

SKIDDING WINCHES FOR FARM TRACTORS IN BROADLEAVED WOODLANDS

Introduction

This Information Note is one of a series produced for a Technical Development Branch (TDB) Outdoor Workshop (ODW) and is produced as a guide to part of a harvesting system suitable for use in small scale woodlands. ODWs are a TDB initiative designed to offer practical advice to practical people through presentation, demonstration and user guidance. The ODW programme will involve repeating trials and introducing new systems around Great Britain so that a wide range of sites, systems and practitioners can be included.

General Description

A farm tractor with a winch attached can skid tree lengths from wood to roadside.

Chainsaw work is required to directionally fell trees, and to convert and stack the final products.

Large trees may be cross-cut in the wood to reduce the length of material dragged by the tractor, which makes manoeuvring easier.

Heavy products may be bunched together for despatch if the winch is equipped with a stacking plate.

Advantages and Disadvantages of Skidding Winches

The winch is an economical method of logging small woodland for a person who already owns a farm tractor. By spending relatively small amounts on a winch and extra protection, the tractor can be equipped for woodland use (Plate 1) but proper instruction in the use of the equipment is required.

Trees can be felled on rough and steep ground, since there is no need to drive close to the tree.

The winch can be used to free 'hung up' trees, and (with care) help 'de-bog' the tractor.

Plate 1

Adapted farm tractor



Winching can be done from the extraction routes, which can be relatively far apart (30 m to 50 m). Less area is taken up by such extraction routes than by those for a farm tractor equipped with hydraulic grapple loader and bogie trailer system.

Tree length skidding systems can be less physically demanding on the chainsaw operator than shortwood systems. However, the directional felling necessary for efficient use of a whole pole skidding system can be difficult for an occasional chainsaw operator to master.

Maximum winching/skidding loads are usually only 1 m³ to 2 m³ (up to 3 m³ on large tractors) and are best used where skid distances are under 250 m. For longer distances to a truck road, this load size compares unfavourably with farm tractors with bogie trailers and loading cranes carrying loads of 5 m³ or more.

Skidded logs may become covered with dirt. Delays can occur at roadside because chainsaws will need frequent sharpening. Some sawmills lack debarking facilities and cannot use dirty logs; alternatively the price for dirty sawlogs may be reduced.

Large roadside bays, accessible to timber lorries, are usually needed for conversion and stacking.

Farm Tractors as Skidders

Purpose-built forestry skidders are designed specifically to winch and skid trees. They are heavy and well guarded underneath with the centre of gravity well forward. Power to weight ratios give efficient performance when moving logs.

Farm tractors are designed for many different tasks. They are kept as light as possible in the basic configuration so that weights may be added for various jobs as necessary. To use a farm tractor for skidding, it is usually necessary to add weights to the front (about 45 kg (100 lbs) for every 7.5 KW (10 hp)).

Other limiting features are ground clearance, small diameter front wheels, narrow front axle design, and poor guarding underneath. Ground clearance on purpose built skidders is usually 50 cm or more; on farm tractors it is usually only 35 m to 40 cm. This severely limits farm tractors on soft or rough terrain.

With a conventional farm tractor, weight on the rear axle is useful, especially for ploughing. However, when skidding the weight is even further back and may cause the front end to rise up, particularly when travelling uphill loaded. Poor steering can result, since the tractor will not turn properly if the front wheels are not firmly on the ground.

Four wheel drive tractors are better for logging than standard tractors, but only if weight distribution keeps the front wheels firmly on the ground. Four wheel drive agricultural tractors can provide 50% more draw bar pull than standard tractors in wet field conditions. (Folkema, MP. FERIC 1986).

The operator must exercise care when using a farm tractor and winch for logging. It lacks the protective plating all around of a purpose-built skidder. It is better to travel slowly with a farm tractor to avoid damage. Extraction routes should be well laid out, as level as possible, avoiding side slopes, have a good surface, and with stumps cut as low as possible.

