

# REDUCED NITROGEN AND METHANE LOSS FROM DAIRY COWS – HOW LOW CAN YOU GO?

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# Milk production in Denmark

550.000 dairy cows

Holstein and Jersey

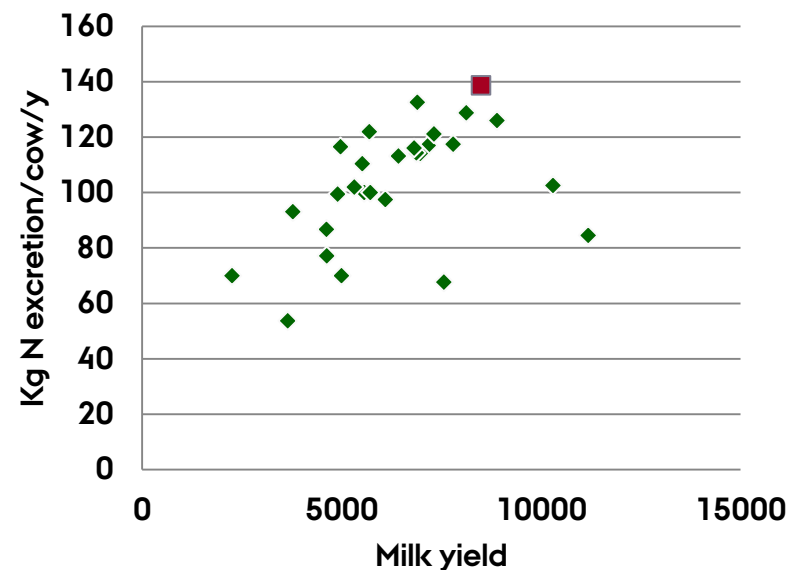
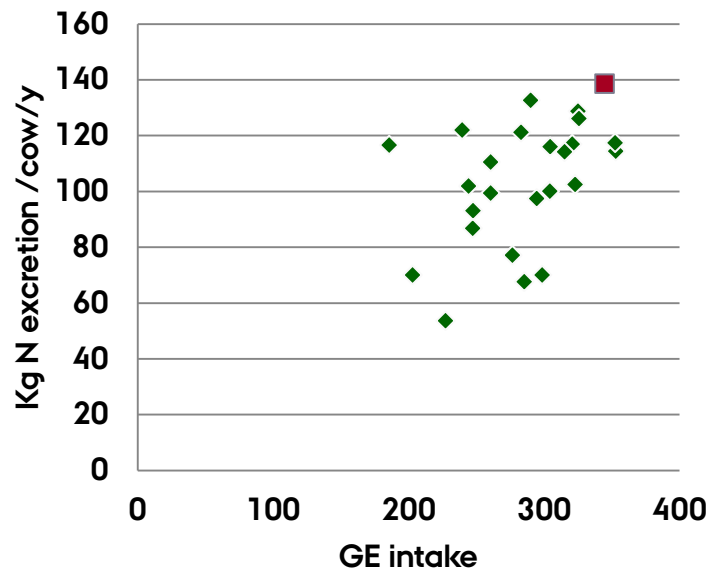
150 cows/farm

Cooperative (advisory service, dairy, slaughterhouse, feed manufacturer etc.)

High share of organic producers

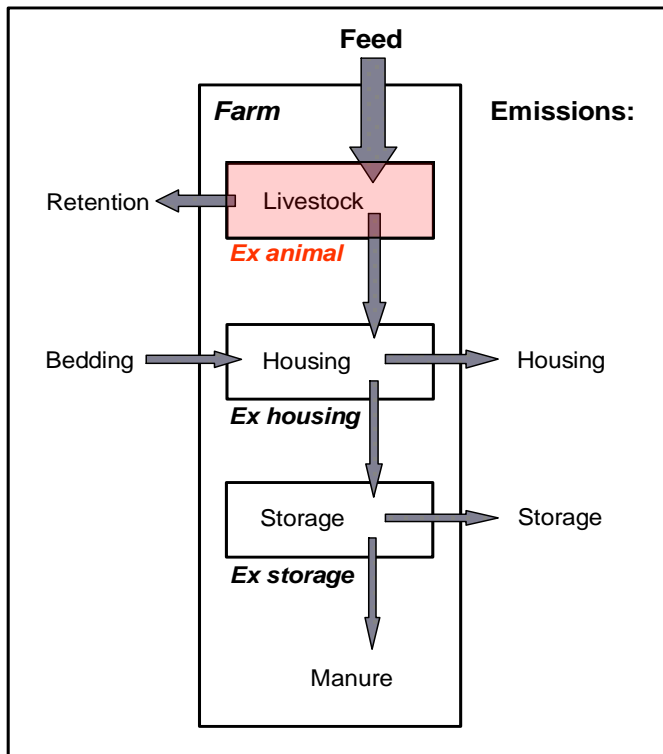
High share of AMS

Loose housing with cubicles



# Ex animal

## Nutrient flow



- Milk yield and composition from on-farm recordings of individual yield.

