

Validation of individual feed intake records using a 3D camera system in commercial farms

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Individual measurements of feed intake

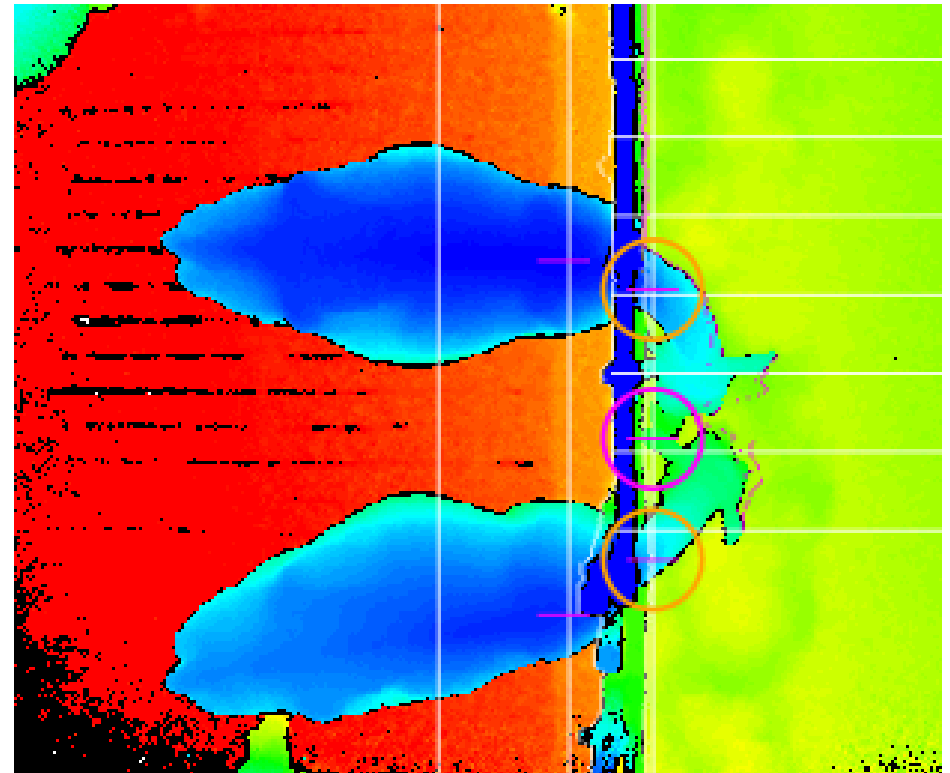


CFIT – Cattle Feed InTake



The CFIT system contains

-  Identification of the cow
-  Feed intake on individual level
-  Body weight predicted based on shape of the back
-  Based on 3D images and AI/ML



Installations June 2022





 7,5 RDC ~ 3000 cows

 7 JER ~ 3000 cows

 8,5 HOL ~ 4000 cows



Data is used for

-  Breeding value estimation for Jersey, Red Dairy Cows and Holstein
-  Management purposes for the farmers who have the system
-  Continuous development of the system
-  Part of various research projects

Genetic correlation through lactation

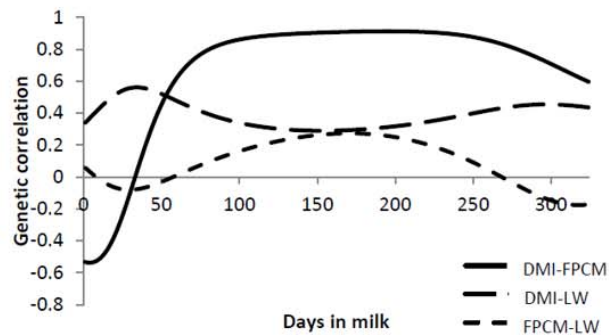
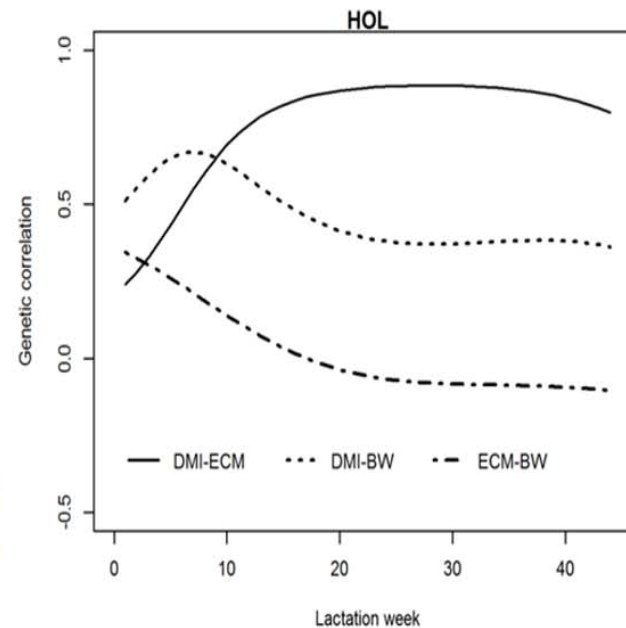


