GHG emissions in animal husbandry

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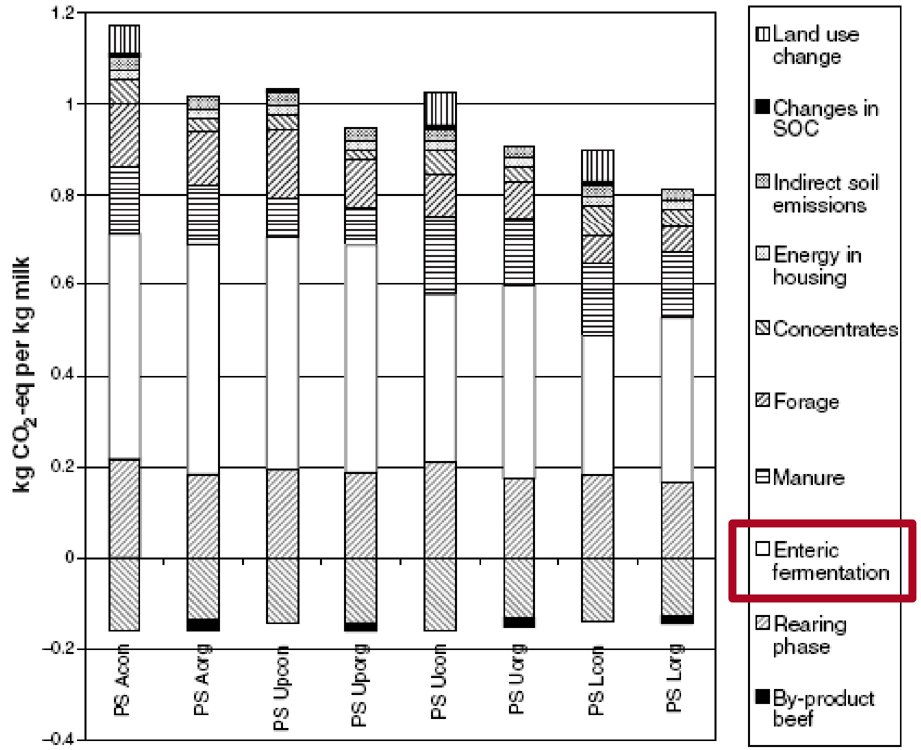
Sources of GHGE in animal production

- Feed production (on farm))
- Feed production (import including LUC)
- Buildings, technique
- Bedding, Manure
- Metabolic emissions (enteric fermentation)



GHGE (kgCO2-eq) per kg milk for eight Dairy production systems in Austria (Hörtenhuber et al., 2010)

Enteric fermentation and Methane

- Focus of discussion according to organic cows
  - High milk yield requires concentrates rich diets
  - Low-fibre diets decrease ruminal methane production
  - Intensive High-output dairy production as climate protector??

- Unconsidered critical elements
  - Import of soybeans and other feed crops from overseas (LUC)
  - Breed characteristics (Holstein: milk and not beef)
  - Animal Health > Replacement rate > Rearing intensity
  - LONGEVITY

Concentrates in cattle nutrition

- 30% of crop production for animal feeding
- Not an appropriate diet for ruminants
- Competition to human nutrition
- Imported feed crops in CH: 0.8 Mio. tons/a
- Organic feed crops import:
  - Grains 70%
  - Protein carrier (soy) 98%

Increasing efficiency of production

- Conventional approach
  - Intensification of production
  - Genetic improvement (more product units per animal)
  - Changing ruminal metamolism by additives and modified diets
- Sustainable approach including
  - Physiological improvement of milk yield curves
  - Animal welfare aspects
  - Integrated herd health management
  - Optimized (not maximized) reproduction parameters

Feed no Food – Grass and Roughage rather than concentrates for dairy cows

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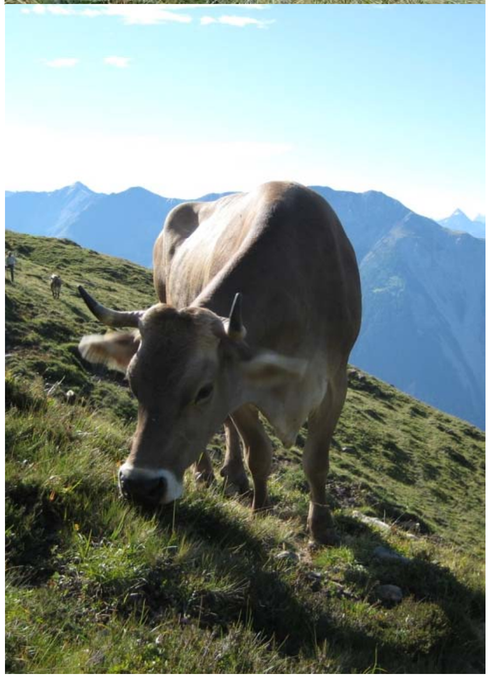
Der Coop Fonds für Nachhaltigkeit unterstützt dieses Projekt.