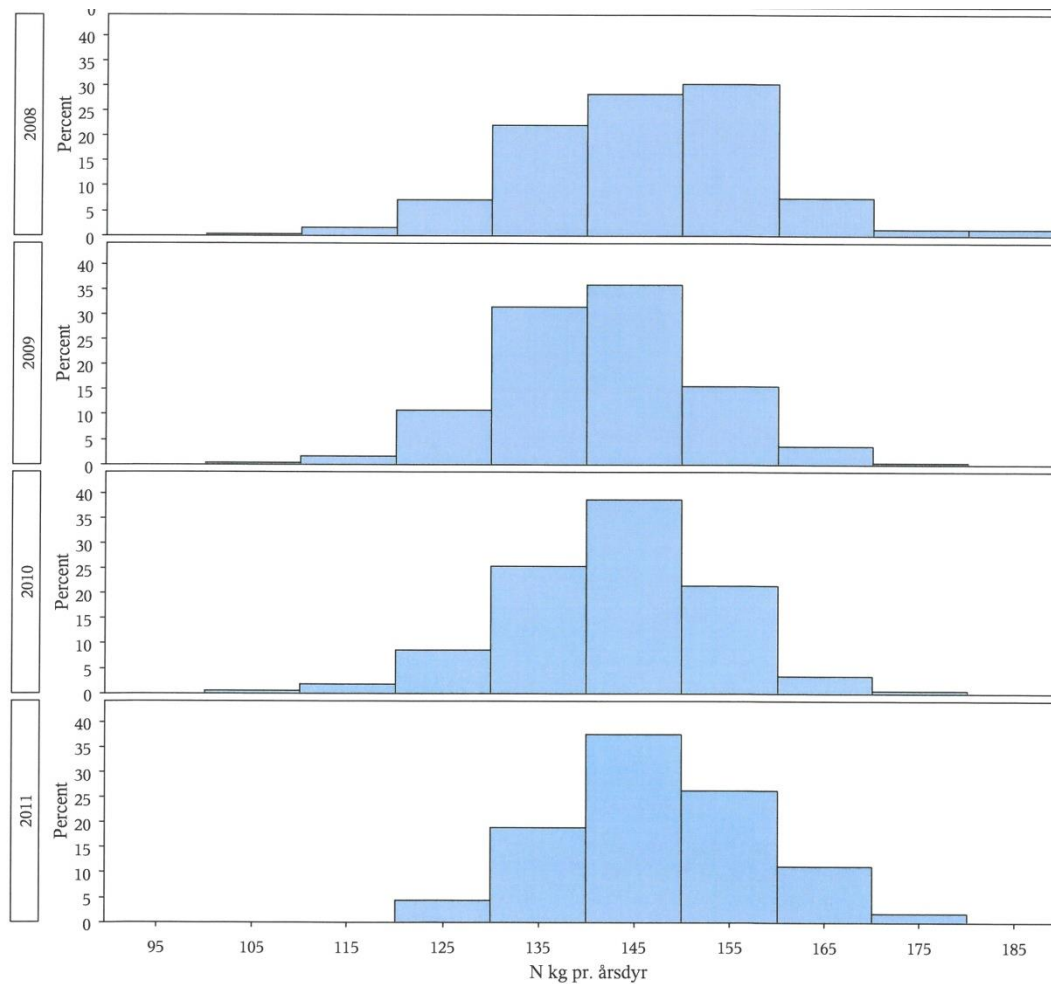
- Feed plans available on-line by the NorFor feed evaluation system and from on-farm efficiency controls.

- Feed content of N and P is higher than requirement as it is based on actual recorded content.

- Feed intake is higher than requirements as it takes feed efficiency (management etc.) into account.

The flow dynamics of the Danish normative system that quantifies nutrient content in livestock manure *ex animal*, *ex housing* and *ex storage*.

# Variation in excretion



**Kg N Ex. per cow per year**

# Data fra DK-farms: Effect of milk yield

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Milk yield	Kg ECM	FE/d	Gram protein pr. FE	Feed efficiency	Kg N ex.	ECM:N
<b>Low 25%</b>	<b>8.250</b>	<b>17.9</b>	<b>174</b>	<b>82</b>	<b>137</b>	<b>60</b>
<b>Avr. 50%</b>	<b>9.340</b>	<b>19.1</b>	<b>174</b>	<b>83</b>	<b>144</b>	<b>65</b>
<b>High 25%</b>	<b>10.330</b>	<b>20.2</b>	<b>176</b>	<b>84</b>	<b>150</b>	<b>69</b>

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# Data fra DK-farms: Effect of feed protein content

Protein	Kg ECM	FE/d	Gram protein pr. FE	Kg N ex.	Urine-N, kg/cow (%)	ECM:N
Low 25%	9.240	18.9	165	133	56 (42)	69
Avr. 50%	9.340	19.1	174	144	69 (48)	65
High 25%	9.340	19.2	184	154	81 (53)	61

