

# Harvest and Storage



The 2016 campaign is upon us and attention is now switching from growing and protecting crops to recovering as much yield as possible from each and every field of beet.

The delayed drilling period, coupled with a dull, wet early summer has tempered yields somewhat, however the warm, sunny end to the summer has seen beet develop well and there will no doubt be some very good crops again this year.

With the later maturing crop, campaign start has been delayed which help to boost returns as from September onwards, sugar beet crops have the potential to put on about 40% of their total yields. With this in mind, just in time harvesting is an important strategy to maximise yields since it not only allows the crop to develop to more of it's potential, but it also reduces sugar loss through

respiration while beet is in store, particularly through the warmer early season conditions. The key to making Just in time work is good discussion between growers, lifting contractors, hauliers and the factories.

This document highlights the key areas to focus those discussions on throughout the season in order to get the very best from this year's crop. BBRO too will be focusing on crop recovery work and we're here to support with any technical questions you may have so, as ever, please do not hesitate to get in touch if we can help.



Operate a 'just in time' harvesting and delivery approach for as long as possible. This will ensure that stocks on farm are kept to a minimum, allowing maximum growth and minimising sugar losses after harvest.

Crops with the poorest yield potential should be harvested first; leave the better crops for later lifting.

Handle beet gently to prevent bruising and sugar loss. Bruised beet will respire rapidly.

Foliar diseases should be controlled to maintain a healthy leaf canopy and benefit late-season growth.

Harvester operators should be fully trained and familiar with equipment. Maintenance is critical and harvesters should be fully serviced and any worn parts renewed where necessary.

Carry out regular assessments during harvester operations.

## Estimate yield loss.

Beet with < 2cm root-tip breakage diameter (%)	Loss (t/ha)
> 80-100	0.5
> 60-80	1
> 40-60	2
> 20/40	3
0-20	>4

For more exact measurement assess the diameter of the root tip breakage point of 20 representative beets and calculate the loss with the root tip breakage tool at [www.uksugarbeet.co.uk](http://www.uksugarbeet.co.uk)



## Harvester Setup - DRY SOIL CONDITIONS

Type of loss/damage	Suggested setting changes
Whole root losses	<ul style="list-style-type: none"> <li>• Set lifting mechanism deeper</li> <li>• Fit discs in place of shares</li> <li>• Decrease forward speed</li> <li>• Add Opper wheel star wheels</li> <li>• Check condition of shares - if worn, replace or repair if possible</li> </ul>
Root tails broken off at lifting	<ul style="list-style-type: none"> <li>• Reduce forward speed</li> </ul>
Root damage - chipping, breakage and cracking in the cleaning mechanism	<ul style="list-style-type: none"> <li>• Set lifting mechanism deeper</li> <li>• Fit turbine gate plates</li> <li>• Reduce turbine speed</li> <li>• Fit ringed turbines and/or more helper tines</li> <li>• Consider increasing or decreasing forward speed</li> <li>• Remove agitator rollers from chain cleaning systems</li> </ul>