coop

RTOACC - Frick, 10.05.2010

Feed no Food: Objectives

- Forage based milk production concepts
- Reduction of concentrates to a minimum
- Consideration of animal needs
- Local feed production as far as possible
- Optimizing feeding management
- Evaluation of roughage based cow type
- Effects on health, welfare and fertility
- Implementation of herd health programmes
- Effects on product quality
- Modeling economic impact
- Modeling GHG emissions



Feed no Food: Dairy farms involved

Feeding Strategy conversion (Concentrates)	No of farms (n=77)	Ø No of cows per herd	Ø yearly milk yield per cow (kg)
No change* (control)	19	26	6'500
50% reduction (<5% in DM)	38	22	5'600
100% reduction	13	23	5'600
Concentrates free a priori	7	18	5'000

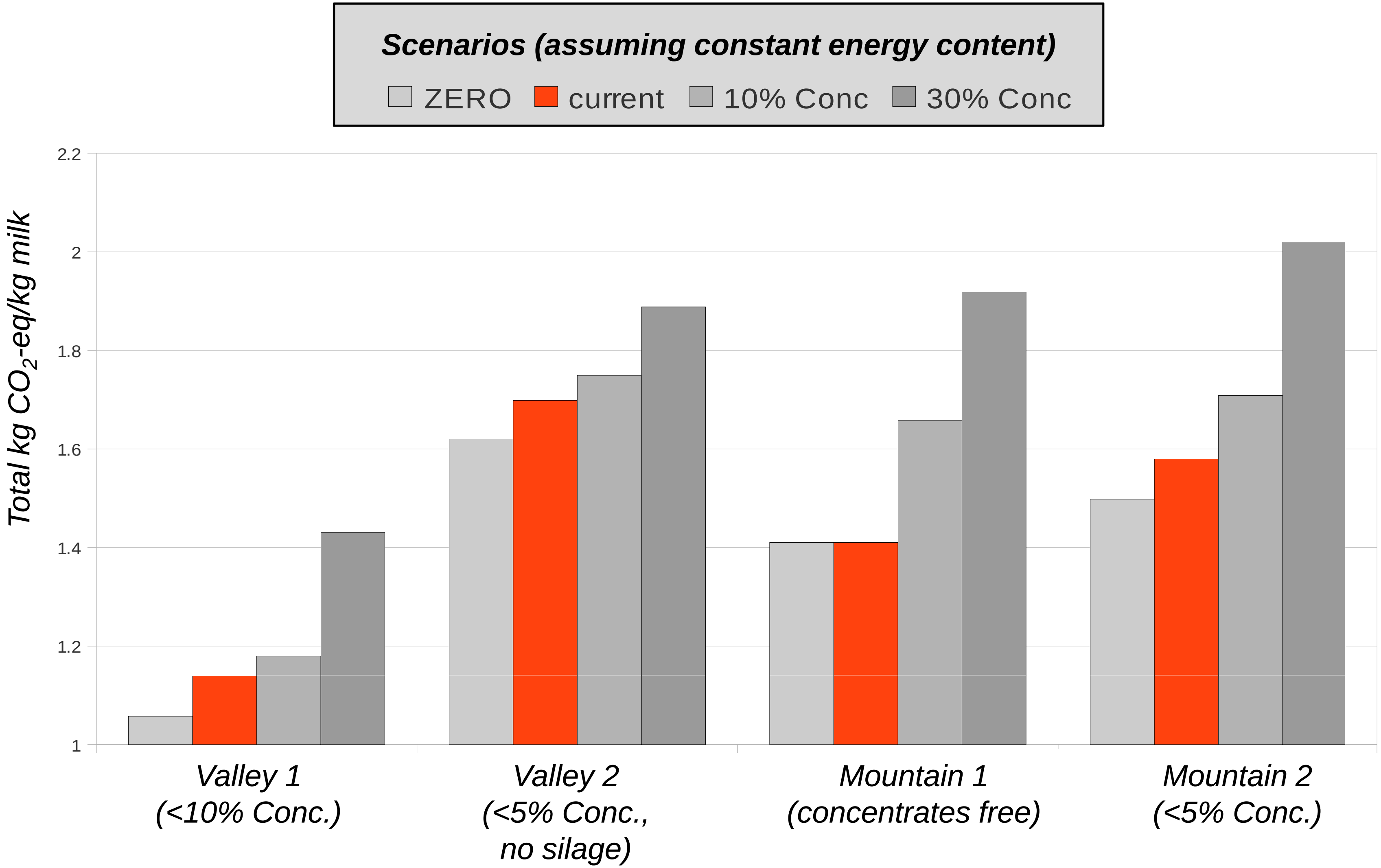
** According to regulations; i.e.: max.10% Concentrates in DM*