# Data fra DK-farms: Effect of intake level

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Intake level	Kg ECM	FE/d	Gram protein pr. FE	Feed efficiency	Kg N Ex.	ECM:N
<b>Low 25%</b>	<b>8.430</b>	<b>17.5</b>	<b>173</b>	<b>84</b>	<b>132</b>	<b>64</b>
<b>Avr. 50%</b>	<b>9.310</b>	<b>19.1</b>	<b>174</b>	<b>83</b>	<b>144</b>	<b>65</b>
<b>High 25%</b>	<b>10.070</b>	<b>20.5</b>	<b>176</b>	<b>81</b>	<b>155</b>	<b>65</b>

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# Data fra DK-farms: Effect of Feed efficiency

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Feed efficiency	Kg ECM	FE/d	Gram protein pr. FE	Feed efficiency	Kg N ex.	ECM:N
<b>Low 25%</b>	<b>8.980</b>	<b>19.5</b>	<b>174</b>	<b>79</b>	<b>150</b>	<b>60</b>
<b>Avr. 50%</b>	<b>9.380</b>	<b>19.1</b>	<b>175</b>	<b>83</b>	<b>144</b>	<b>65</b>
<b>High 25%</b>	<b>9.560</b>	<b>18.6</b>	<b>173</b>	<b>87</b>	<b>136</b>	<b>70</b>

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# What is the potential tomorrow?