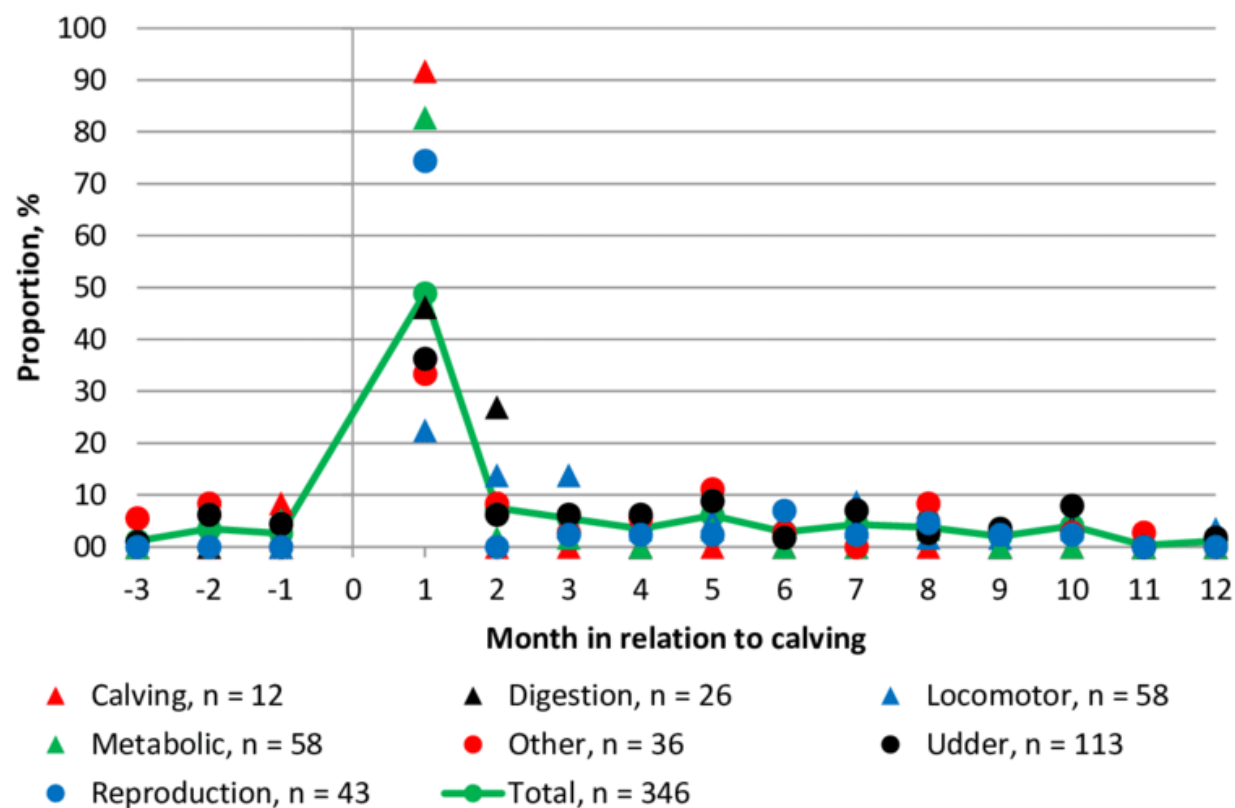
Figure 2.6 Pairwise genetic correlations when two traits are measured on the same day from 1 to 324 days in milk (DIM) between 1. dry matter intake and fat and protein corrected milk (DMI-FPCM, SE of median=0.06, of 3rd quartile=0.09), 2. dry matter intake and live weight (DMI-LW, SE of median=0.11, of 3rd quartile=0.10), and 3. fat and protein corrected milk and live weight (FPCM-LW, SE of median=0.12, of 3rd quartile=0.13).

