

61st Intercoop Europe Animal Feed Congress

**„optiKuh“ a new approach to improve dairy
husbandry – focus on breeding and
feeding for a better performance**

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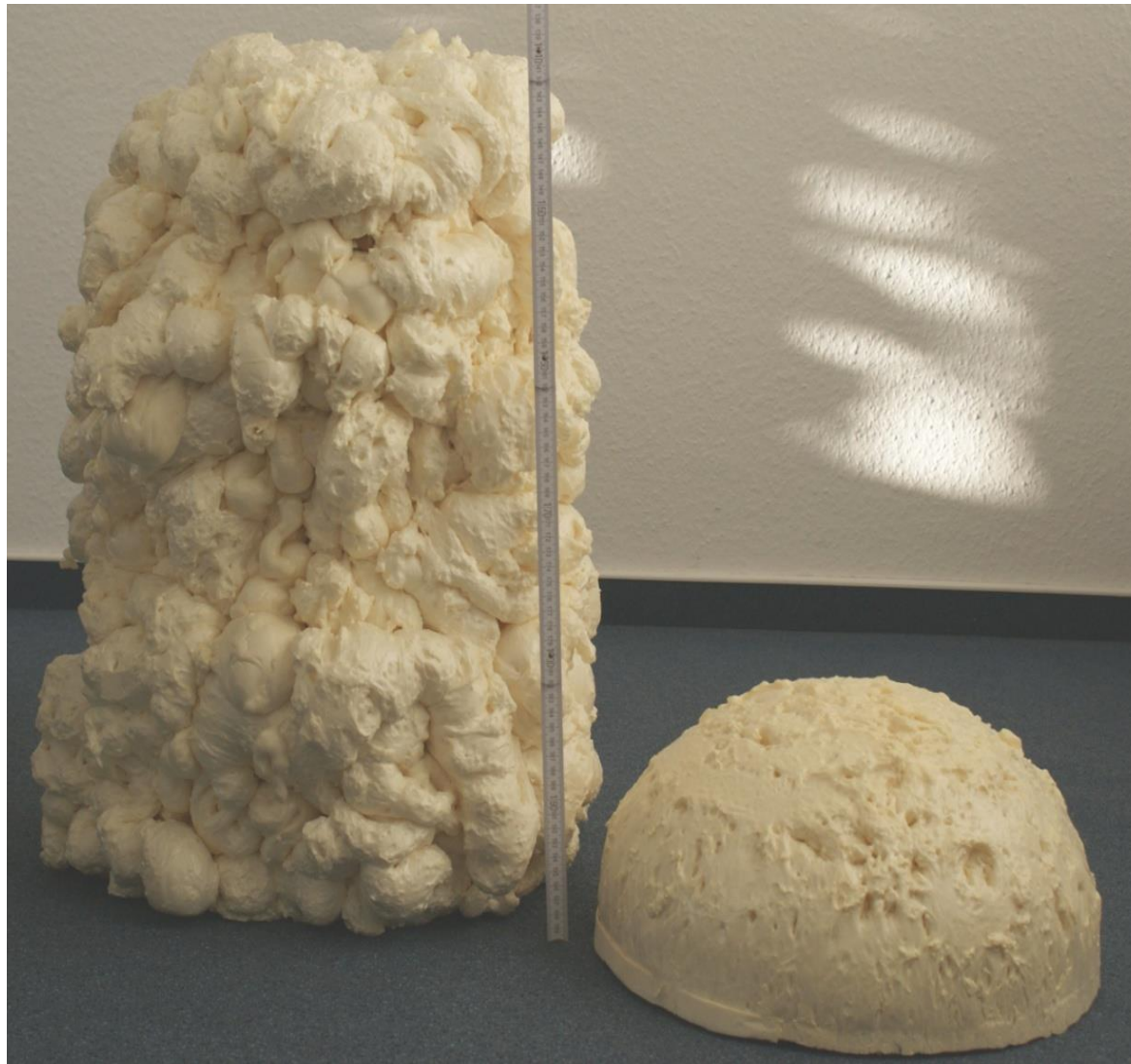
- **introduction**
- **DAFA** – strategy farm animals
- conception of **optiKuh**
- **results** und discussion
- amount of **concentrates**
- **innovations**
- **implications and opportunities**