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## › **Milk yield**

- › Today: 9517 kg ECM
- › Best 25%: 10294 kg ECM

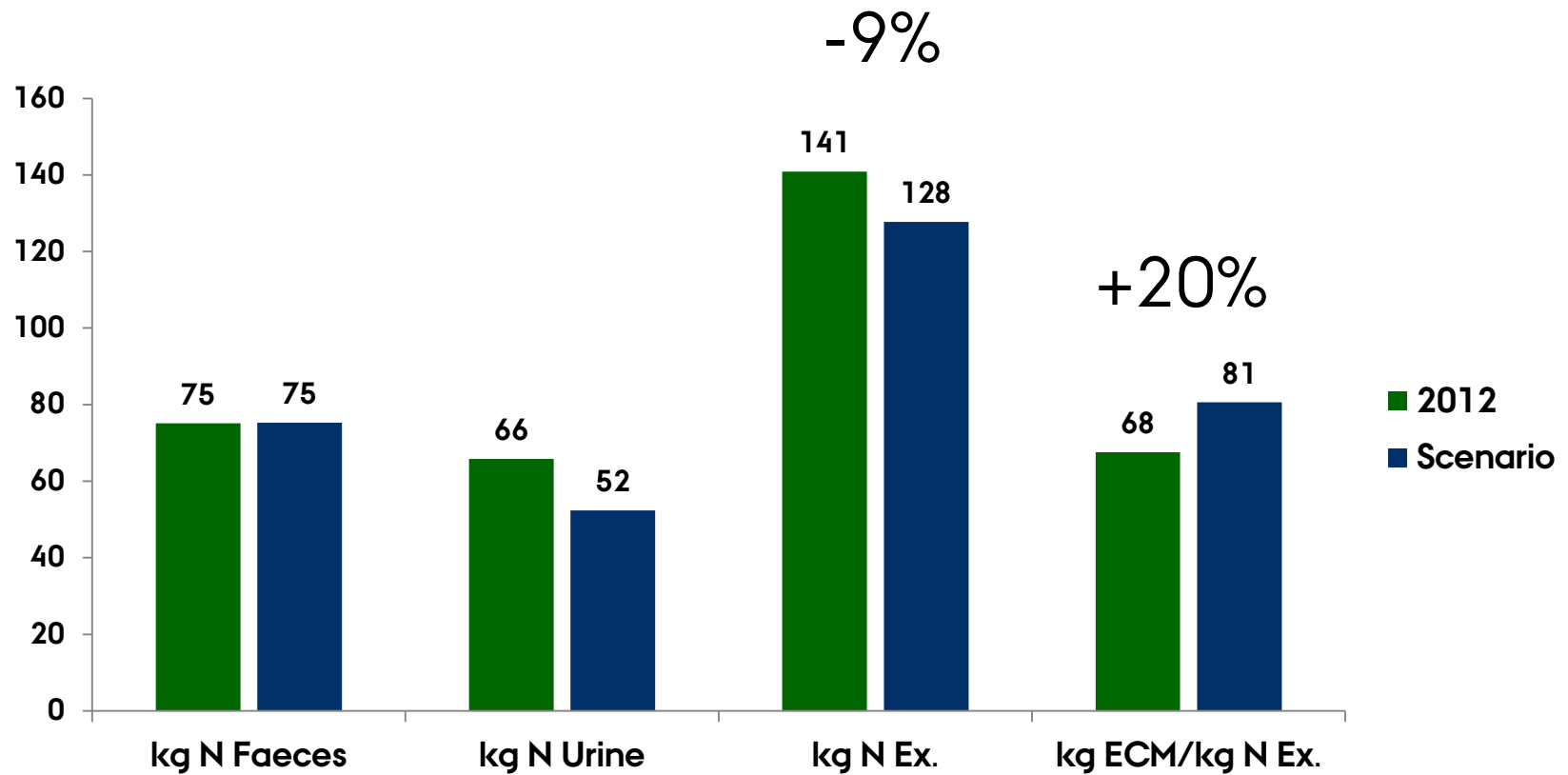