Manzanilla Pech et al., 2016 JDS







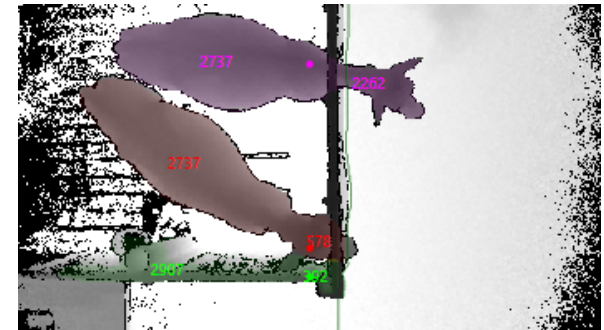
Li et al., 2018 JDS

Diseases occur in early lactation



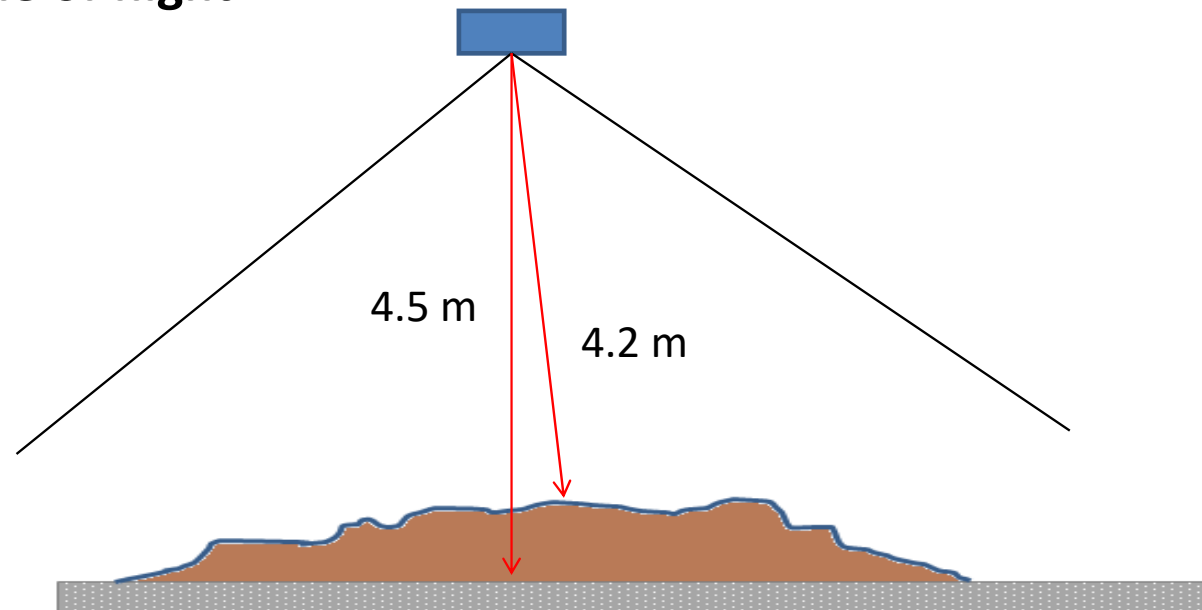
So VG strategy is based on:

-  Full lactations are necessary
-  Research farm data will not provide enough data
-  The research farm approach is too expensive, time consuming and impractical in commercial farms
-  Data from normal production herds are needed for documentation

