems associated with bales

Fire

- The distances between stacks and occupied buildings should reflect the risks if a stack catches fire. Your local fire and rescue authority should be able to provide you with guidance about this and 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 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.

Overhead power lines and underground services

- Do not work or build stacks under or within 9 m horizontal distance of overhead power lines.
- Make sure loading equipment is lowered when passing under overhead power lines – if possible, fit 'goal posts' to alert the driver.
- 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.

Manual handling

Careful planning can reduce some of the ill-health problems associated with lifting and carrying:

- Arrange the work to reduce double-handling.
- Use mechanical bale-handling equipment wherever possible.
- Make sure, if bales do have to be handled manually, that:
 - the people involved in the work are physically capable and have been properly trained in manual handling;
 - bales are handled at a height that is comfortable;
 - handling aids, eg pitchforks or bale-hooks, are used, and used correctly.

Dust

Dust can cause respiratory (breathing) problems.

- Whenever possible, use mechanical equipment for handling bales.
- Avoid shaking out bales that are mouldy or particularly dusty.
- Wear a suitable respirator if working inside buildings, which is 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: **masks not labelled like this may not offer any 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.

Children and young people

Children and young people are attracted to bales and stacks and are particularly at risk where farm machinery is being used.

- Prevent children and young people 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 or toys or clothes lying on bales.
- Do not allow children or young people to be present during stacking and de-stacking work.

Checklist: Steps to take before starting work with bales

People

- Keep children and young people clear or make sure they are supervised
- Use signs or barriers to keep away members of the public or anyone not involved in bale handling
- Make sure 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 emergency

Workplace

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

Equipment

- Use the correct equipment and make sure it is securely fitted
- Make sure equipment is up to 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 is properly planned
- There are safe systems of work established for:
 - lone working
 - what to do if something goes wrong
- Secure barns to reduce the risk of access by unauthorised people, in particular children and young people

Find out more

Why fall for it? Preventing falls in agriculture Leaflet INDG369 HSE Books 2002

Shock horror: Safe working near overhead power lines in agriculture
Leaflet INDG389 HSE Books 2003 (single copy free or priced packs of 10
ISBN 0 7176 2764 0)

Working safely near overhead power lines Agriculture Information Sheet AIS8(rev2)
HSE Books 2000

Manual handling solutions for farms Agricultural Safety Leaflet AS23(rev3)
HSE Books 2006 (single copy free or priced packs of 15 ISBN 0 7176 6186 5)

Farmer's lung Agricultural Safety Leaflet AS5
HSE Books 1988

Common zoonoses in agriculture Agriculture Information Sheet AIS2(rev2)
HSE Books 2000

Keep children safe on the farm: Fatal accidents to children Leaflet
INDG340 HSE Books 2001

Preventing accidents to children on farms Agricultural Safety Leaflet AS10(rev2)
HSE Books 2000

LOLER: How the regulations apply to agriculture Agriculture Information Sheet
AIS28 HSE Books 1998

Fatal traction: Practical advice on avoiding agricultural transport accidents
Leaflet INDG279(rev1) HSE Books 2001

Tractor action: A step-by-step guide to using tractors safely Leaflet INDG185(rev1)
HSE Books 2003 (single copy free or priced packs of 10 ISBN 0 7176 2711 X)

PUWER 98: How the regulations apply to agriculture and forestry
Agriculture Information Sheet AIS27 HSE Books 1998

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