excessive loss of body fat at the beginning of lactation

60 kg

loss of body fat in the 1. third of lactation

loss of back fat from **26** to **14** mm

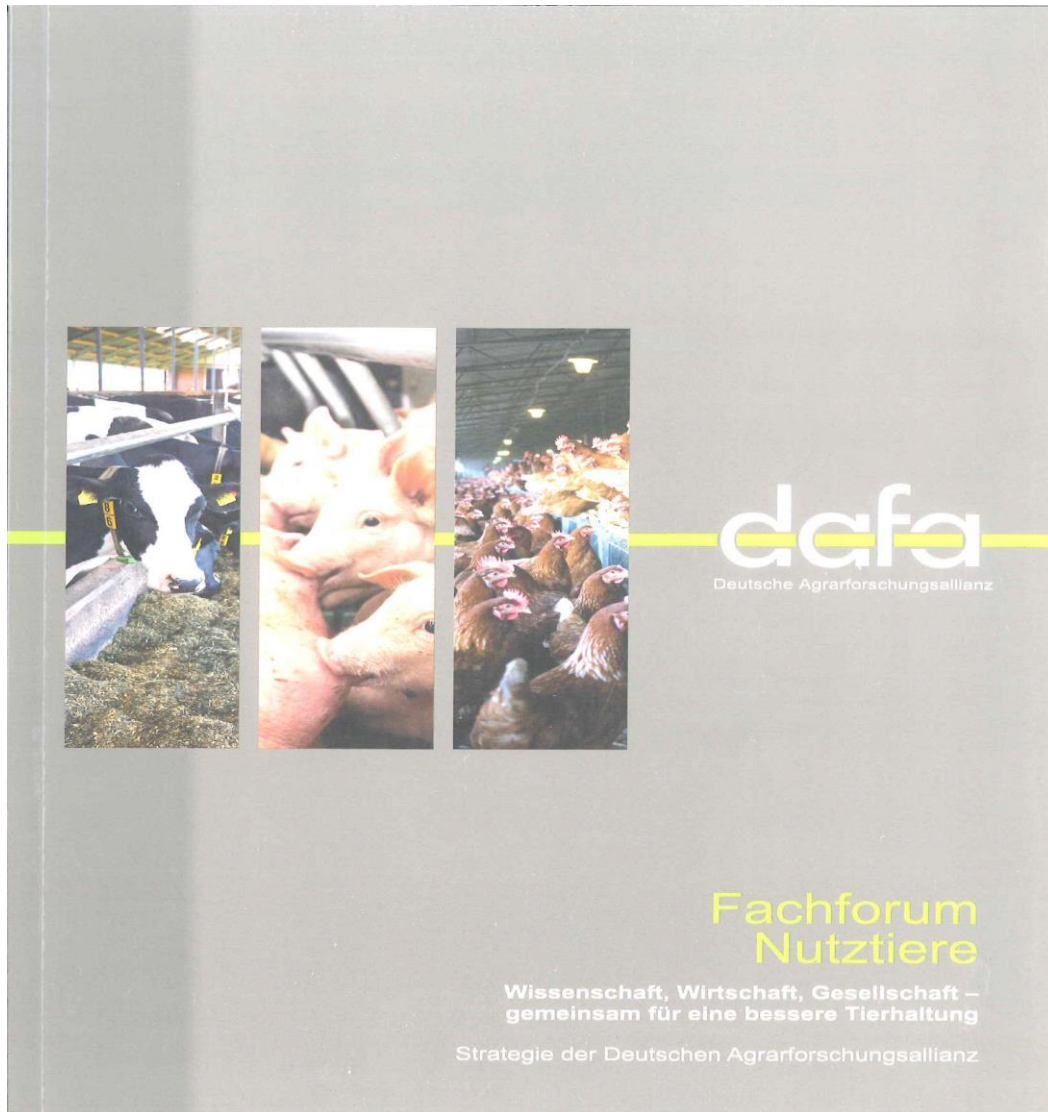


10 kg

loss of body fat In the 1. third of lactation

loss of back fat from **19** to **17** mm

dafa – expert forum for livestock



**Science,
Industry,
Society –
together
for a better
animal
husbandry**

offering of BLE 10/2012



funded by:

Federal Agency for Agriculture and Food (*BLE*), Bonn

program:

financing of **innovations** to improve the husbandry of livestock; research and development

➤ research and development:

- **25 % from industrial partners**
- innovations are of main interest

➤ collaboration partners:

- LKV: MV (NRW, Bayern, BW)
- animal breeding: Bioökonomieforschung e.V. (FBF),
RinderAllianz GmbH (RMV)
- animal and data company (TiDa GmbH)
- Zoetis
- feed industry: DVT (german association of animal nutrition)
and Raiffeisenverband

official start in Berlin with state secretary Peter Bleser

03/2015



Improvement in dairy farming through breeding strategies for feed intake and metabolic stability and environmental sustainability under conditions of optimized feeding intensity and utilization of metabolism indicators and sensors in herd management

focus of the study: animal welfare and environmental impacts

- combined feeding and breeding experiments
- investigations of milk spectral data „MIR“
- field trials: breeding for less methane emissions etc.

➤ hypothesis:

intensity of dairy farming depends on:

- genetic merit (*breed*)
- roughage quality
- amount of concentrates

observing „**good professional practice**“ different intensities are possible, taking animal health and welfare into account

➤ experimental questions:

influence of genetic type, roughage quality and amount of concentrates on animal health, animal welfare, performance and economy?

- project duration: 3 years 10/2014 — 06/2018
- trial period: 2 years 12/2014 — 02/2017
- data collection: dry period and lactation period
- source of data: > **1.500** dairy cows (*ger. - Holstein, Simmental, Brown Swiss*)



feeding trials on dairy cows with detection of individual daily feed intake

roughage: 6,5 MJ NEL/kg DM
6,1 MJ NEL/kg DM

concentrates: 250 g/kg ECM
150 g/kg ECM

animal data of OptiKuh

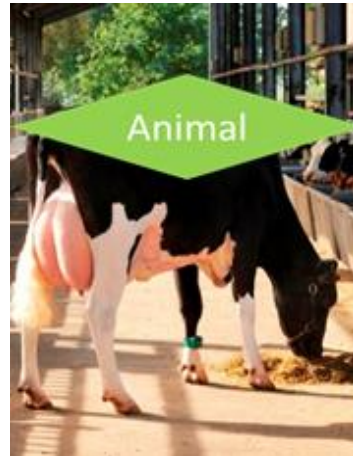


- rations

- feed constituents

- feed intake with feeding troughs

- energy balance



- genotype

- liveweight

- body condition, back fat thickness

- metabolic parameters blood/urine

- data of sensors in herd management: ruminating activity, rumen pH-value, methane emission

- data of animal health, herd management (Transition Cow Index, TKI)



- milk yield

- milk constituents

- spectral data

Central data collection: Tier und Daten GmbH (TiDa GmbH)

high standardization of pre-analytics and analytics!