## › **Feed efficiency**

- › Today: 83%
- › Best 25%: 87%

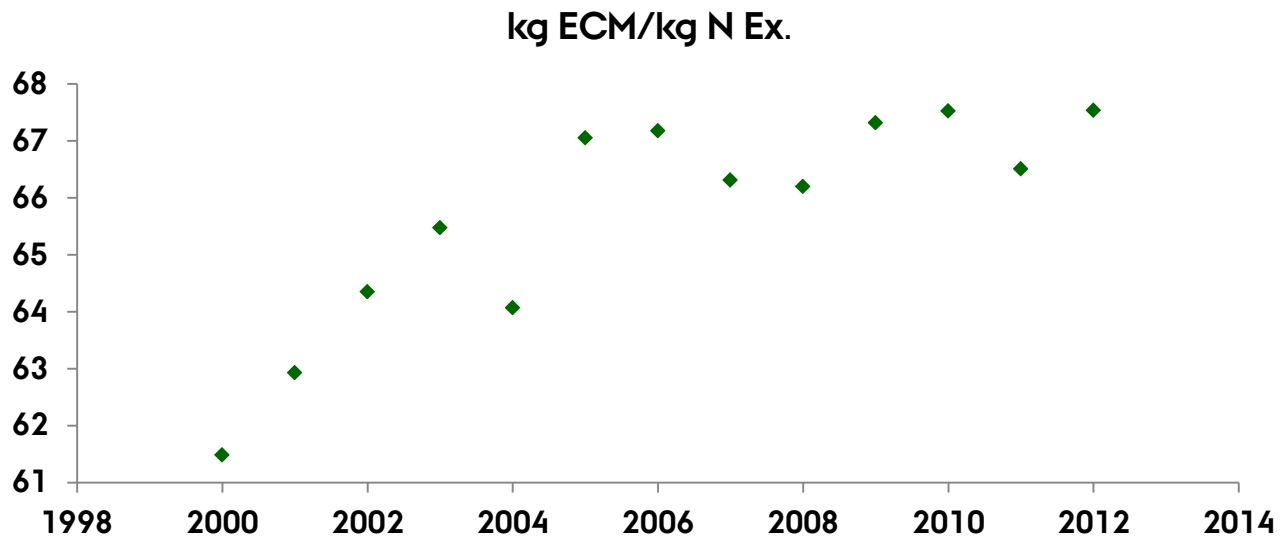
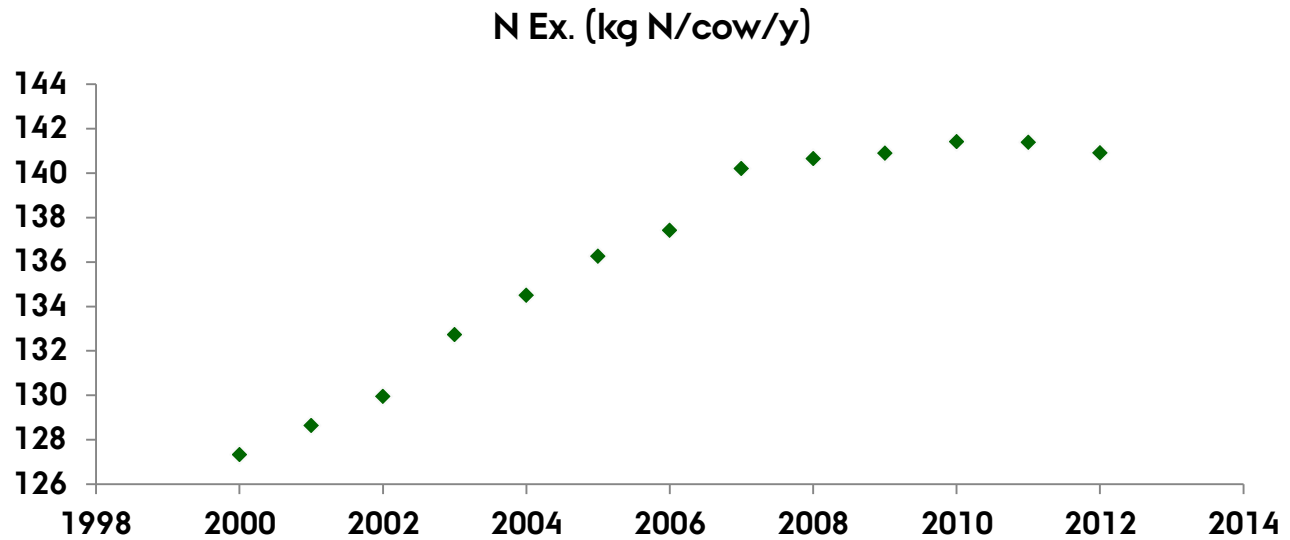
## › **Protein content**