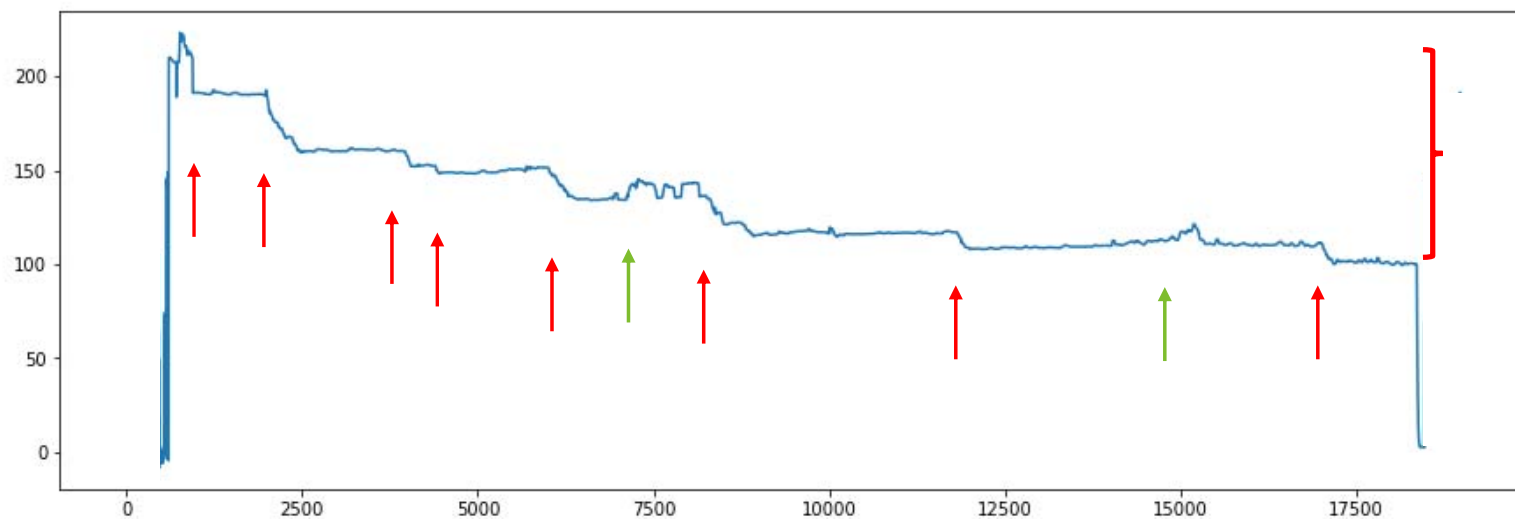


System setup

3D Camera – time of flight







Example of a cow



↑ Cow eating

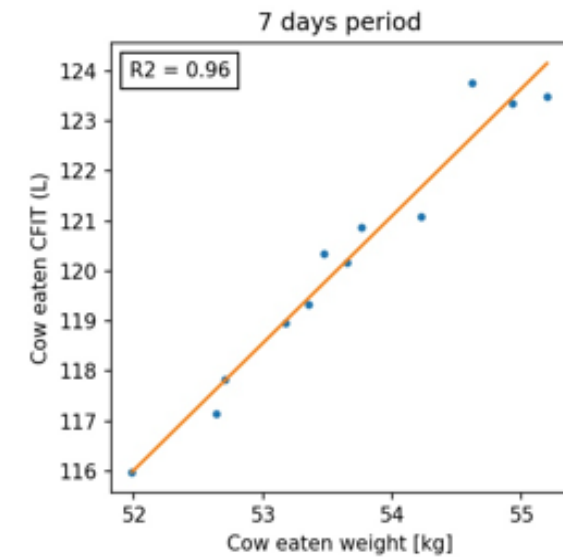
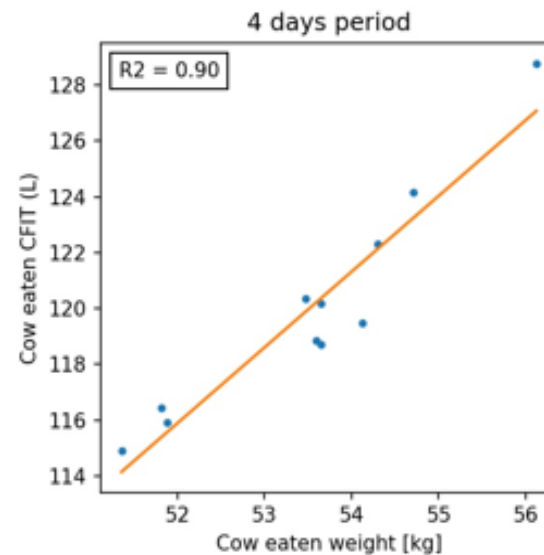
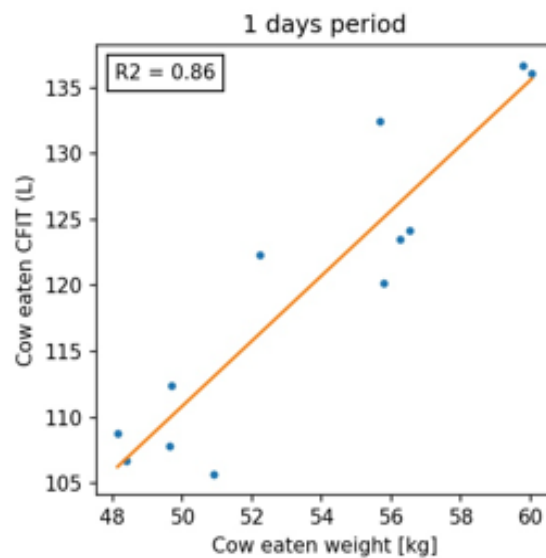
↑ Push up of feed