Good directional felling is very important when skidding with a farm tractor/winch. It can take a lot of time and effort with a farm tractor/winch to realign a badly felled tree. Equipment can easily be broken and accidents may result if it is badly used.

Outputs

Ground conditions, this includes steepness, roughness and softness of the site, the size of trees being extracted, and the average haulage distance all affect output, as does the type of working e.g. thinning or felling (Table 1). Although large trees give high levels of output, overtaxing the tractor gives a dramatic fall in output and often leads to heavy repair bills.

Table 1

Two-wheel drive tractors fitted with 2.5 tonne single drum winch. Extraction in good ground conditions

	Tree Size (m ³)	Trees per Load	Load (tonnes)	Standard Output (tonnes/hour)		
				Average Extraction Distance		
				50 m	100 m	200 m
Thinning	0.10	5	0.5	3.0	2.8	2.6
	0.20	2-3	0.5	3.4	3.2	2.9
Felling	0.10	10	1.0	4.8	4.6	4.2
	0.20	5	1.0	6.0	5.7	5.1

A volume/weight ratio of 1.0 m³/tonne assumes freshly felled material.

Standard outputs are for sustained working with equipment in good condition and a well motivated driver which include allowances of 17% for Rest and 16% for Other Work.

Forestry Modifications

Farm tractors are designed for agricultural use. Modifications are needed before they can be used for logging. These modifications should be easily disconnected, or alternatively should not interrupt normal agricultural work. Some tractor manufacturers provide standardised protection packages for logging

work (Massey Ferguson; Valmet). However the tractor owner with workshop and welding equipment should have little difficulty making much of the basic equipment

The tractor operator **must** be protected if the tractor overturns. A safety cab or frame is essential (regulations concerning safety cabs or frames are summarised in Arboriculture and Forestry Advisory Group (AFAG) Guide No 501 *Tractor units in tree work*).

A belly pan should be fitted to protect the underside of the tractor, and should be made from 10 mm thick steel. Curving the pan downwards in the centre increases its strength and reduces the risk of the

tractor becoming stuck on stumps and other obstacles. Belly pans should be easily cleaned and be hinged downwards, or have access doors incorporated in their design. Considerable amounts of oil-soaked forest litter can quickly accumulate inside the belly pan, creating a fire risk.

Cleaning must be routinely carried out. Suitable fire extinguishers should be firmly fixed but readily accessible.

The radiator must be protected. A steel mesh guard should be strong enough to prevent puncture by branches. This guarding should be extended along the sides of the engine to protect components such as fuel lines and filters. Other guarding should be fitted to deflect branches from the cab front window, exhaust, and intake pipes, and must be fitted to protect a seated operator when winching. This is sometimes incorporated in the winch.

Wheels should be set wide for stability and to give room for fitting tyre chains. Tyre chains are required on all driven wheels to ensure adequate traction. Ring chains are best, but more expensive than standard snow chain types. Experience has shown these traction aids to be essential in all but the very best of conditions. Operators will otherwise be tempted to rush at obstacles or sticky patches. All wheels should have adequate valve stem protection.

Farm tractors used as skidders should have the towing hitch assembly removed (to increase ground clearance).

Mounting the Winch on the Farm Tractor

When the winch is attached to the tractor 3 point linkage, the PTO shaft should be in a straight line between tractor and winch. The support legs (Plate 2) or stacking plate on the winch should be adjusted until the PTO shaft is horizontal.

Plate 2

Support legs strong enough to roll and stack timber



The shaft should be capable of free rotation with the 3 point linkage fully raised. This feature should be confirmed with the supplier before fitting as broken PTO shafts can often result. Problems may also occur when the linkage arms are too short and the

length of the PTO shaft is less than 50 cm. Lift arms can be extended but this may affect the tractor's balance. It may not be possible to fit winches on tractors with these limitations.

