ForHeal Forestry Higher Education Advancement in Laos

Co-funded by the Erasmus+ Programme of the European Union

Primary timber transport Skidding

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January 23, 2019

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Contents and Goals

- After this section you will be able to:
- Distinguish between the pros and cons of
  - Gravitational timber transport
  - Animal logging
  - Skidding with farm tractors
  - Skidding with forestry skidders
- Describe the extraction using skidders

Primary timber transport

- Methods of primary timber transport
  - Manual
  - Gravitational
  - Animal
  - Mechanized
- Primary timber transport according to the way of transport
  - Gravitational (down the slope)
  - Antigravitational (up the slope)

Gravitational timber transport

- Using the gravitational force to transport timber from the stump to the roadside
- Free timber sliding
- Timber sleighing
- Sliding timber in chutes
  - Dry methods
  - Wet methods
  - Plastic (metal) slides

Gravitational timber transport

- Timber cannot be stopped once in motion
- Limited possibility to change the direction of timber once in motion
- Damage to timber (breakage, damaged butt end, etc.)
- Very dangerous

Animal logging

- Using animal power in
  - Timber removal
  - Skidding
  - Low timber concentration
  - Difficult terrain conditions
  - Slow, low productivity
  - Lower environmental impact than skidders
  - https://www.youtube.com/watch?v=2pikqXJeOAg
  - https://www.youtube.com/watch?v=Suaxcv3qMkU
- At 0.8-1 m s^{-1} the horse can skid about 10-15% of its weight
  - 0.25 m^3 of raw spruce or 0.4 m^3 air dried spruce

Mechanized Extraction

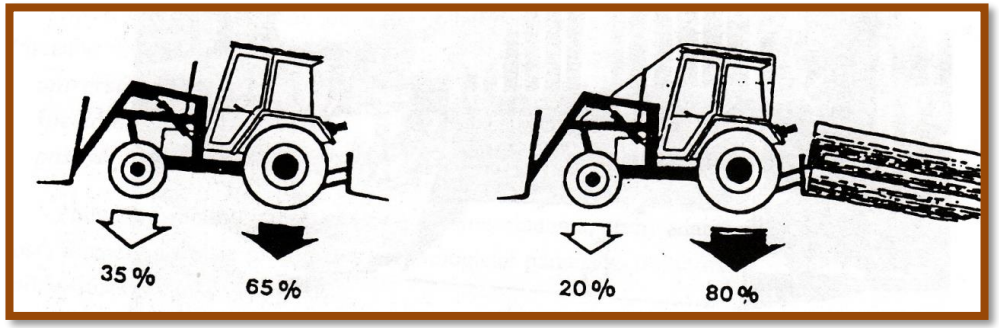
- Classification according to machine used:
  - Farm tractors
  - Forest skidders
  - Forwarders
  - Mobile winches
  - Cable yarders
  - Helicopters
  - Combined logging machines (harvarders, forwesters, etc.)
- https://www.youtube.com/watch?v=h8GMfMxb-7c&list=PLUyWkHwckhS5Xtr8ZZbqjZXdqKuiTH9jc&index=20

Skidding timber by farm tractors

- Adapting farm tractors for forestry work:
  - Winch
  - Front dozer blade and/or end plate
  - Safety cab or a safety frame with mesh
  - Bottom engine plate
  - Equipment and tools

Skidding timber by farm tractors

- Pro: can be used for other operations
- Con: farm tractors have 67% weight on their rear axle



Engine power	kW	33.1	41.8	46	50	59	75.5	77
Pulling force	kN	30.87	34.09	34.6	35.16	55	57	58
	t	3.1	3.4	3.5	3.5	5.5	5.7	5.8