## Harvester Setup - WET SOIL CONDITIONS

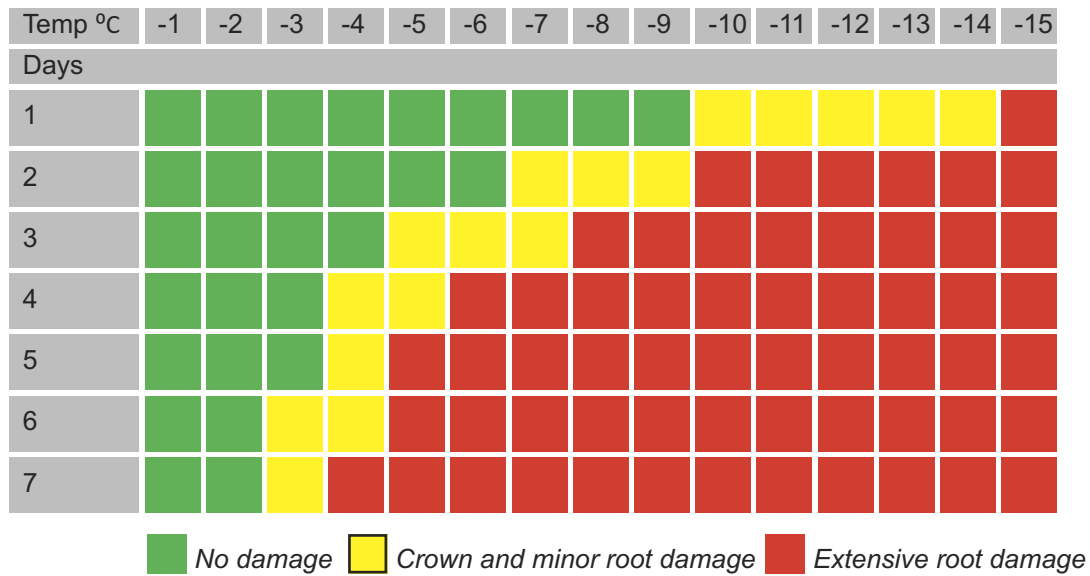
Type of loss/damage	Suggested setting changes
Whole root losses	<ul style="list-style-type: none"> <li>• Increase or decrease forward speed</li> <li>• Set lifting mechanisms deeper</li> <li>• Replace discs with shares or close discs</li> </ul>
Root tails broken off at lifting	<ul style="list-style-type: none"> <li>• Adjust depth of lifting mechanism - raise/lower</li> </ul>
Root damage - chipping, breakage and cracking in the cleaning mechanism	<ul style="list-style-type: none"> <li>• Reduce turbine speed</li> <li>• Increase forward speed</li> <li>• Check lifting accuracy</li> </ul>
Excessive soil adhering to harvested roots	<ul style="list-style-type: none"> <li>• Increase turbine speed</li> <li>• Remove gate plates</li> <li>• Fit pigtines instead of railed gates</li> <li>• Fit lifting shares in place of discs</li> <li>• Raise lifting mechanism</li> <li>• Fit agitator rollers and chains</li> <li>• Increase turbine gate gaps</li> <li>• Increase angle of roller bed and lower grub chain</li> </ul>

## Harvester Setup - CROP CONDITIONS

Type of loss/damage	Suggested setting changes
Small beet	<ul style="list-style-type: none"> <li>• Fit gate plates</li> <li>• Reduce pitch of cleaning/transport chains or fit plastic pipe over chain links to reduce pitch</li> <li>• Close turbine finger wheel gaps</li> <li>• Close Opper wheel gaps</li> </ul>
Gappy beet	<ul style="list-style-type: none"> <li>• Open discs and move further from skids</li> <li>• Sharpen topper knives</li> <li>• Reduce scalper arm pressure</li> </ul>
High weed infestation	<ul style="list-style-type: none"> <li>• Increase gap between turbine and gates</li> <li>• Increase angle of roller bed</li> <li>• Replace flails on topper</li> <li>• Sharpen knives</li> </ul>

## In-field storage considerations

The main risk to in-field storage is frost. The chart below shows the level of root damage that might be expected for different levels of frost.



## Clamping

Average losses in clamp are circa 0.1% of total sugar volume per day but **BBRO storage trials** have shown that **best practice** techniques result in just **0.039% of total sugar volume loss per day**. If storage is managed very poorly, the result can be very serious and lead to load rejections and beet becoming unsaleable with a total loss of value.