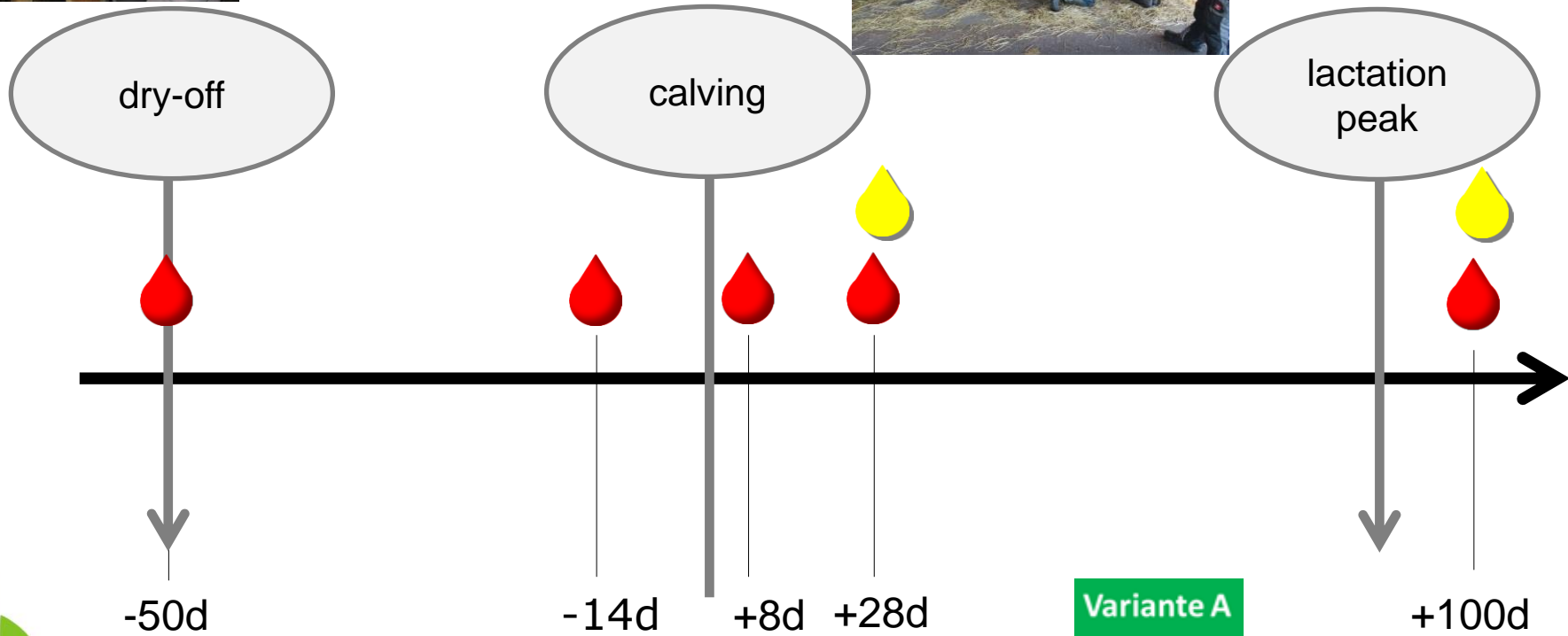
body condition
back fat thickness
(BFT) } **1 x month**



