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Labour requirement for feeding of dairy cows by automatic feeding systems

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Introduction

- The conventional feeding of cows is one of the most time-consuming activities in dairy farming.
- Automatic feeding systems (AFS) are expected to optimize the feed management, improve the labour efficiency, and increase the flexibility of the dairy farmers.

Aim of the study

- To create calculation models for estimation of labour time requirement for feeding of dairy cows with different AFS as a support tool for dairy farmers by the choice of feeding equipments

Material and Methods

Analysis of labour input on farms → **Data evaluation** → **Creation of calculation models**

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Labour studies
(survey, observation, and recording of time taken to accomplish individual tasks)

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Analysis - using of programs Meza (Drigus), MS Excel, SigmaPlot

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- Using of MS Excel

For semi AFS
-filling of silage bunkers in a conventional way by different implements for tractor
(front loader bucket, silage grip bucket, silage cutting bucket, silage block cutter)

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To determine the influence factors and to obtain the labour input time for required work elements

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To generate the standard times/standard time formulas for required work elements

For fully AFS
- automatic silage pick up with rotary cutter from tower or deep silos

Results

The calculation models:

- include following tasks:
  - filling of bunkers for roughage (silage, straw, and hay)
  - filling of the storage units for other components (e.g. mineral)
  - cleaning of feeding table and space around storage bunkers, removing of forage remains
  - pushing the feed towards the feeding fence (when not automatically)
  - others (makeready tasks, ratio management, maintenance works, etc.)
- are valid for three AFS (Triolet, Mullerup, and Pellon)
- over 100 influence factors can be modified
- calculations can be performed for existing farms as well as for fictive farms

In conclusion:

- The calculation models can be a helpful tool for dairy farmers by the choice of the feeding technique for their specific farm situation.
- They enable to calculate labour time requirement for the feeding applying selected semi and fully AFS also for fictive farms (without knowing of exact farm design).
- Further measurements will be performed to expand the standard time database and improve calculation models.

Example model calculations:

Assumptions for example model calculations:

Distance between bunkers and silo (m):	50
Capacity of pick up and transport equipments (m³):	
Front loader bucket	1.15
Silage grip bucket	1.15
Silage cutting bucket	2.00
Silage block cutter	2.50
Pushing feed against the feeding fence:	automatically

Effect of the frequency and filling technique of silage bunkers depending on herd size:
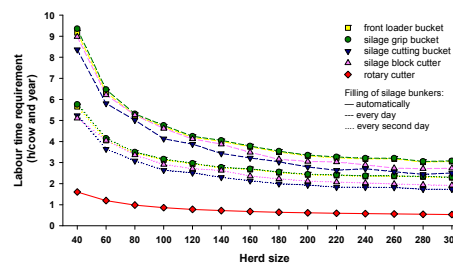
Effect of the distance between silos and silage bunkers by different filling technique depending on herd size: