



HELSINGIN YLIOPISTO



EUROPEAN UNION  
EUROPEAN REGIONAL DEVELOPMENT FUND  
INVESTING IN YOUR FUTURE



# Energy Positive Farm - ENPOS

Hay and silage production chains  
in Finland

ENPOS Seminar - Energy use in plant production – Otepää 20 – 22 January 2010

# Mowers

---



Disc mower



Drum mower



Self-propelled disc mower

# Rakes and tedders

---





# Windrower or swather



# Round baler

---



Round baler



Mini round baler



# Square balers – big and conventional

---



Big square baler



Conventional square baler

# Silage choppers

Precision choppers or metered choppers



Flail chopper



# Loader wagon

---





# Silage silos

---



Clamp



Stack

Tower



# Bale wrapping with plastic

---



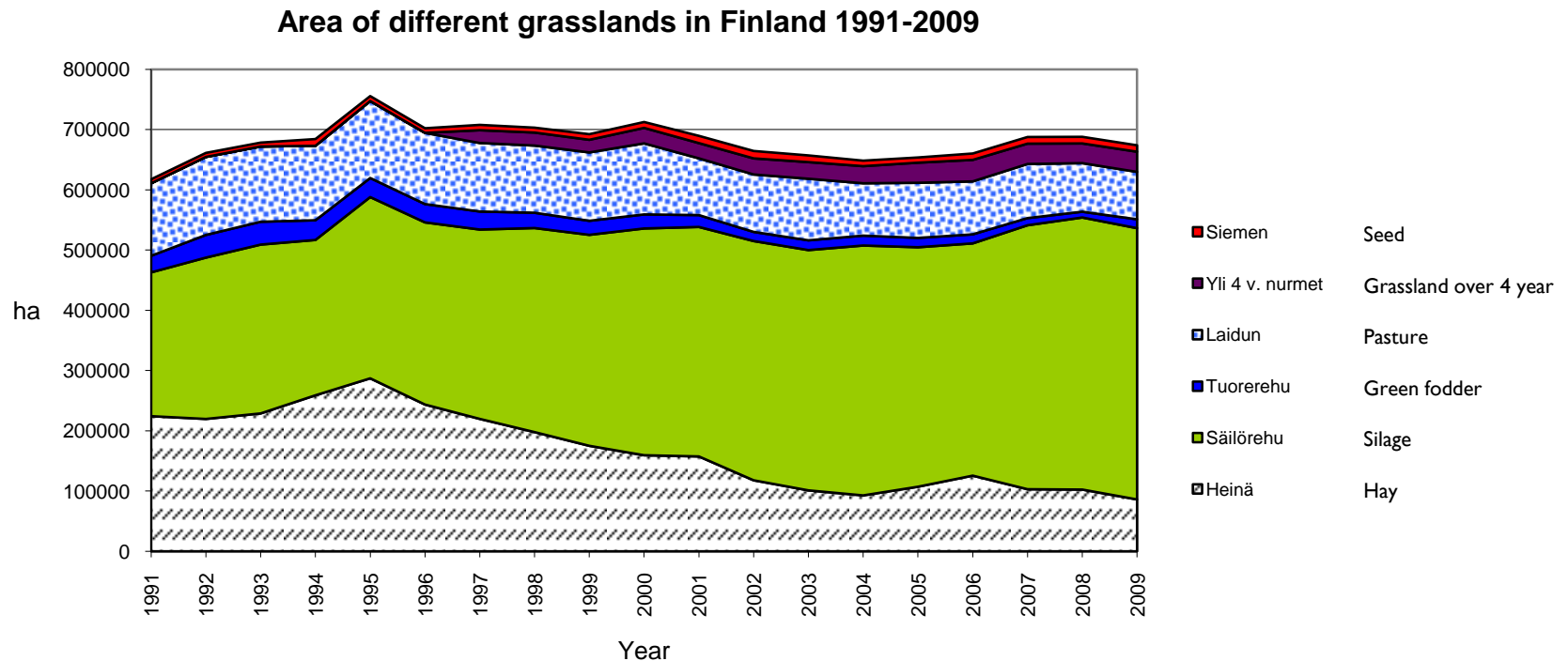
Wrapping bales one by one

Bales in a tube





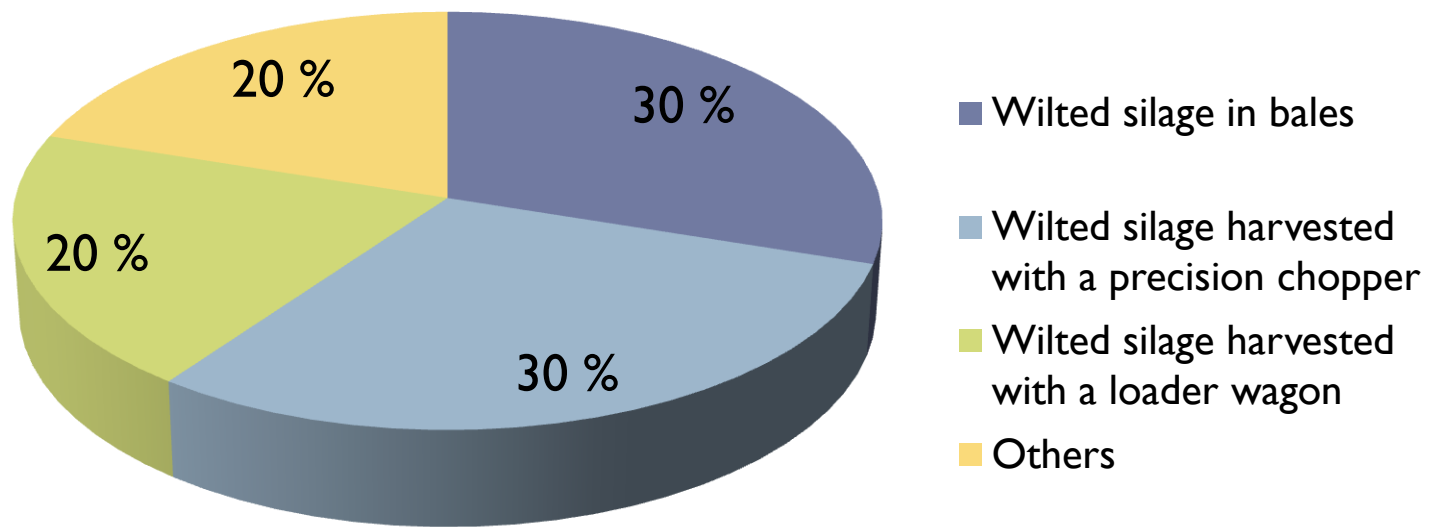
# Development of hay and silage production in Finland



Source: Niemeläinen, O. 2010. Arvio mahdollisista nurmibiomassan lähteistä bioenergian raaka-aineeksi Suomessa. Maataloustieteen päivät 2010.

# Share of different silage harvesting chains in Finland

---





# Typical hay harvesting chains in Finland

---

## ▶ Baler chain

- ▶ Disc mower
- ▶ Tedder/Rake (tedding 2 – 5 times, windrowing before baling)
- ▶ Baler (round, big rectangular or conventional)
- ▶ Transport to storage
- ▶ Drying in barn recommended

## ▶ Loader wagon chain

- ▶ Disc mower
