Genetic evaluation of Saved feed

Rasmus S. Stephansen, SEGES
Jan Lassen, VikingGenetics
Ulrik S. Nielsen, SEGES
Freddy Fikse, Växa Sverige
Jukka Pösö, Faba
Daniel Gordo, AU
Martin Lidauer, Luke
Enyew Negussie, Luke
Gert P. Aamand, NAV

Outline

- Introduction to Saved feed (Gert)
- Recording of individual feed intake (Jan)
- Genetic evaluation of metabolic efficiency (Rasmus)
- What are the other countries doing? (Gert)

Introduction to Saved feed

$$EBV_{(Saved\ feed)} = EBV_{(Maintenance)} + EBV_{(Metabolic)}$$

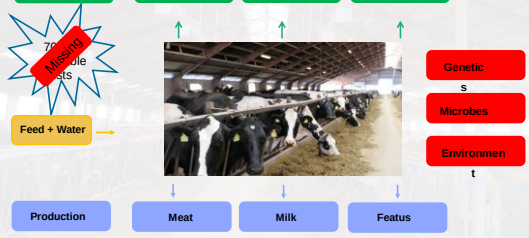
Covered at NAV workshop 2019 and GEBVs are published

Focus in this presentation

Research on feed intake

- FUNC initiated in 2013
- Followed up by several projects (SWE, FIN, DNK)
- Huge investment from industry
- Made international collaboration possible

Feed efficiency



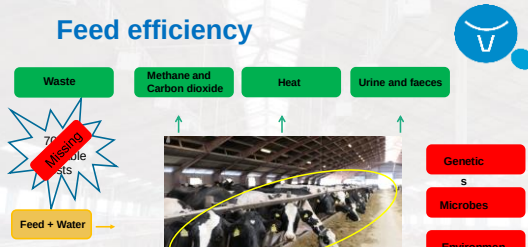
New traits – new challenges

- Registrations have always been on the shelf – from management
- Not for feed intake and methane
- Still investments from industry

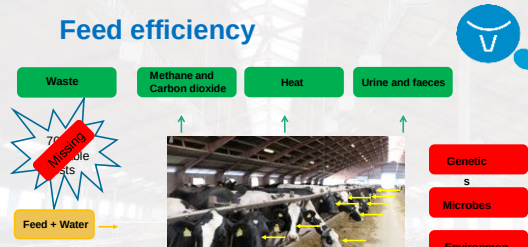
NAV

Nordisk Avlsværdi Vurdering • Nordic Cattle Genetic Evaluation

Feed efficiency



Feed efficiency



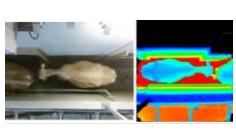
Definition of a registration

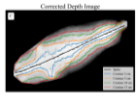
- Time since registration was performed
- Is the registration made on an informative cow
- Is the cow part of a research project

EDCP project

- Will continue in next 5 years
- CDCB and VIT will join additionally – UK will leave
- Where are we in 5 years?

CFIT





Status on CFIT

- Robust system - 3,5 years in first test herd
- Identification of a cow at each visit +95% accurate (IP)
- Repeatability of individual daily feed intake of 55% (IP)
- Preliminary heritability of 25% for feed intake
- Repeatability of individual weight based on contours 89% (IP)
- Install over next 2 years to have 1500 cows in all 3 breeds

Where are we now with metabolic efficiency?

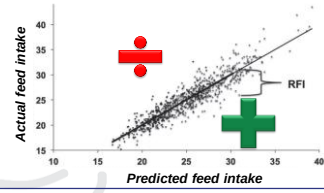
- Which data do we have for cows with phenotypes and genotypes - January 2020?

N cows	HOL	RDC	JER
DFS	425	320	Few
Abroad	1,350	None	None
CFIT	None	None	400

- What can we do with these data?

Genetic evaluation - Metabolic efficiency

- What is metabolic efficiency?
  - The difference between the actual and predicted feed intake



Genetic evaluation - Metabolic efficiency

- What is metabolic efficiency?
  - The difference between the actual and predicted feed intake
- Implications with RFI
  - Require information about: Feed intake, ECM, BW, BCS, pregnancy status, etc.
  - Easy to identify efficient animals
  - Complicated to evaluate genetically
    - Caused by mobilization

Genetic evaluation - Metabolic efficiency

- Data sources:
  - Nordic HOL + abroad HOL data (The Canadian data) + Nordic RDC

	Nordic HOL		Abroad HOL		Nordic RDC	
	N cows	N records	N cows	N records	N cows	N records
1st parity	754	26,271	992	19,019	682	16,300
2nd parity	537	18,478	752	8,936		
3rd parity	310	9,582	260	2,795		
N Cows/ genotyped	759/425		1,459/1,351		682/320	

Genetic evaluation - Metabolic efficiency

- Challenges with this data set
  - Animals in different feeding trials
  - Measured in different periods of lactation
  - Measured by different equipment
  - Not all animals are genotyped
- Means the genetic correlation is <1 between research herds

Genetic evaluation - Metabolic efficiency

- Genetic parameters
  - Holstein - DFS (759 cows) + Canadian (1,459 cows)
  - RDC - Finnish data (682 cows)
    - Heritability 12-15%
    - Validation reliability 5-10%

Genetic evaluation - Metabolic efficiency

- Reliability in small reference populations - experience from JER on protein yield (heritability higher than for Metabolic efficiency)

N animals with genotypes	Extra reliability next to pedigree
1,200 bulls	10%
2,000 bulls	15%
2,000 bulls + 10,000 cows	30%
2,600 bulls + 20,000 cows	35%

Genetic evaluation - Metabolic efficiency

How many cows do we need with phenotypes and genotypes?

- To get 10% extra reliability next to pedigree info >6,000 cows with feed intake data is needed
- Research farm data is not sufficient to achieve high reliabilities
- Continues data collection is the way to increase reliability
- CFIT seems to be the opportunity!

Publication of GEBVs

$$EBV_{(Saved\ feed)} = EBV_{(Maintenance)} + EBV_{(Metabolic)}$$

Published in 2019

Intense work ongoing for a publication of GEBVs in 2020

Overview
What are other countries doing?

Looked at DEU, NLD, FRA, AUS, NOR, USA & CAN

- **General lack of feed intake data, and weight data**
  - **Research farm data, some exchanges have taken place across countries for HOL**
  - **NLD have installed "feed intake boxes" in a few "private" farms**
  - **Very little and only Nordic research farm data exists for RDC and Jersey**
  - **Research data often based on historical data**

Overview other countries

	Ongoing/plans	When	Saved feed	Inclusion in TMI
NAV	1.Maintainance eff. (weight+conf.) 2.Metabolic eff.	2019 2020	Yes	2020? disc.
AUS	1.Maintainance eff. (weight+conf.) 2.Metabolic eff.	Ongoing Ongoing	Yes	Ongoing
USA	1.Maintainance (from conf.) 2.Metabolic eff.	Ongoing 2020	Yes	2020? disc
DEU	1.Maintainance eff (weight+conf.) 2.Metabolic eff.	2021 (2021)	Yes	
NLD	Feed intake	Ongoing	(Yes)	2018
CAN	Ongoing	No plans yet		Look at options
FRA	No concrete plans	No plans		
NOR	Planning 2020	?		

Conclusions

- **Feed efficiency is hot topic world wide**
- **GEBVs for Metabolic efficiency in 2020**
- **Reliable GEBVs depends on large scale feed intake recording**
- **CFIT seems to be the possibility**