- › Today: 172 g CP/SFU
- › Best 25%: 163 g CP/SFU

# Potential



# Development from year 2000

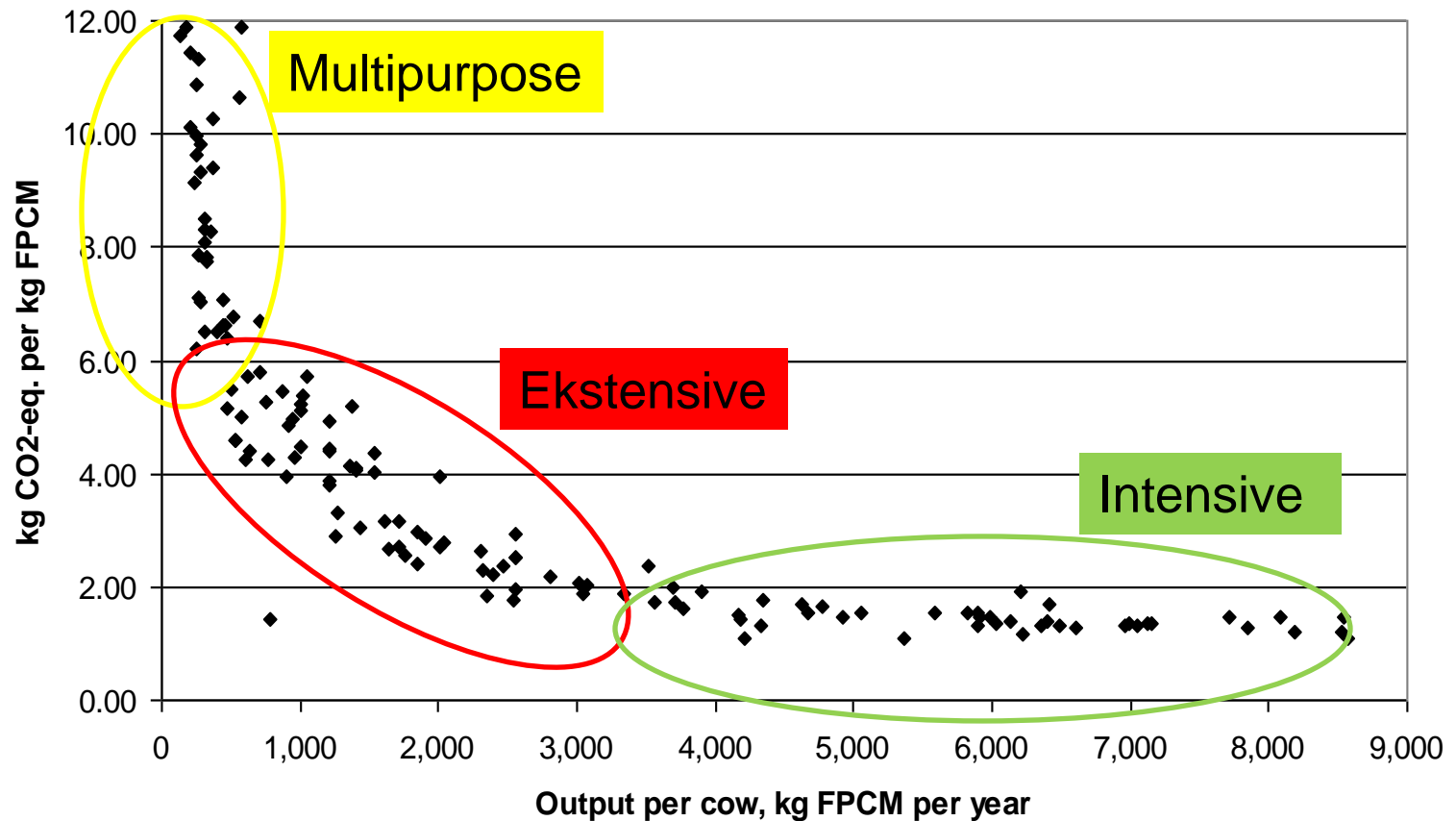


# Conclusion - Nitrogen

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- › The Danish system uses data from practice to calculate N excretion
- › Comparing the current standard values with the top 25% shows a potential to
  - reduce N excretion per animal with 9%
  - reduce N emission with 21%
  - improve efficiency with 20%
  - increase milk yield with 8%