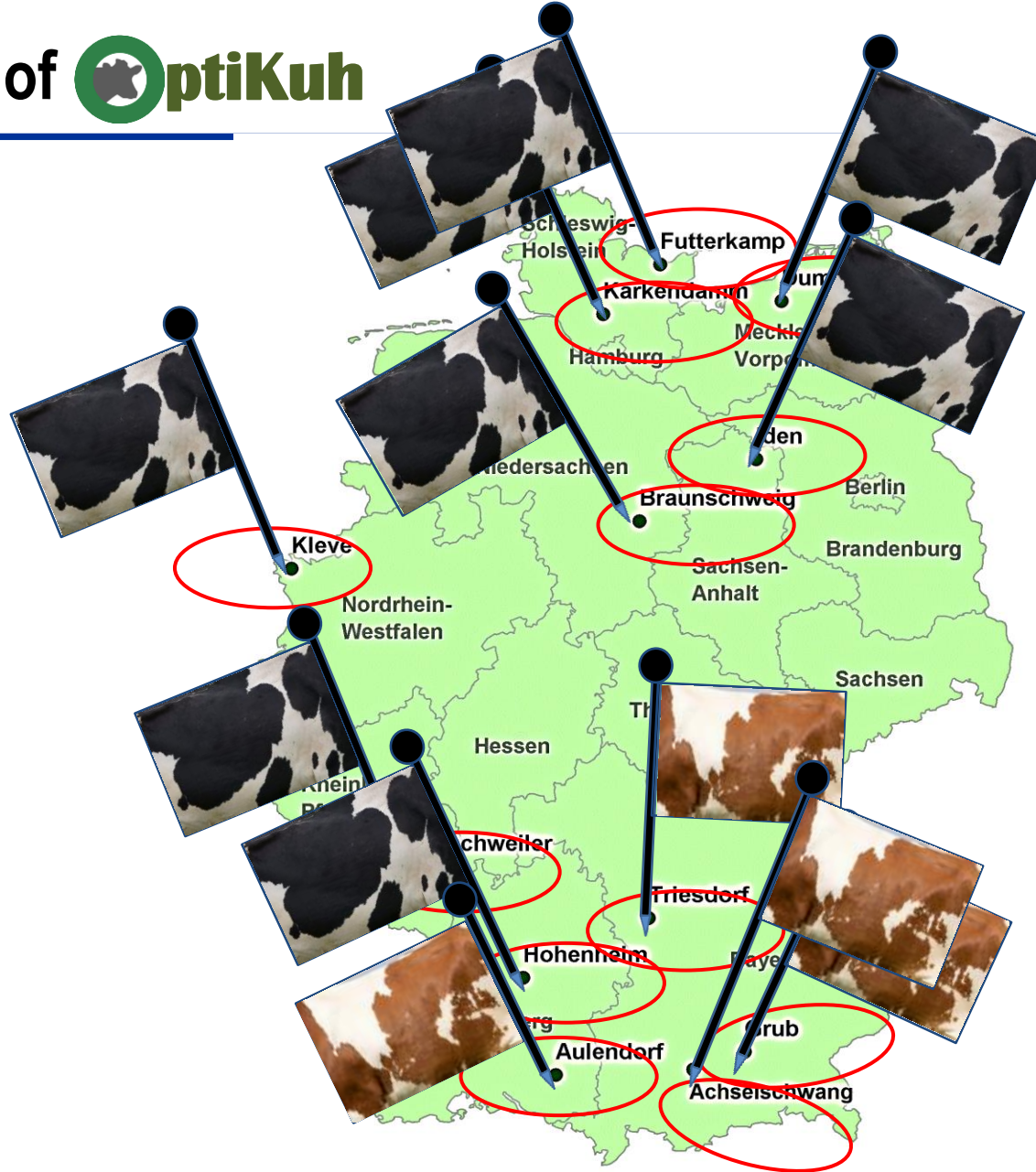
urine samples → NSBA



blood samples → Glu, BHB, NEFA, Ca, Insulin, Adiponectin, IGF-1



Trial sites of OptiKuh



research institutions of OptiKuh

trial sites	variant*	breed	scope of the experiments
Karkendamm	B	DH	entire herd
Futterkamp	B	DH	integration in feeding trials
Dummerstorf	A	DH	two groups over 2 years
Iden	B	DH	integration in feeding trials
Braunschweig	A	DH	four groups over 16 weeks of lactation
Haus Riswick	A	DH	four groups over 2 years
	B	DH	integration in feeding trials
Neumühle	B	DH	entire herd
Triesdorf	A	FV	two groups over 2 years
Hohenheim	B	DH	entire herd
Aulendorf	A	FV	two groups over 2 years
Grub	A	FV	four groups over 2 years
Achselschwang	B and A	FV/BV	integration in feeding trials

- **A** - targeted feeding experiment, **B** – routine data collection
- **DH** – german Holstein, **FV** – Simmental, **BV** Brown Swiss

61st Intercoop Europe, optiKuh – a new approach, H. Spiekers, Grub 06/2018

14

targets:

- **low feed costs** (*high feed efficiency*) **for products** (*milk, meat ..*) **in the complete system** (*heifer and cow*)
- **high capacity of feed intake**
- **good self-adjustment of the cow** (*constant condition*)

requirements for characteristics:

- *recording in routine operation*
- *good relationship to the „real“ characteristics*
- *adequate genetic determination*