Project status: farm evaluation finished, implementation starting

Exemplary LCA in 4 model farms

Farm	Valley 1	Valley 2	Mountain 1	Mountain 2
No of cows	32	62	17	12
Av. Milk yield	**6800 kg**	**6450 kg**	**5500 kg**	**5000 kg**
Ration	Silage	No silage	No silage	Silage
Concentrates	**<10%**	**<10%**	**free**	**<5%**
Barn type	Freestall	Freestall	Stanchion Freestall	Stanchion
Feed production	Intensive grassland	Intensive grassland	Extensive grassland	Extensive grassland
Alpine grazing	No	No	Yes	Yes

Preliminary results (GHGE models)



Animal health and climate protection

- General health improvement and longevity
- Udder health improvement
- Fertility improvement
- Rearing management

Health, Longevity and climate protection

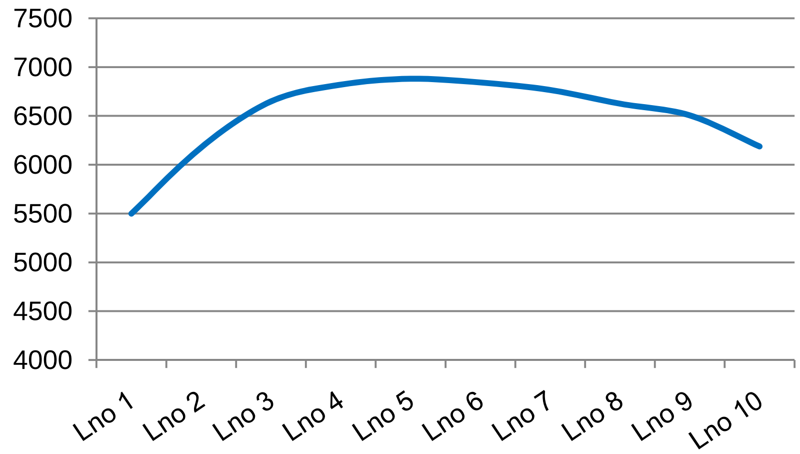
- Replacement strongly depends on animal health
- Replacement intensity increases rearing days per farm
- Health improvement reduces culling rate
- Prolongation of LNo by 1 lactation leads to 23% less **„unproductive“ days**
- Milk yield optimum during 6th lactation!

Impact of replacement intensity on „unproductive days“ during rearing period

	Ø CH	Increasing longevity	
Mean Lactation No	3.3	4.3	5.3
Replacement rate per year	~30%	~23%	~19%
„Unproductive“ days due to rearing*	**277/cow**	**212/cow (-23%)**	**173/cow (-38%)**