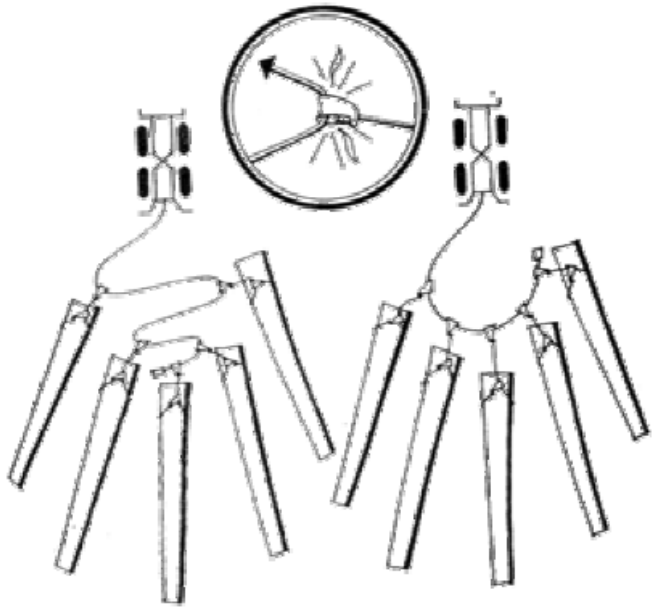
Skidding timber by forestry skidders

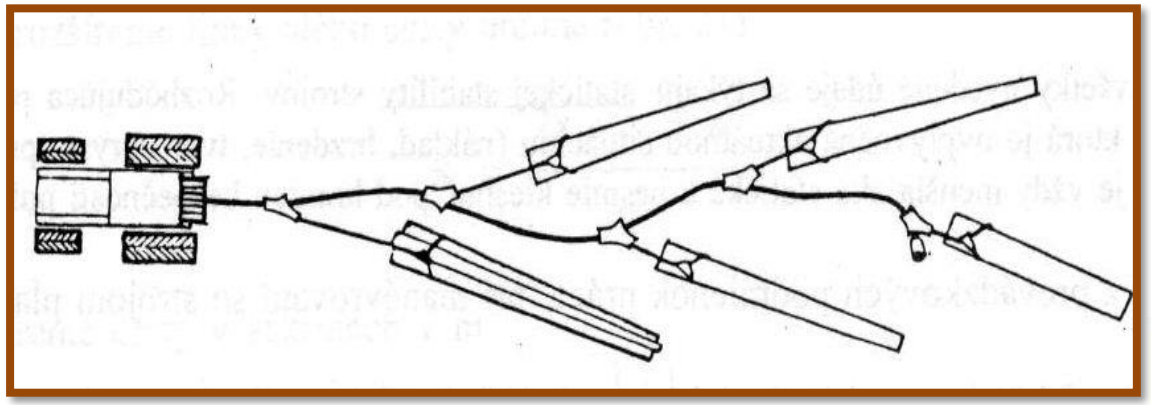
- The most common primary timber transport technology in Central Europe
- Base machine is a skidder
- Multiple adapters can be mounted on the base machine:
  - Clambunk
  - Grapple
  - Multioperation adapter
  - Mulcher
  - Forestry trailers

Technology of skidding

- Timber skidding
  - Removal
  - Skidding
- Skidding technologies
  - Chokerless
    - Clambunk
    - Forwarding
    - Grapple
  - Choker
    - Individual
    - Bundle
    - Choker line

Control:
- Mechanical
- Remote control (cable, radio, other)