- I. intensity of the dairy cow feeding: high and low amounts of concentrates are possible, using the roughage **potential!**
- II. selection of feed intake and feed efficiency is possible : “calibration set” has to be sustained => **more data necessary**
- III. milk production and environmental impact: laser-methane-detector „works“; farm balance (*N/P*) depends on amount of concentrates
- IV. introduction of metabolic indicators
- V. introduction of milk control data and MIR-spectra, sensors and TKI

increase of feed intake and milk yield in OptiKuh

trial site	roughage [MJ NEL/ kg DM]	increase per kg DM concentrates [kg]	
		feed-DM	ECM*
Grub	6.1	0.7	0.8
	6.5	0.8	1.2
Triesdorf	6.5	0.5	0.6
Aulendorf	6.5	0.3	0

* ECM – energy corrected milk, **3.4 %** protein and **4 %** fat

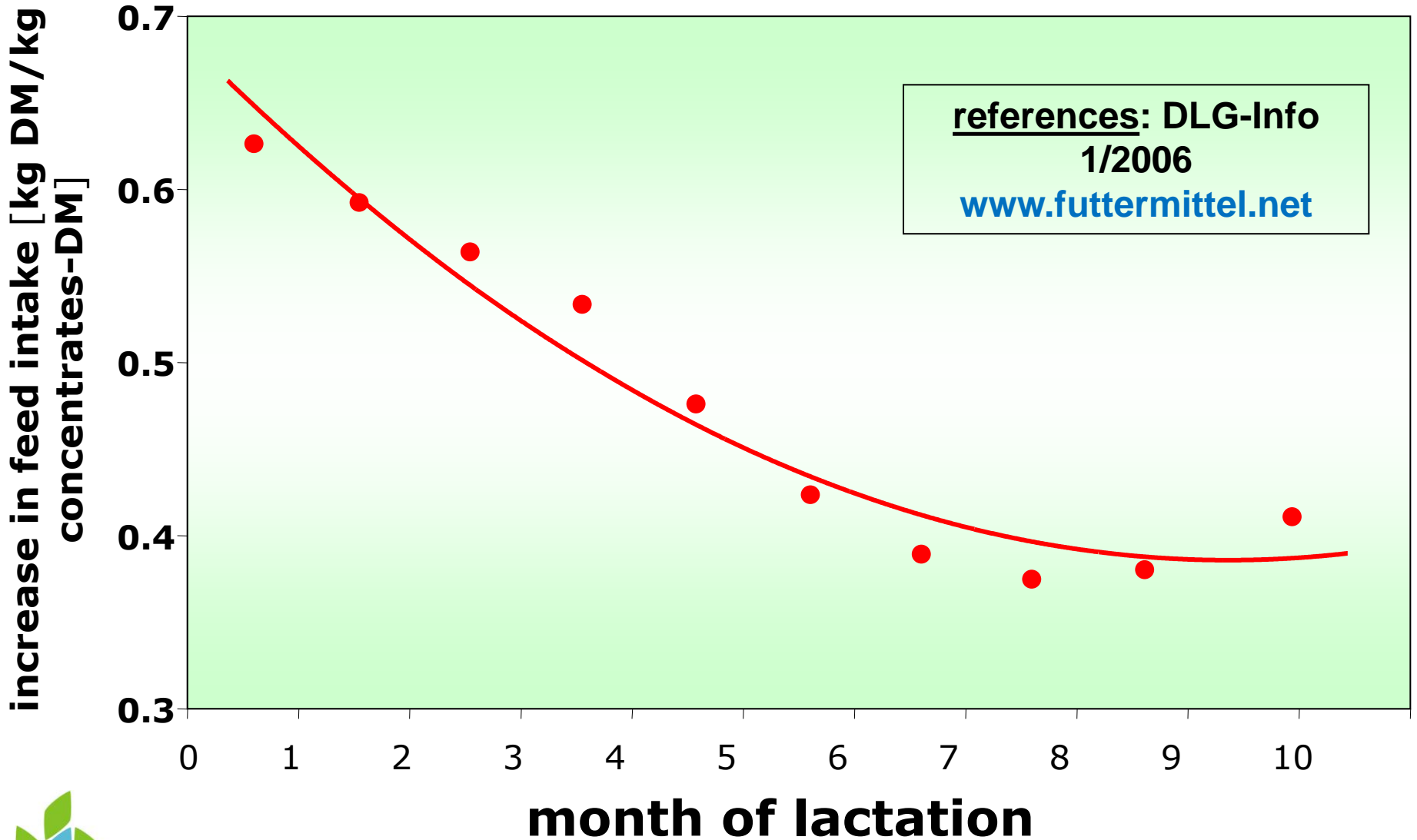


trial site	Aulendorf*		Triesdorf*	
feeding system	TMR – two-phase		pTMR+concentrates	
roughage [MJ NEL/kg DM]	6.5			
concentrates level*	L	H	L	H
feed intake [kg DM/d]	21.0	21.6	18.9 ^a	19.9 ^b
roughage [kg DM/d]	17.3 ^a	15.5 ^b	14.9 ^a	13.8 ^b
concentrates [kg DM/d]	3.8	6.1	4.0	6.1
milk yield [kg/cow/d]	26.4	26.5	27.4	28.4
protein [%]	3.6	3.6	3.2 ^a	3.4 ^b
fat [%]	4.5	4.4	4.2	4.3
ECM [kg/cow/d]	27.8	27.8	28.3	29.5

* L, low: 150 g/kg energy-corrected milk (ECM); H, high: 250 g/kg ECM;

References: Gerster et al. (2018), Kraus et al. (2018)

increase of feed intake by concentrates during lactation



income over feed costs – trial OptiKuh, Grub

feeding groups	6.1 L	6.1 H	6.5 L	6.5 H
ECM [kg/cow/y]	7194	8235	7673	8396
milk proceeds [€/cow, y]	2291	2623	2444	2674
roughage				
dt DM/cow/y	50.3	47.3	51.1	49.8
€/cow/y	993	933	994	971
concentrates				
dt/cow/y, energy level 3	13.1	22.6	13.4	20.9
€/cow/y	370	641	380	592
feed costs [€/cow/year]	1363	1574	1374	1563
income over feed costs [€/cow/y]	928	1049	1070	1111

income over feed costs – trial optiKuh, Triesdorf

amounts of concentrates [g/kg ECM]	150	250