# What can we do about methane?



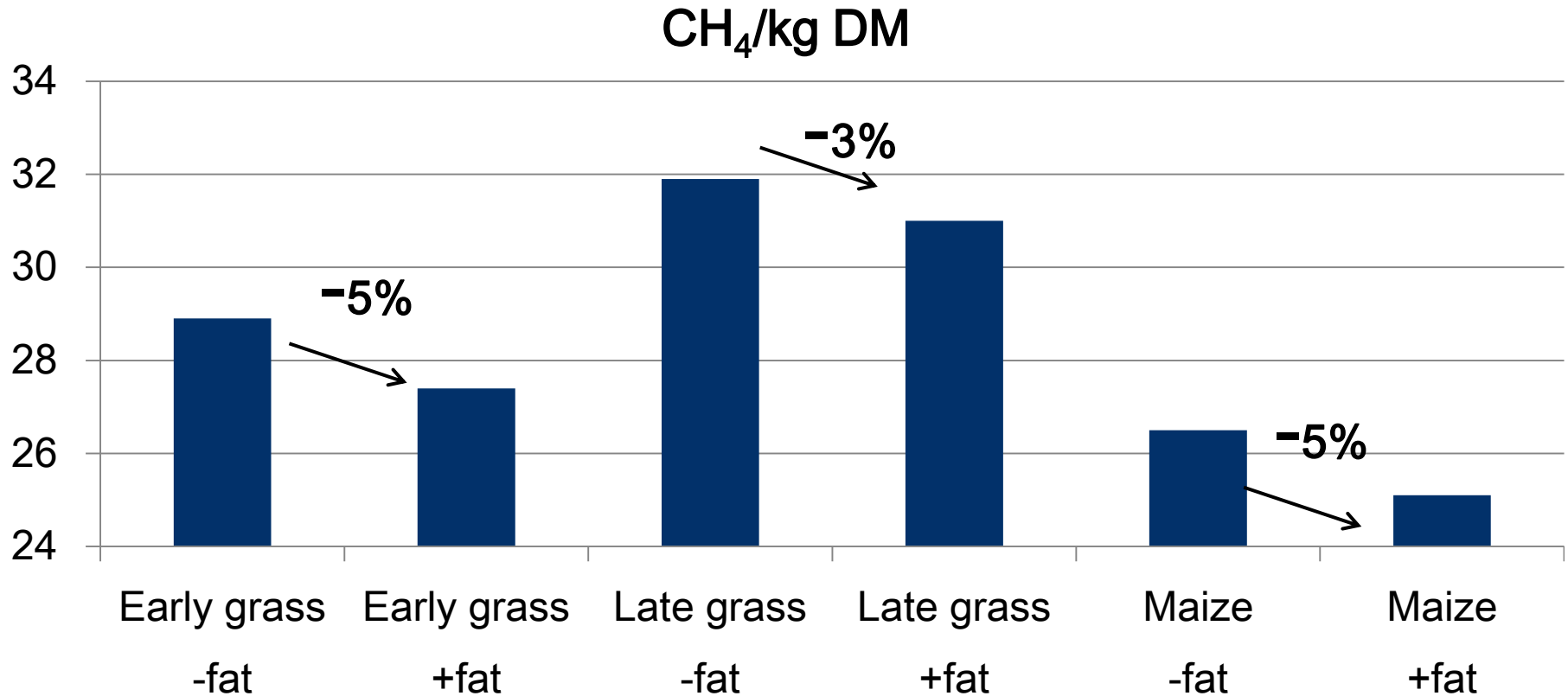
# Most recent data from 1923 !!

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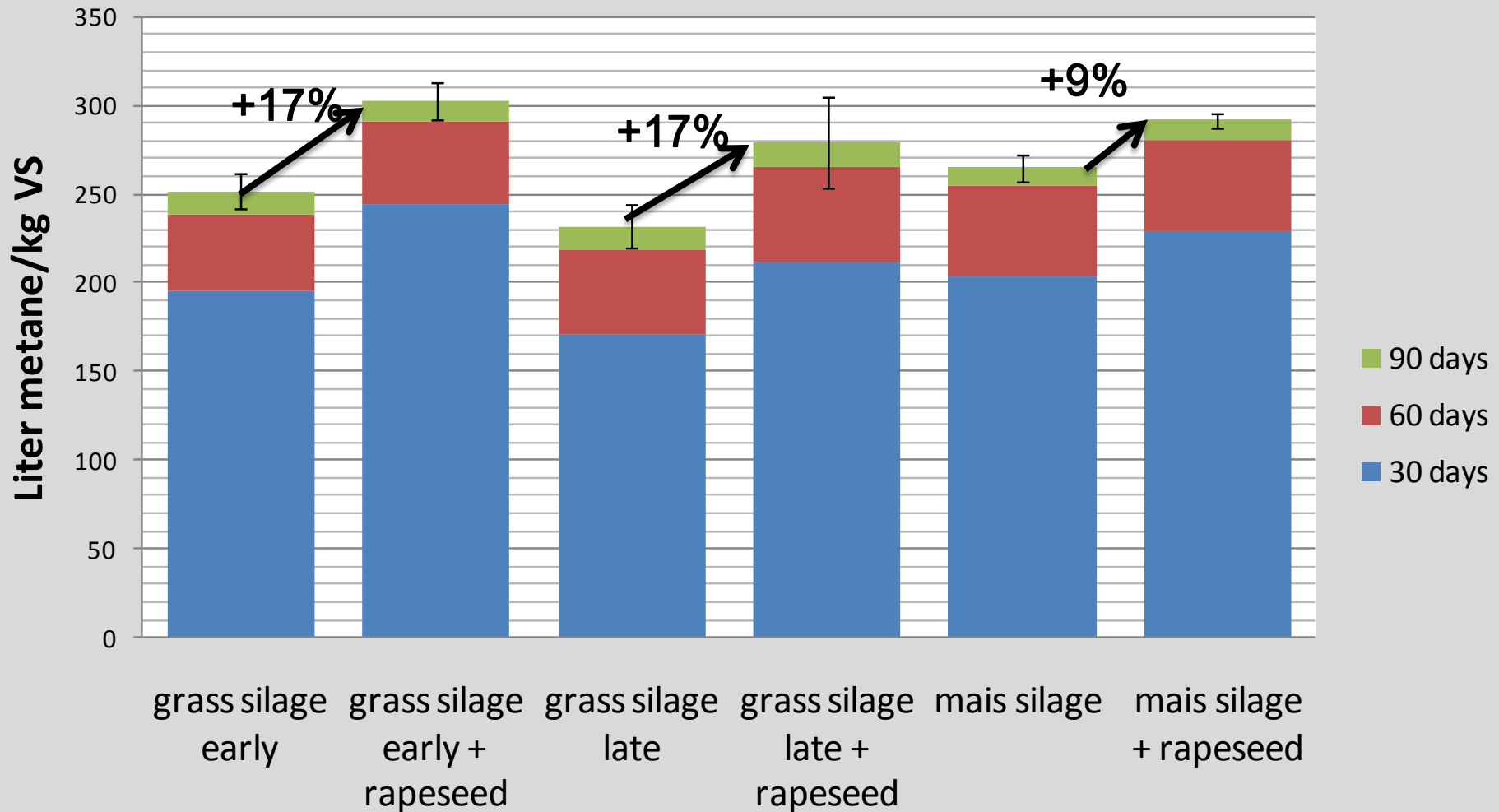