Skidders adapted for various technologies

- **Grapple**
- chokerless semi-suspended skidding

Forestry trailer
forwarding

Clambunk
chokerless semi-suspended skidding

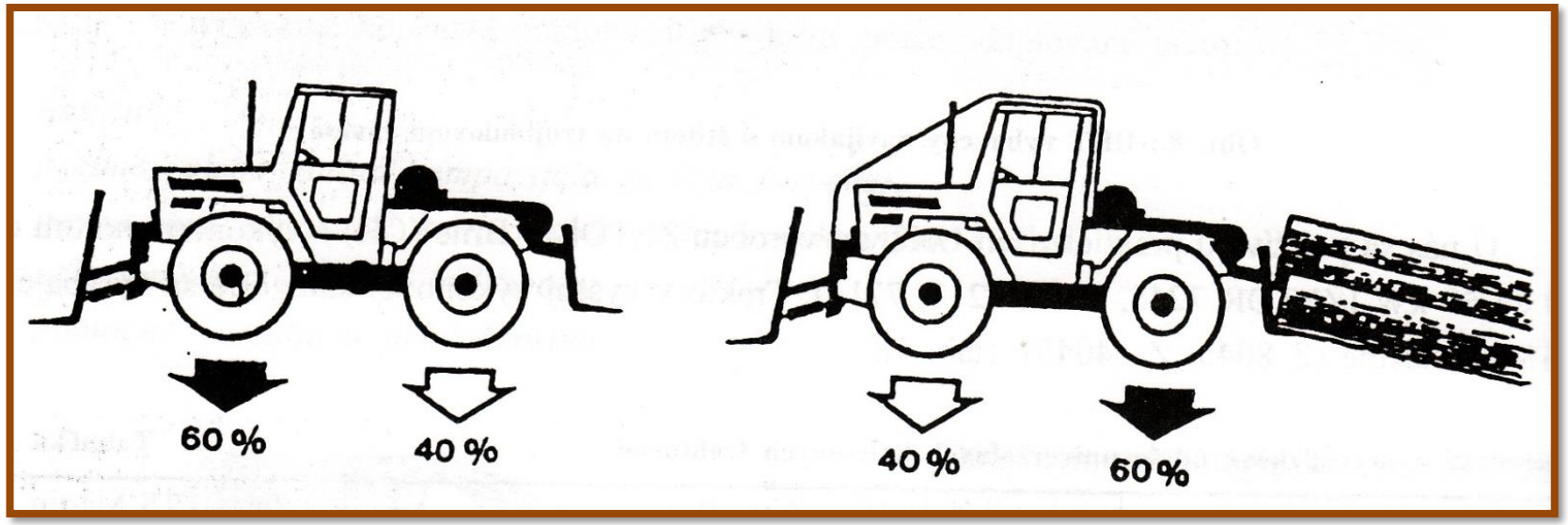
Forestry skidders: adapters

Forestry skidders: Tandem wheels

- Tandem wheels increase the accessibility of the machine
- The wheels are driven by a chain or spur gearing so that the rotation of both wheels is synchronized

Forestry skidders: advantages over farm tractors

- All wheel drive
- Better manouverability
- Greater accessibility
- Easier load assembly