ECM [kg/cow/year]	9070	9537
milk proceeds [€/cow/y]	2889	3038
roughage		
dt DM/cow/y	52.1	49.3
€/cow/y	959	907
concentrates		
dt /cow/y, energy level 3	16.2	24.4
€/cow/y	406	610
feed costs [€/cow/y]	1365	1517
income over feed costs [€/cow/y]	1523	1520

References: Dorfner (2018)

impact of different amounts of concentrates on farm balance

trial  OptiKuh, Triesdorf

concentrates [dt/cow/y]	16.2	24.4
ECM [kg/cow/year]	9070	9540
<u>nitrogen</u> [kg/cow/y]		
in concentrates*	49	73
in milk	49	52
balance	0	21
<u>phosphorus</u> [kg/cow/y]		
in concentrates*	9.2	13.9
in milk	9.1	9.5
balance	0.1	4.6

* 30 g N and 5.7 g P/kg

- scientific contributions (e.g. *DGFZ 9*): - **discussion**
- scientific publications, **8 PhD-thesis** etc.: - **scientific papers ...**
- further development of **methods and self-management** (*evaluation of rumen pH, methane etc.*)
- development of recommendations and breeding strategies in scientific societies: AfBN part of the GfE, DGFZ, DLG etc.
- derivation of **recommendations** for feeding practice, breeding and testing of practicability of sensors
- development and establishment of **innovative** feeding and management concepts
- advisory strategies: TKI, **MIR**, feeding concepts etc.

- **additional use of data / data sharing:**
 - **international breeding** projects: feed intake, methane reduction, efficiency etc. (*requests*)
 - deduction of reference values of the metabolism on the basis of blood and urine; **PhD-thesis (LMU)**
 - continuation by **national** breeding organisations
 - adjustment of the guidelines for determining the national **emission inventory** of dairy cows; Thüneninstitut
 - **economical** analysis of the individual animal data for breeding- and production economics
- **aim of the project:** Establishment of a continuous „callibration set feed intake“ => start eMissionCow 06/‘18

thanks to all involved in OptiKuh



more informations: www.optikuh.de