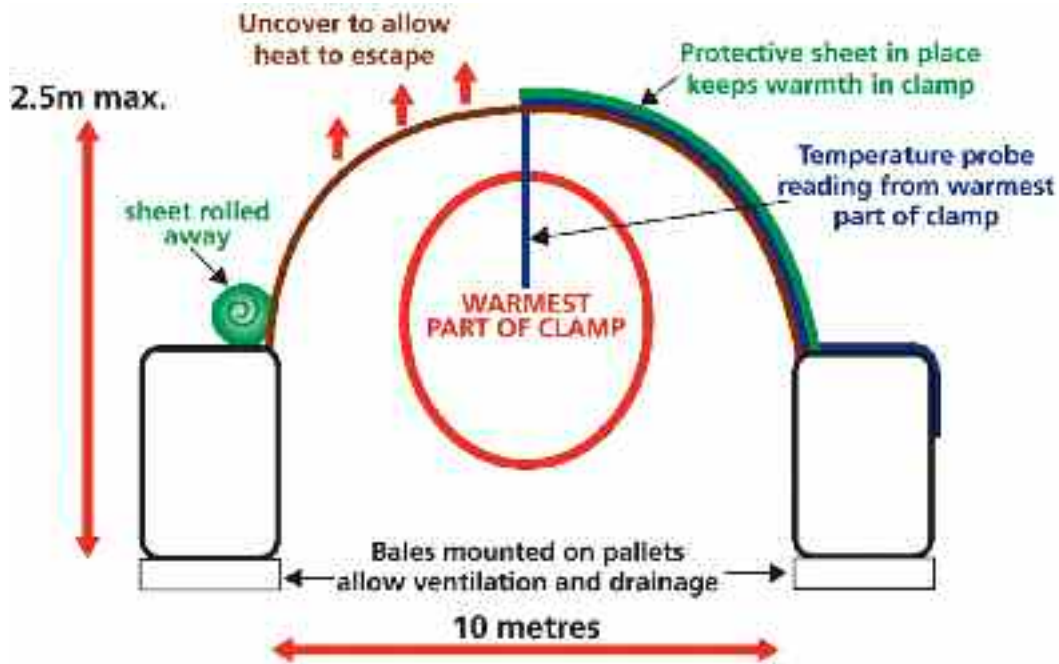
Planning and attention to detail is fundamental when building a clamp. Where it is necessary to harvest and store beet on farm, the following should be considered.

### All clamps

- Clamps should be built in an open area to aid ventilation and cooling.
- Choose a firm, well-drained site which will be suitable for loading and unloading.
- Never push beet up the face of the clamp. This will break beet, compact the clamp and in turn restrict air movement, allow heat to build-up and increase the rate of sugar loss.
- Sugar beet stores best where it has only minimal damage from harvesting.



## Cross section of a traditional clamp



## Early season clamp



Early in the season beet should be in a clamp for no more than a few days. These clamps should not be covered or have retaining walls.

Short-term clamps are designed to give maximum surface area and therefore cooling to reduce sugar loss through respiration.

Clamps should be made up of individual loads and be no more than 2m high.

## Late season clamp



Late season long-term clamps should be no more than 2.5m high with a level surface so there are no frost pockets.

Clamps should be built using straw retaining walls. Bales should be placed on pallets with the open end facing outward to aid ventilation.

Only use clamp sheets if the ground temperature is forecast to be below  $-3^{\circ}\text{C}$ .

Clamp sheets are made of polyfelt which not only offer protection but also allow the beet to breathe.

## A-shaped clamp

for self-propelled cleaner-loaders



Where a self-propelled cleaner-loader is used, clamps should be built in an 'A' shape of the correct width to allow the machine to operate effectively. The beet must be placed on a flat un-rutted surface.

Clamps are normally built on the headland but consideration needs to be given for machinery to access the clamp easily.

A-shaped clamps are best built with a harvester or side-delivery trailer rather than a conventional tipping trailer to avoid rutting in the clamp base.

# On Farm Health and Safety

## Clamp Location

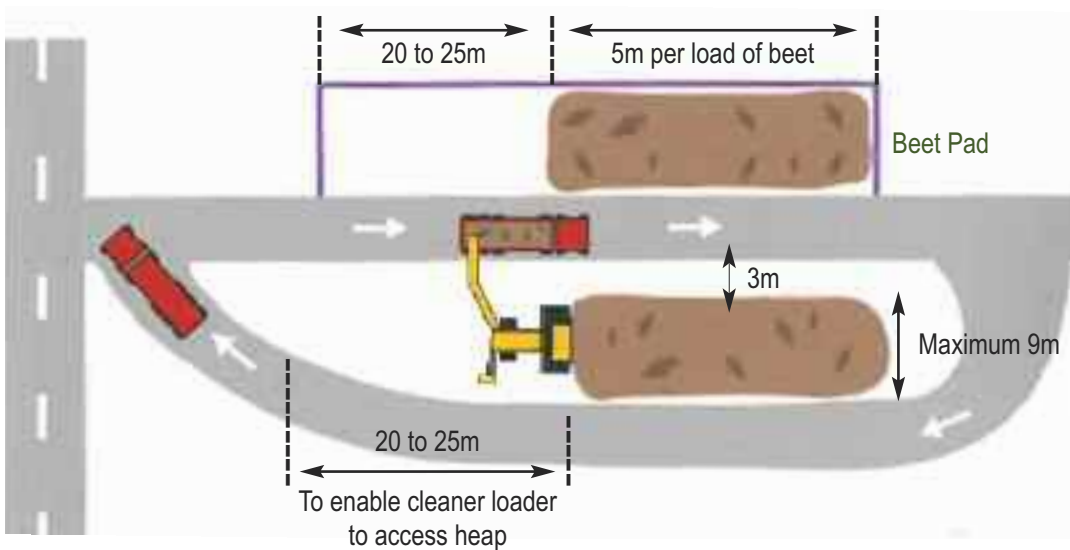
Loading sites for each field should be agreed with your haulage contractor and ideally situated on a level terrain.