Some useful accessories

Line caddy device (line backpack) (Plate 3): for safe, remote control

Skid cone: used when small diameter timber is pulled in bundles (Plate 3). Reduces both damage to remaining trees and the risk of the load becoming caught behind obstacles. Fibreglass, weight 6 kg.

Plate 3

Line caddy and skid cone



Skid grapple: When pulling individual logs butt end first, the 3 pronged conical skid grapple is used. Prevents the log sticking behind stumps and stones. Diameters 50 cm and 60 cm, weights 8 kg and 12 kg respectively.

Operational Notes

Forest work with a farm tractor can be hazardous. Operators should be experienced and confident they understand the work situation, particularly the limitations of a modified farm tractor in woodland conditions.

Personal protection needs are described in AFAG Guide No 501 *Tractor units in tree work*. If the operator is also to use a chainsaw extra personal protection is required. This is described fully in AFAG Guide No 301 *Using petrol driven chainsaws*.

Two types of chokering equipment are applicable to the farm tractor and winch. Choker chains with captive sliders and keyhole adjusters are suitable for winching by the butt end. Chains will not easily suffer abrasion damage when dragging large logs or timber pieces. However, a large amount of weight is transferred to the rear axle by this method and may affect steering, especially when travelling uphill. When winching by the butt end care has to be taken to avoid obstacles that may catch the winch load and cause rope breakage.

Tip first winching may be more suitable, especially with lighter farm tractors. Detachable choker hooks with polypropylene rope chokers can be used and are cheaper than choker chains. With good directional felling, tip first winching is considerably easier. The load is raised higher at the winch, reducing problems with ground obstacles. However, this method puts less weight and thus grip on the tractor rear axle, and increases the load drag effect. In tip first extraction, a few detachable choker hooks and choker chains are required for the occasional log needing butt first extraction.

A line caddy device is useful for remotely controlling the winch. It automatically winds or unwinds the control line as the operator follows the load or pulls out the winch rope, enables the operator to be in a safe position when controlling winching, and in the best position to see obstacles. The device holds about 45 m of line, costs about £60, and can usually be obtained through the winch manufacturer's agent. Radio control for winches is available, but more expensive.

On smaller winches, with lighter tractors, choker chains or winch rope should be attached to the base plate slots or lower pulley. This prevents tractors overturning. Detailed instructions are usually included in the winch manufacturers' information.

Further information is contained in the booklet *The Farm Tractor in the Forest* (obtainable from Forestry Commission publications).

Older, more basic equipment and its usage

Some earlier, more basic equipment for small farm tractors used chain hooks, slotted butt plates and timber tongs mounted on the tractor tool bar. In very easy terrain, with small trees easily assembled into tractor loads by the chainsaw operator, this simple equipment could equal or better the performance of small winch tractors. However, site conditions must allow the tractor to drive, and reverse, to each load.

Development of these principles led to larger, hydraulic powered timber tongs, hydratongs. These can deal with larger poles and assemble their own loads, but are still limited to easy terrain.

Technical Development Branch

Develops, evaluates and promotes safe and efficient equipment and methods of work, maintains output information and provides advice on forest operations.

Conclusion

Almost any farm tractor can be adapted for woodland use, provided the work is correctly carried out. Conversion can be so that normal farm usage is not compromised. The cost of the adaptation can be relative to the intensity of projected woodland work. Conversion of a basic farm tractor for occasional/seasonal woodland skidding is easy and reasonable inexpensive.

Outputs can be high enough to make the operation commercially attractive given the correct equipment and good job planning.

Additional tree felling and tractor driving skills are necessary. This training is best gained from recognised sources.

Further Information

Recommended additional reading

AFAG leaflets:

- 303 Chainsaw snedding
- 304 Chainsaw crosscutting and manual stacking
- 306 Chainsaw clearance of windblow
- 308 Top-handled chainsaws
- 310 Use of winches – directional felling and takedown
- 805 Training and certification

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