Validation set up

-  A scale measures simultaneously with camera
-  On cow with access to feed
-  6 cows measured on same diet
-  14 days pr cow



Results



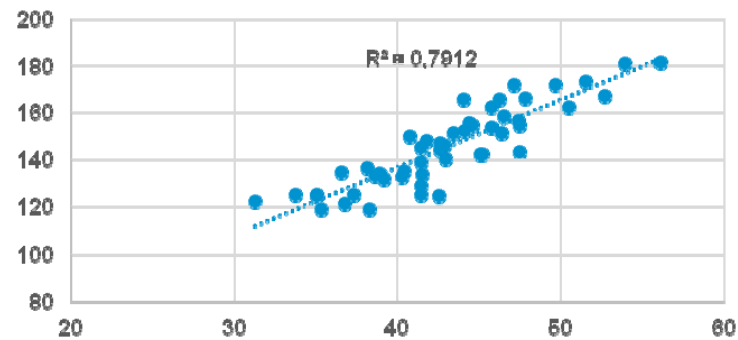
Validation study at Aarhus University

- Scale measures together with cameras
- 4 diets: maize/grass silage and barley/drybeetroot
- 48 HOL cows in latin square design
- Challenge the camera system with different densities
– especially with different silage types

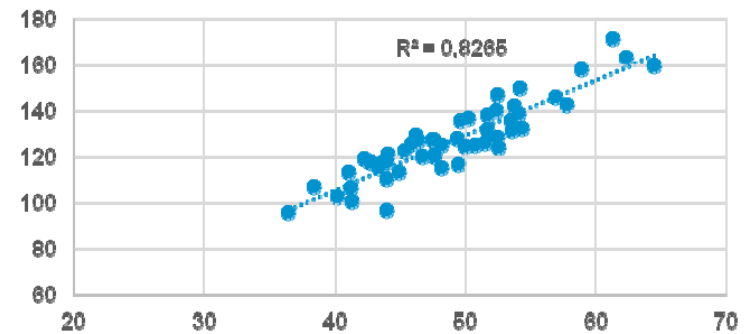


Results – comparing kg and volume

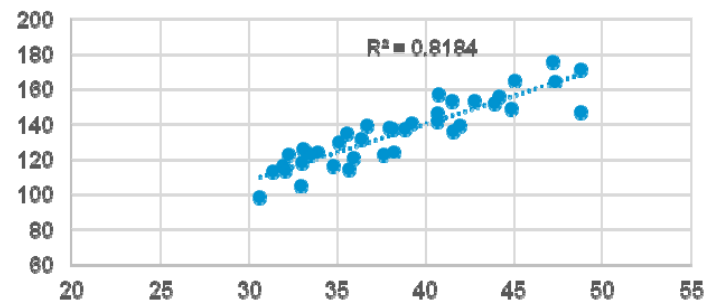
Grass + Barley



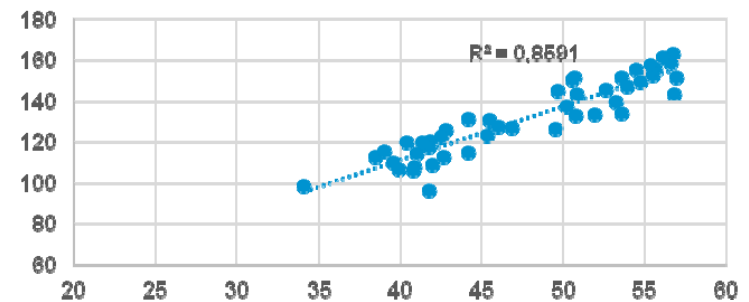
Maize + Barley







Grass + Drybeetroot



Maize + Drybeetroot



Sum up

-  The CFIT system and scale measures of daily feed intake corresponds with each other
-  In commercial farm $r^2 = 0,86$ on daily intake and 0,98 on weekly averages of daily intake
-  In research farm $r^2 = 0,81$ to 0,86 on daily intake
-  CFIT continues to be developed and improved for more installations





Thank you