For a clamp: Ideally a firm, well drained site which will be suitable for loading and unloading.

## The loading site must have good access and be situated:

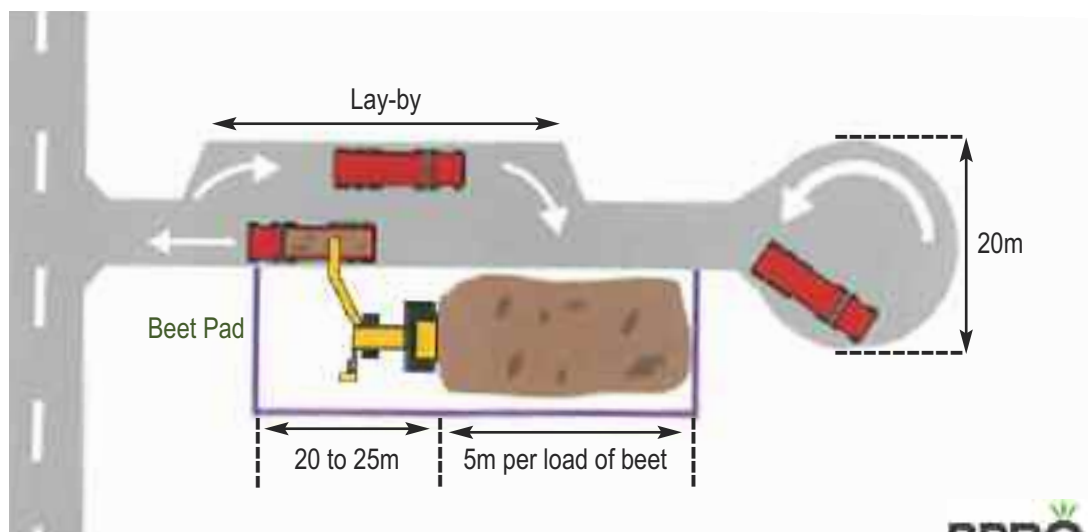
- ✓ More than 200m away from bends in the road.
- ✓ More than 100m away from roundabouts.
- ✓ More than 10m away from overhead power lines, ensuring that machinery can operate safely in the vicinity.
- ✓ On even ground, in order to stabilise loading equipment and maximise beet recovery.
- ✓ At a minimum distance of 2m - 3m from the edge of the roadway.

## Organising access for hauliers - *self propelled loaders*



Having a one way system allows traffic to move freely without having the risk of reversing.

Turning area of an artic should ideally be an area of 20m or greater.