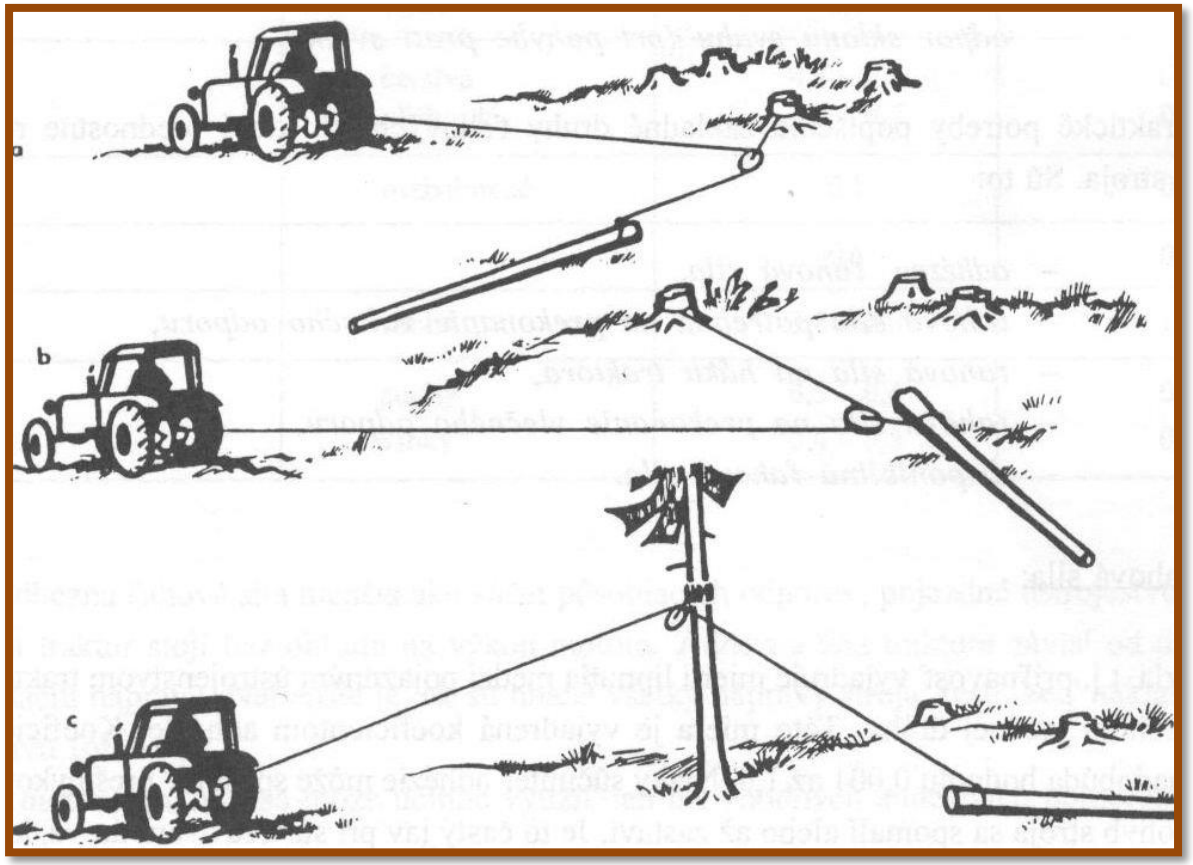


Tracked skidders

- Better for low bearing soils
- Smaller pressure on soil surface
- Almost no use for them in Central Europe
- Lower productivity than wheeled skidders
- Costlier than wheeled skidders
- Difficult maintenance

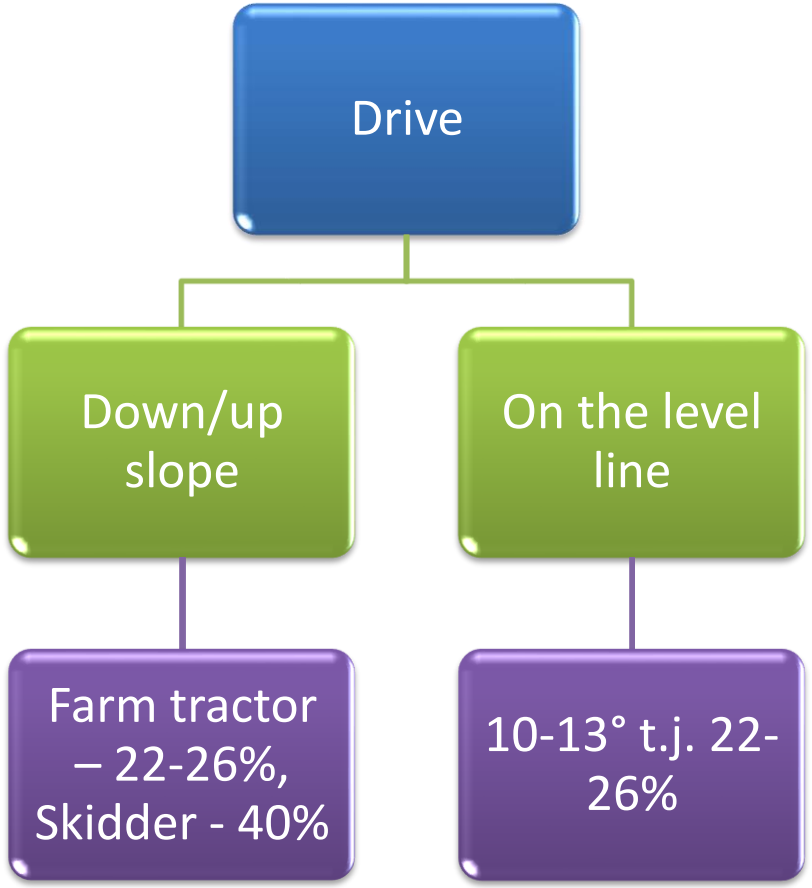
Choker skidding: equipment

- Cable or chain chokers
- Opening rollers
- Auxiliary cable with a noose
- Roller chokers
- Choker hooks
- Hand tools