** Age at 1st calving: 30 m*

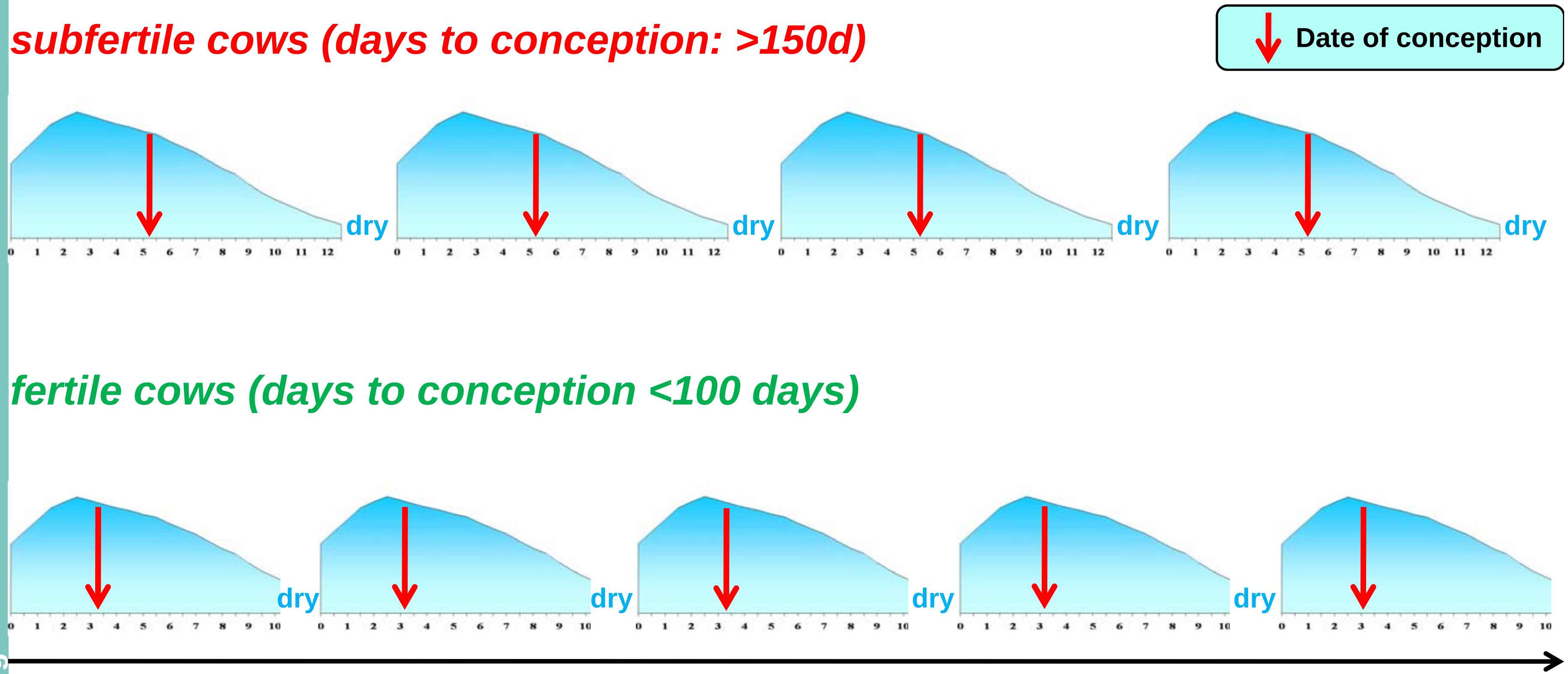
Milk yield (kg/cow) per 305 days by lactation number (data of FiBL project „pro-Q“)



Fertiliy and climate protection

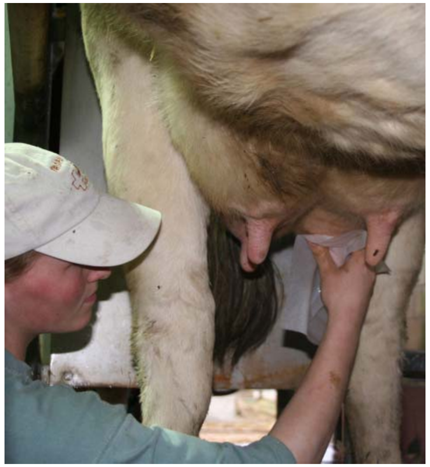
- Fertilty of heifers
  - Age at first calving in CH: 30 mon
  - Optimum: 24 to 28 mon?
- Fertility of cows
  - Infertility the most important culling reason
  - Reducing periods of low milk yield
  - Increasing number of calves for beef production

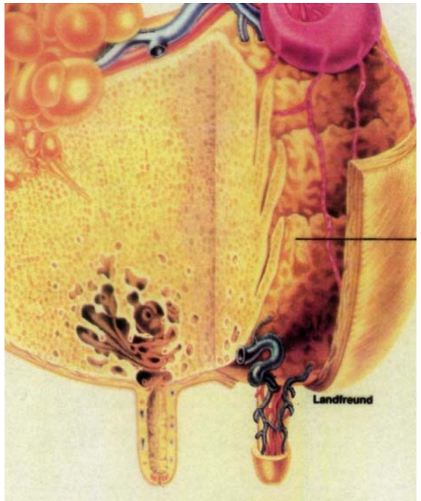
Lactation curves depending on fertility



Milk yield difference after 5 years: +5000 kg **t**

Udder health and climate protection





- Milk loss by clinical mastitis
  - 5 to 10 days by delivery stop
  - 10+ days by reconvalescence
- Milk loss per day by increased Somatic Cell Count (SCC)
  - **10 to 20%**
- High culling rates due to udder health

Challenges & future aspects

- Extending LCA models (beef production, land use change, milk yield differences after conversion to concentrates reduced milk production)

- Farm infrastructure for homegrown feedstuff
- Sufficient energy content and quality of rations

- Control of fertility and animal welfare
- Control of udder health, particularly in old cows
- Promoting robustness of cows by herd health management and breeding techniques

Conclusions

- Reducing concentrates in dairy production decreases GHGE **depending on feed quality**

- Animal health has a significant impact on GHGE
- Health improvement is leading to longevity increase
- Improved udder health minimizes milk losses
- Optimized fertility increases cumulative milk yield
- Need for herd health improvement programmes
- Animal welfare aspects are of highest priority
- Robust animals for improved lifetime performance