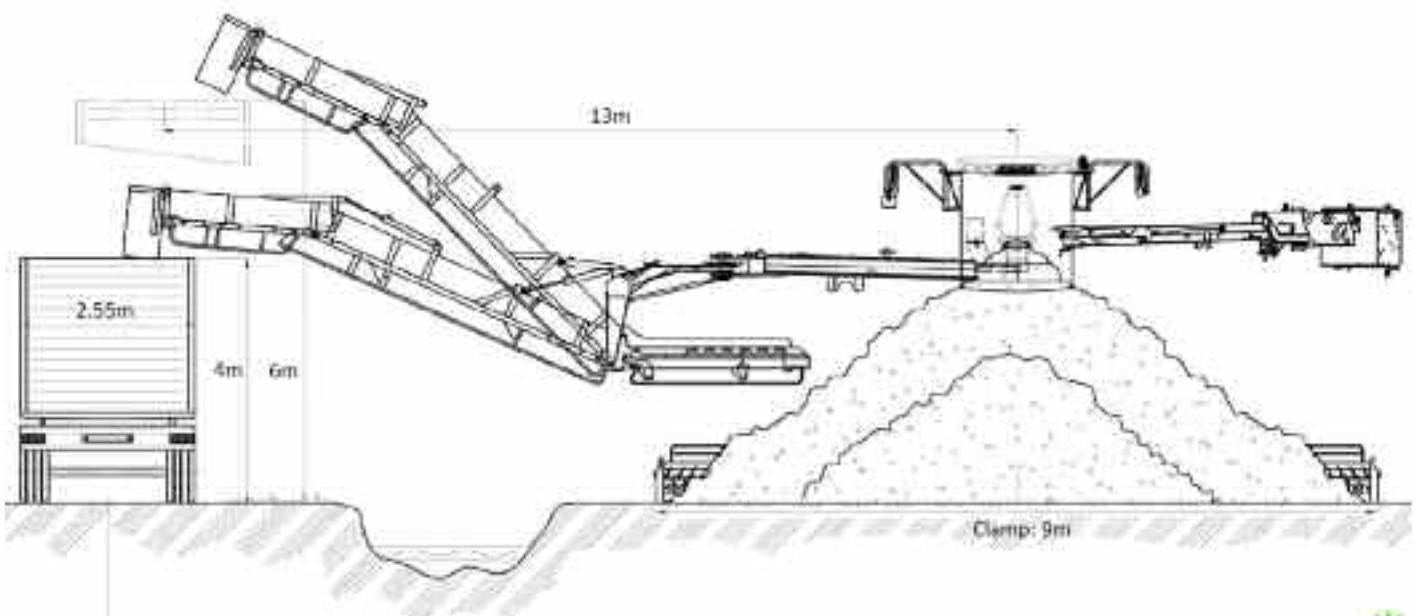




## Loading

**BE AWARE:** The loading reach of a self-propelled cleaner/loader will change when the loading site and the lorry are on different levels. Please contact your haulage contractor for specific dimensions.

Please ensure all lorries are loaded safely before leaving the loading point. There should be a minimum ullage of 125mm around the inside of the lorry body, to contain any beet that may move during transport.



## Vehicle Safety

- » Ideally lorries must not be reversed for long distances down roads or tracks. If the site is situated where this cannot be avoided it will be necessary to provide an experienced banksman.
- » Routes must be properly maintained for a 44 tonne articulated vehicle for any weather conditions experienced during the campaign.
- » It is the grower's responsibility to apply adequate amounts of grit or salt to farm roads and tracks to permit scheduled collection in icy or snowy conditions.
- » If a lorry was to get stuck due to unsuitable conditions, the grower is responsible to provide suitable machinery to resolve the issue.



*Banksman should stand in a safe place where the driver can see them.*

## Pedestrian Safety

The most common cause of serious and fatal injuries in agriculture involves moving vehicles.

**When on site, pedestrians must make themselves known to cleaner-loader operators, and follow their guidelines.**

Never approach or walk behind or beside a reversing vehicle. If you must approach, attract the driver's attention first and wait for them to stop, especially if you need to speak to the driver or mount the machine.