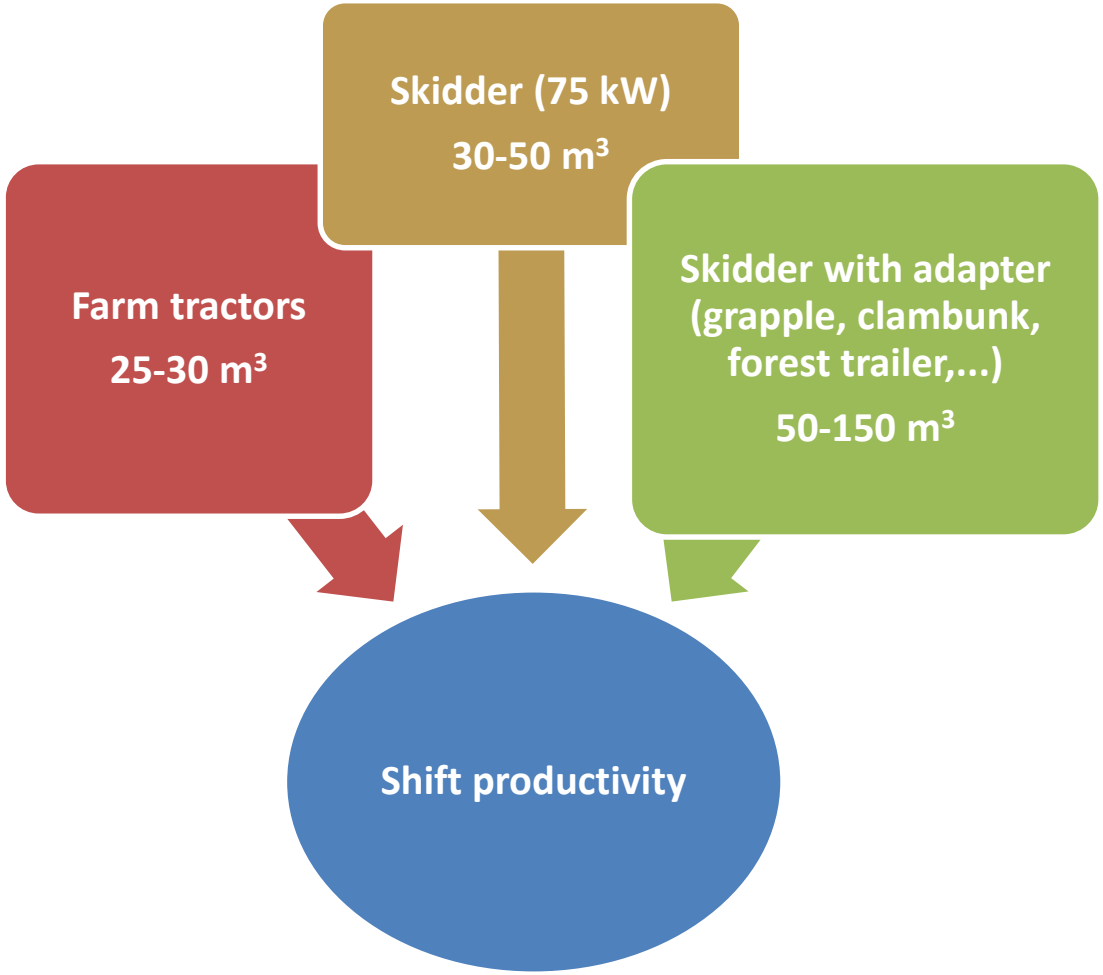
Skidder stability

- The angle to which a skidder can be safely inclined laterally or transversely
- Critical slope
  - The slope, at which the centroidal axis goes outside the outline of the skidder
- Stability depends on:
  - Machine dimensions
  - Centre of gravity
  - The effects of load
  - Slope and terrain
  - Loading of the steering axle
- Lateral stability is affected
  - by wheel gauge
  - Position of centre of gravity



Skidding productivity

- Productivity of skidding is affected by:
  - mean log volume,
  - wood type (hardwood/softwood),
  - timber removal and skidding distance,
  - correct direction of felling, etc.



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THANK YOU FOR YOUR ATTENTION