- ▶ Tedder/Rake (tedding 1 – 3 times, windrowing before loading)
- ▶ Loading with loader wagon
- ▶ Transport to storage
- ▶ Drying in barn recommended

# Typical silage harvesting chains in Finland

---

- ▶ Precision chopper or loader wagon chain
  - ▶ Mower-conditioner
  - ▶ Chopping and loading (additive mixed to grass)
  - ▶ Transport to the preservation site, 2-3 tractors with wagons or loader wagon
  - ▶ Tipping, spreading and compacting
  - ▶ Preservation in a clamp, stack or tower
- ▶ Wrapped bales
  - ▶ Mower-conditioner
  - ▶ Baling or chopping and baling (additive mixed to grass)
  - ▶ Wrapping
  - ▶ Transport to the field edge
  - ▶ Transport to the farm during indoor feeding season





This material has been produced in ENPOS project. ENPOS is acronym for *Energy Positive Farm*.

The project partners are

- University of Helsinki, department of Agricultural Sciences – Agrotechnology
- MTT Agrifood Research Finland - Agricultural Engineering
- Estonian University of Life Sciences

Project home page is at <http://enpos.weebly.com/>

The project is financed by the EU Central Baltic IV A Programme 2007-2013

This publication reflects the authors views and the Managing Authority cannot be held liable for the information published by the project partners.

**ENPOS** Energy Positive Farm



EUROPEAN UNION  
EUROPEAN REGIONAL DEVELOPMENT FUND  
**INVESTING IN YOUR FUTURE**



CENTRAL BALTIC  
INTERREG IV A  
PROGRAMME  
2007-2013