LfL Tier und Technik

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Institute for Agricultural Engineering and Animal Husbandry

Creation of calculation models for estimation of labour requirement for loose barn dried hay production on dairy farms

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Introduction

- New technologies for barn dried hay production were introduced to farmers in the last years.
- Among others, this redounds to renewed interest of farmers in barn dried hay production as an interesting alternative of forage conservation.
- However, less information is available about labour requirement for barn dried hay production using these technologies on dairy farms.

Aim of the study

- to create calculation models for estimation of labour requirement for selected tasks during loose barn dried hay production

Material and Methods

Time studies on dairy farms (harvest years 2017and 2018) →

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- video recording of performed work using action Cameras (GoPro®)
- recording of influence variables (e.g. weights, distances)
- dividing the task into work elements and timing of needed work elements using program MEZA (Drigus®)

Data evaluation and determination of standard times for work elements →

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- mean values calculation

(estimation if true mean values and number of required observations by accuracy of 10 % at a probability of 95 %)

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- determination of standard times for required work elements

Creation of calculation models for estimation of labour time requirement

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- for harvesting of hay with forage wagon

(all tasks needed to load the hay on field and unload on the farm)

- for filling of drying boxes with hay crane

(all tasks needed to reload the hay from unloading point to drying boxes)

Results

Standard times and the calculation models:

- Preliminary standard times for needed work elements have been determined. Most of standard times already reached required accuracy.
- However, not all planned measurements were performed yet and also not all already measured data could be evaluated. Some changes in levels of standard times can be expected.

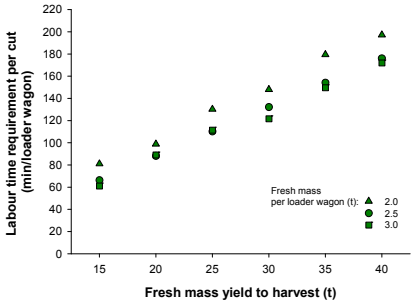
Tab 1. Examples of standard times (preliminary) for work elements by hay reloading with hay crane with possibility of diagonal movement

Work element	Unit	Standard time (cmin)
To get on crane and to start it	event	33.88
Driving of crane without load	m	1.06
Loading of hay	event	18.86
Driving of crane with load	m	0.76
Unloading of hay	event	13.87
To turn of crane and to get of it	event	22.38

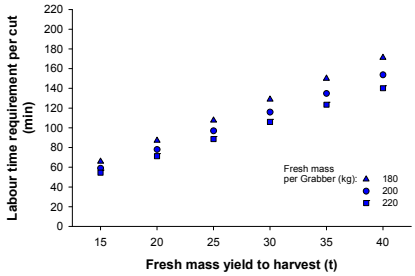
- The first calculation models for estimation of labour time requirement could be created for both tasks of interest in this study. However, the models will be further improved if necessary.
- The standard times and calculation models will be created also for other tasks (e.g. set up and fitting works during harvesting, pushing hay together during reloading of hay to drying boxes, and tasks during drying process) to complete whole loose barn dried hay production process.

Example model calculations:

Effect of loader wagon capacity and fresh mass yield to harvested using 2 loader wagons:



Effect of grabber capacity and harvested fresh mass yield by reloading the hay into drying boxes:



Some assumptions for calculations: working width of rake: 12 m
fresh mass yield: 2.4 t/ha
dry matter of hay: 70 %

Conclusions

- Further measurements and data evaluation will be performed to improve the standard time database and calculation models.
- The calculation models can be a useful tool for dairy farmers by the choice of facilities (e.g. technique capacity) and planning of labour for their specific farm situation.

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