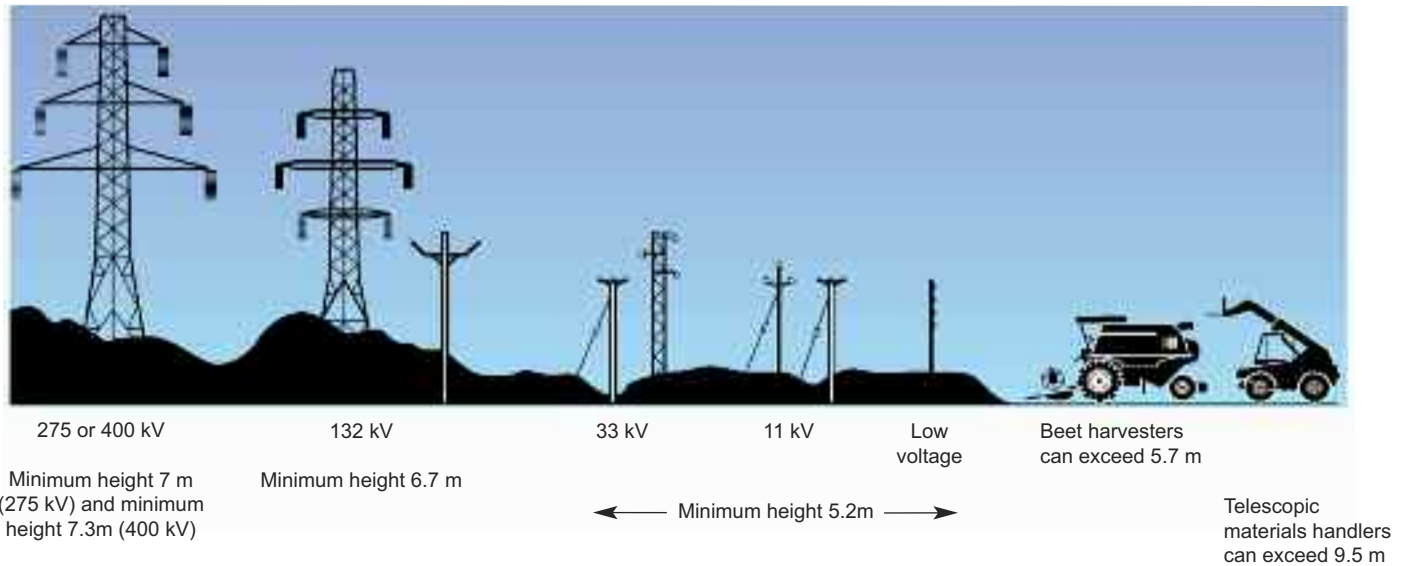
**Do not get on or off vehicles whilst they are moving.**

Minimum PPE should include high-vis upper body clothing, safety footwear, light eye protection and a hard hat.





## Overhead Power Lines



**To work out the distance:** Measure the distance from the line of the nearest conductor to the work, projected vertically downwards onto the floor and perpendicular to the route of the line.

Please see HSE documents at: [www.hse.gov.uk](http://www.hse.gov.uk)

Planning and consultation of the OHPLs on sites should be undertaken with your hauliers before the start of campaign. Please provide haulage and harvest contractors with a map of power cables on the farm.



Where you cannot avoid working within 10m of overhead power lines, consult your Distribution Network Operator for advice. If the line cannot be made dead you will need to assess the risks and agree a safe system of work with the Distribution Network Operator, hauliers and contractors.

Follow the guidance in HSE Agriculture Information Sheet AIS8: [www.hse.gov.uk/pubns/ais8.htm](http://www.hse.gov.uk/pubns/ais8.htm)

### Further useful online resources:

- [www.hse.gov.uk/workplacetransport/index.htm](http://www.hse.gov.uk/workplacetransport/index.htm)
- [www.hse.gov.uk/agriculture/index.htm](http://www.hse.gov.uk/agriculture/index.htm)

Relevant guidance can be viewed and/or downloaded. Alternatively consider providing a list of relevant publications e.g. Farmwise: Your essential guide to health and safety in agriculture:

- [www.hse.gov.uk/pubns/books/hsg270.htm](http://www.hse.gov.uk/pubns/books/hsg270.htm)

# On Farm Storage

## Storage Strategy

When building a clamp, aim to handle the sugar beet as gently as possible to minimise sugar losses, as bruising and breakage will increase respiration and sugar loss.

Poor ventilation is associated with overheating and is often the result of excess soil, weeds or leaf material and leads to sugar loss. Beet harvested in very muddy conditions should be in a clamp for five to seven days to allow the soil to dry, but no more than two to two and a half weeks in store as overheating risks are increased.

## To minimise sugar losses, our guidelines would be:

- » Operate a 'just in time' harvesting and delivery approach for as long as practical and monitor the weather forecast as season progresses.
- » Minimise beet storage early in the campaign. Short-term storage using fly-tipped or Maus clamps are the preferred methods.
- » Clamps should be built in an open area to aid ventilation and cooling, with the capability to protect from frost damage.
- » Don't push beet up the face of the clamp.
- » Operate a 'first in, first out' system, so older beet is delivered first.



# Loading out checklist



Ensure the loading area is safe. Check for overhead electricity cables.



Do not slice beet by pushing bucket up the face of the clamp, or skimming ground level beet.



Minimise drop height into the cleaner loader hopper.



Adjust cleaner loader speed so that some beet always remains in the hopper when the next bucketful is added. (i.e. drop beet onto beet rather than beet onto an empty hopper floor).



Fill lorries by loading beet onto beet.