4 new animal friendly chambers installed in 2009

# Fat x forage – cow



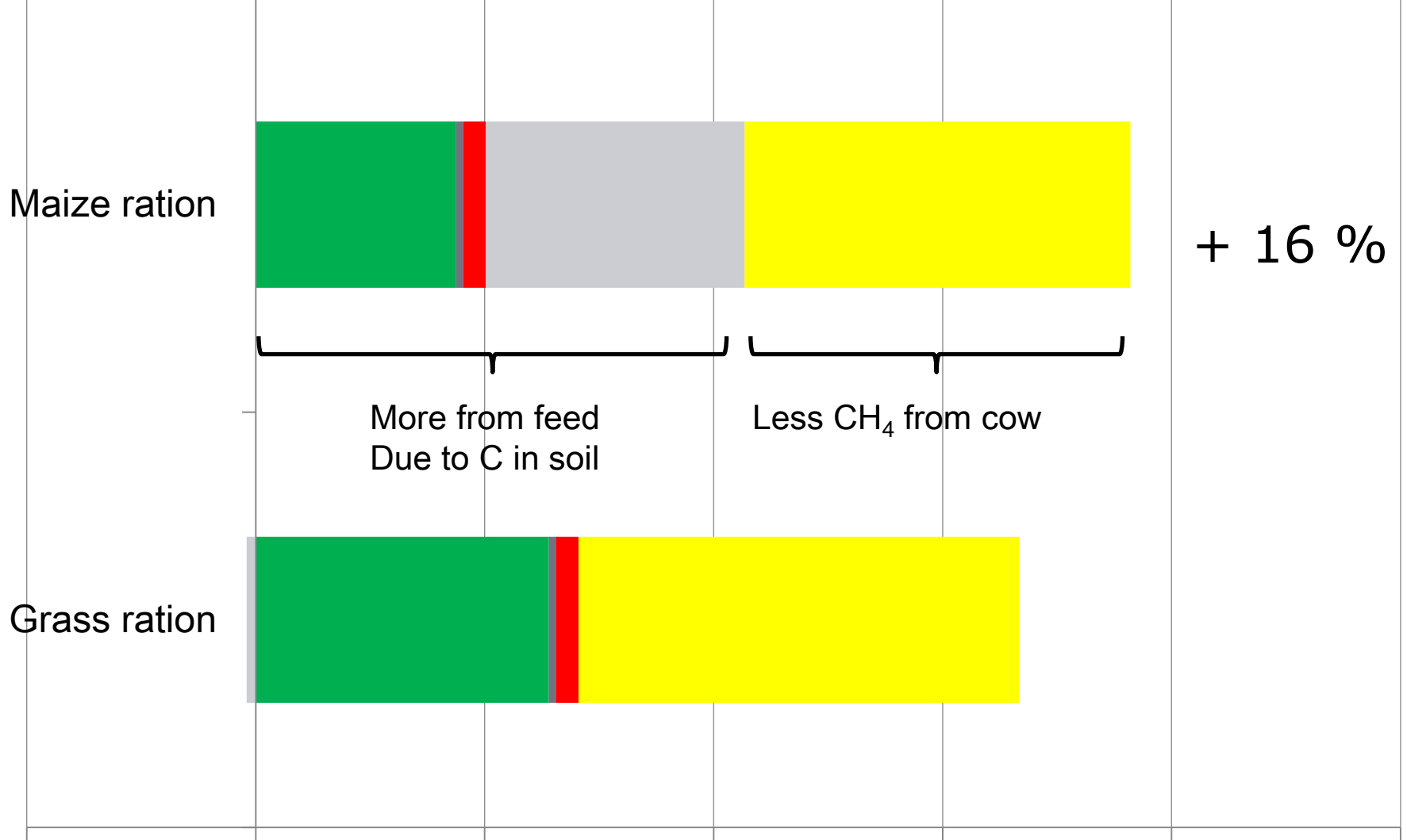
# Fat x forage – biogas potential



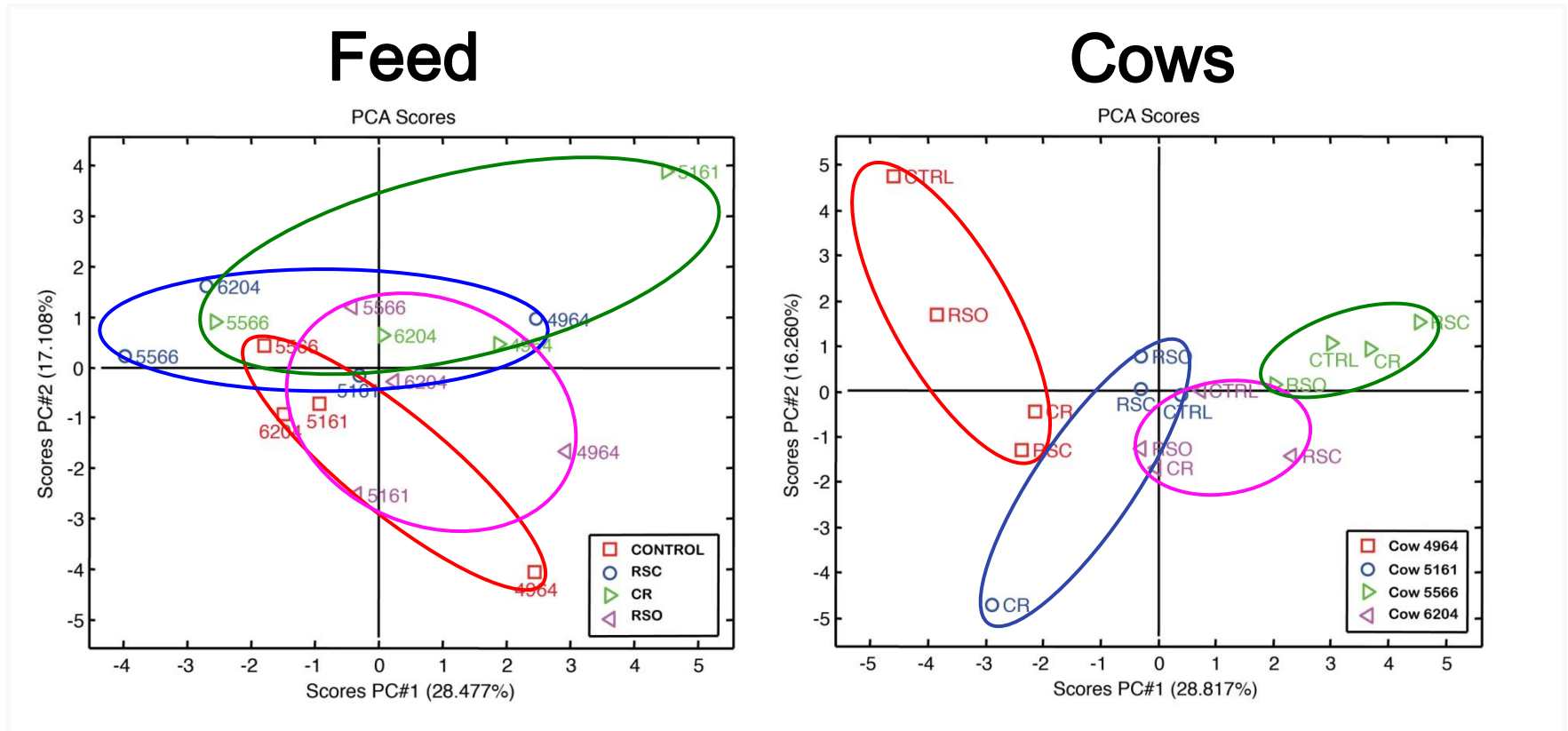


# GHG from feed + CH<sub>4</sub> from cow, kg CO<sub>2</sub>/kg ECM

■ Growing ■ Processing ■ Transport ■ LUC ■ C in soil ■ CH4 cow



# Microbial community



# On farm screening

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# Conclusion – Methane

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- › Methane emission from ruminants is unavoidable but can be reduced.
  - › Increased production and production efficiency
  - › Optimised feeding
  - › Breeding for the low methane producing cows
  - › We have to look on the chain perspective as well (biogas)
  - › Potential: 15% reduction or more

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Thank you