FreeWalk - Develop economic sound free walk farming systems elevating animal welfare, health and manure quality, while being appreciated by society

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SusAn virtual Research Project Seminar
17 November 2020
FreeWalk research set-up

- As innovative housing systems, the compost bedded pack barn and the artificial floor system (Cow garden) are applied with a completely free walking and lying area and are compared with cubicle barns for reference.
- 22 freewalk systems with bedded pack barn and artificial floor and 22 cubicle systems (paired) have been studied.
- Lying and walking area in the cubicle and freewalk housing systems range from 5.5 to 10.0 m² (avg 8.6) and from 10 to 30 m² (avg 16.0) per dairy cow, respectively.
Barns with artificial floor – Cow Garden barn
Barn with artificial floor & Compost bedded pack barn for suckler cows or/and pigs
FreeWalk results: Building & Bedding management

- **A larger barn** has a **higher cost** for the building, because roof is more expensive, but costs for manure/bedding storage can be **cheaper**
- **Bedding consumption in freewalk** (sawdust, wood chips) **5x higher** than in **cubicles** (avg. 8.6 kg vs 1.7 kg/cow day)
  - **Costs of material** seen as a big **disadvantage** of freewalk systems
- **Management of bedding** is an art; winter and summer time ask for a different approach
- **Temperature** of the composting bedding material varies a lot from farm to farm
  - Temperature from 40 to 50 degrees is considered optimal for a **good composting process**; (too) low temperatures were found in the winter months
- **Dry matter content** of the **bedding material** is a key parameter for a successful composting process; a **water balance model is set-up**
FreeWalk results: Bedding material

• The physical, chemical and biological properties of 51 different conventional and alternative bedding materials for dairy cattle were evaluated.

• The physical properties exhibited substantial differences among the materials, except for the dry bulk density, which showed no difference.

• Regarding chemical properties, all of the tested materials presented desirable behaviour.

• *Posidonia oceanica* can be considered as a potential alternative material for use as bedding material for dairy cows, shows effective physical properties.

• In addition, *Miscanthus grass* and spelt husks are suitable alternative materials for use in cubicles and freewalk housing systems.
FreeWalk results: **Bedding material**

**Publications:**

*Evaluation of the Physical Properties of Bedding Materials for Dairy Cattle Using Fuzzy Clustering Analysis*

Patrícia Ferreira Ponciano Ferraz, Gabriel Araújo e Silva Ferraz, Lorenzo Leso, Marija Klopčič, Giuseppe Rossi and Matteo Barbari

*Animals* 2020, 10(2), 351

[https://doi.org/10.3390/ani10020351](https://doi.org/10.3390/ani10020351)

*Properties of conventional and alternative bedding materials for dairy cattle*

Patrícia Ferreira Ponciano Ferraz, Gabriel Araújo e Silva Ferraz, Lorenzo Leso, Marija Klopčič, Matteo Barbari, Giuseppe Rossi

*Journal Dairy Sci.* 2020, 103, 9, 8661-8674

[https://doi.org/10.3168/jds.2020-18318](https://doi.org/10.3168/jds.2020-18318)
FreeWalk results: Animal Welfare

- **Cow welfare measurements** were done on the 44 farms, using mainly animal-based measures, from an adaptation of the Welfare Quality® Protocol
  - Farms were visited during winter 2017 and summer 2018, when 4,036 dairy cows were scored by the same observer
  - Results showed a large influence by the housing system on animal-based measures and comfort around resting
- **Freewalk housing systems** appear to enhance the well-being of animals by offering them plenty of space
- Behavioural research showed a significantly higher activity for cows in freewalk herds and slightly shorter lying time, and less antagonistic behaviour
Publication:

Symposium review - Animal welfare in free-walk systems in Europe
Isabel Blanco-Penedo, Wijbrand Ouweltjes, Elfriede Ofner-Schröck, Kerstin Brügemann, Ulf Emanuelson
Journal Dairy Sci. 2020, 103, 6: 5773-5782
https://doi.org/10.3168/jds.2019-17315
FreeWalk results: Animal Health

- **DHIA data** indicated a significant **higher somatic cell count in milk** and a **lower ketosis risk** in freewalk than cubicles herds.

- **Use of antibiotics** in freewalk herds was **significantly less** than in a group of 80 Cubicle housed herds.

- The hygiene of legs and udder was somewhat **less positive** in freewalk systems.
FreeWalk results: Emissions and soil

• The **ammonia emissions** of freewalk housing with wood chip bedding material were **31% lower** per cow than those of the cubicle housing system, whereas the **methane emissions** were **34% higher** per cow.

• The **composted bedding material** from freewalk systems was judged as a **better soil improver** than **slurry**.
FreeWalk results: **Consumer view**

- A sample of 3,693 consumers from 8 European countries and discussions in 6 focus groups from 3 European countries did not distinguish clearly between housing systems in their food choice.

- **Consumers** appear to focus more on organic production and on grazing.
Interest in **multi-functional use** of freewalk buildings and products from this system

**Publication in procedure:**
Consumers and farmers perceptions in Europe regarding use of composted bedding material from cattle.

*Journal Sustainability*
Networking & farmer groups

Study tour to Research farm of Kentucky University, 25 June 2019
Era-Net SusAn Mid-term COFUNDED projects seminar, Wageningen 10 – 11 April 2019
Visit of compost bedded pack barn in Kentucky, 25 June 2019

FreeWalk consortium meeting in Bled (Slovenia), 4 - 5 June 2018
Working meeting of Dutch farmers

Study tour of Slovenian farmers to the Netherlands, October 2018
Future need for research

• Follow-up research intends to **find out** if some of the results are purely **housing effect** or **caused by differences in farmers’ attitude** (or both)

• Follow-up research to **develop ways** to **clean the bedding** in combination with alternative bedding material to reduces emissions of ammonia and green house gasses

• More research on the **bacteria flora of the composting bedding material in freewalk barns** is needed

• **New floor systems** (like artificial floor) with separation of faeces and urine to be **further developed**

• Combining of elements from cubicles and freewalk housing systems as a system for the future
FreeWalk products

Publications:

**Invited review - Compost-bedded pack barns for dairy cows**
Lorenzo Leso, Matteo Barbari, Marcos Aurélio Lopes, Flávio Alves Damasceno, Paul Galama, Joseph L. Taraba, Abele Kuipers
*J. Dairy Sci.* 2019, 103:1072–1099
[https://doi.org/10.3168/jds.2019-16864](https://doi.org/10.3168/jds.2019-16864)

**Symposium review - Future of housing for dairy cattle**
Paul J. Galama, Wijbrand Ouweltjes, Marcia I. Endres, Yehuda R. Sprecher, Lorenzo Leso, Abele Kuipers, Marija Klopčič
*Journal Dairy Sci.* 2020, 103, 6: 5759-5772
[https://doi.org/10.3168/jds.2019-17214](https://doi.org/10.3168/jds.2019-17214)
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