Ensure load is safe with sufficient freeboard to prevent beet from falling off en route to the factory.



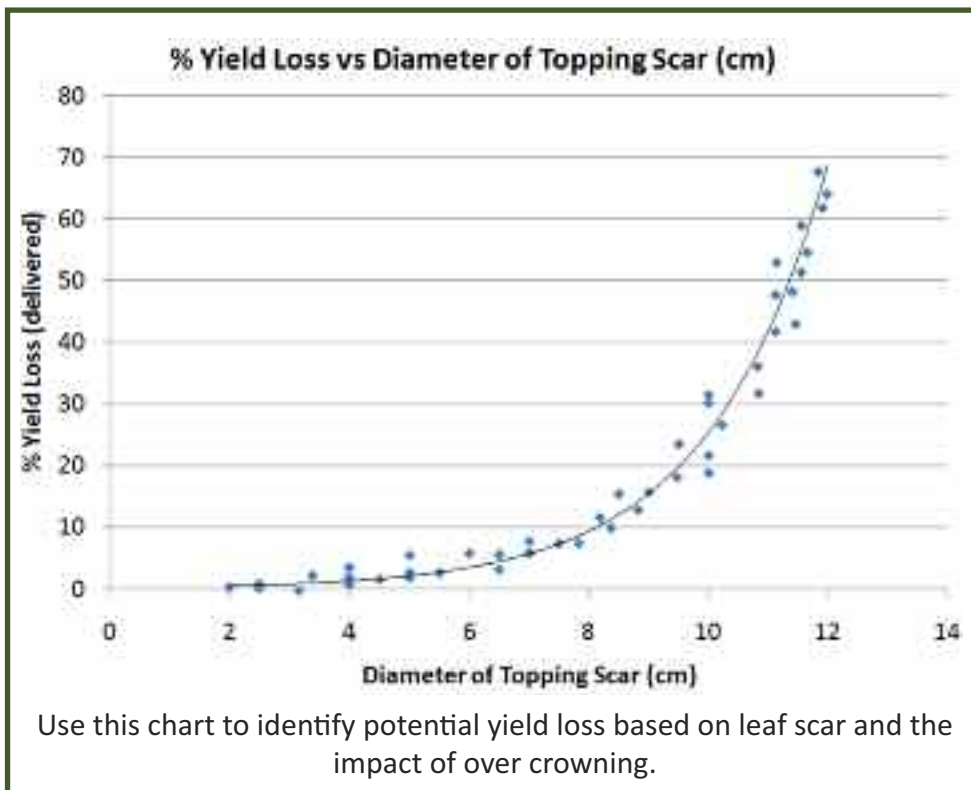
# Whole Beet Delivery Standards

Whole beet delivery was successfully introduced for the 2011 campaign along with a fixed crown tare.

Following the second year of evaluation trials in 2011 the agreed fixed crown tare for the 2012 campaign and beyond has been set at 6.61%.

- » The agreement provides all growers with an incentive to **maximise yield** and to deliver all beet of suitable quality to process.
- » Harvesting practice should be to **remove the minimum crown** material possible to help to avoid loss of yield in the field.
- » **Up to 5% increased sugar beet yields** are now possible, worth between £80-£90/ha more revenue.






Aim for a crown scar of 3cm - the size of a two pound coin



For a guide on how to accurately measure and assess losses from over crowning, please refer to **British Sugar Beet Review, Autumn 2013**, which includes an article and a useful harvester losses gauge, or contact your British Sugar Area Manager.



# Whole Beet Delivery Guide

LOSS OF DELIVERED YIELD	OPTIMUM	ACCEPTABLE	Potential issue for factory ONLY IF TOO MANY	
				
<p><b>Large amounts of root material removed.</b></p> <p>1cm slice of root material removed from all the beets can typically result in a 12% yield loss.</p> <p>Adjust harvester to remove less root material.</p>	<p><b>All green material removed and some root material.</b></p> <p>Loss of potential yield.</p> <p>Adjust harvester to remove less root material.</p>	<p><b>Optimum defoliation.</b></p> <p>All leaf material removed and root fully in-tact.</p> <p>Yield maximised.</p>	<p><b>Acceptable.</b></p> <p>No issues with receiving beets of this standard.</p>	<p><b>Too much green material.</b></p> <p>Will be tolerated if not too many in loads.</p>

