

## **2 PRIEDAS**



## Livestock building emission assessment



### Objectives of the study and farm observations

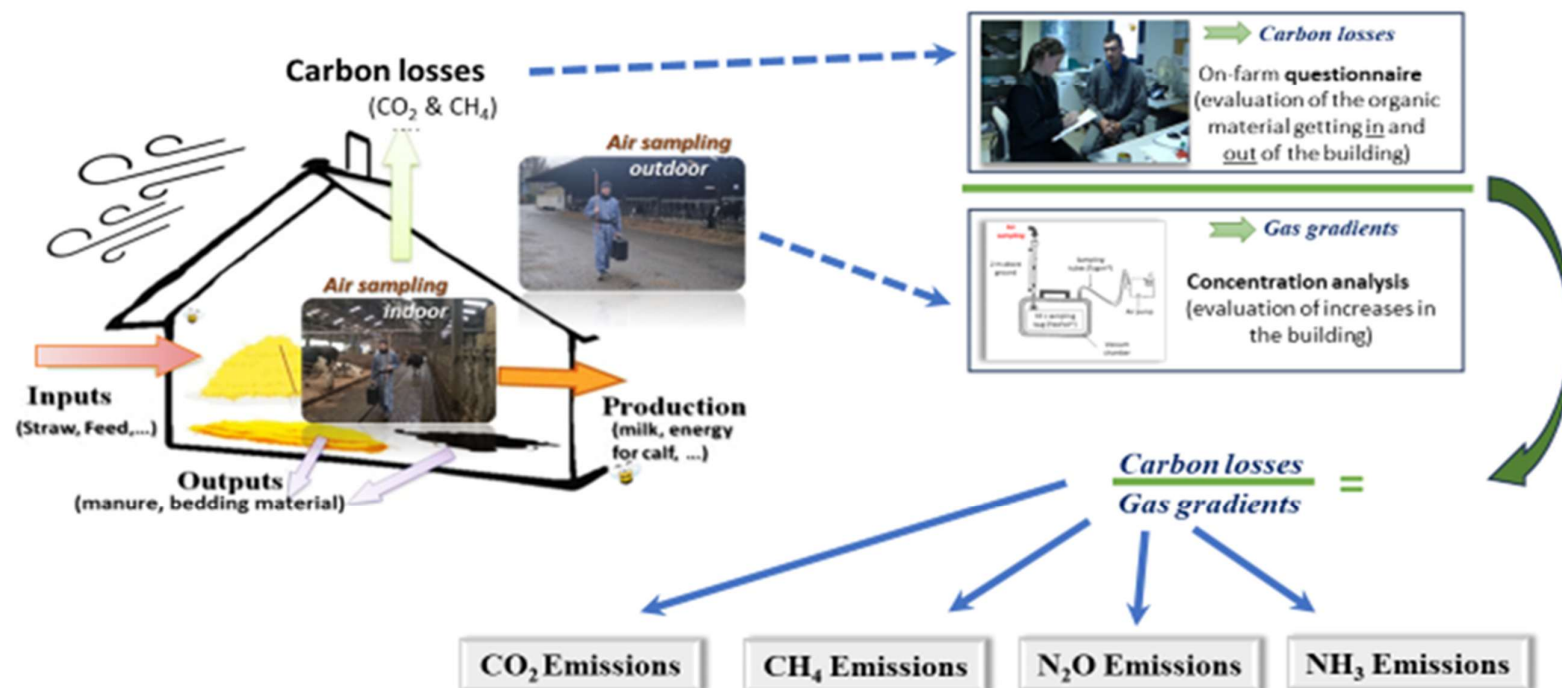


#### Objectives

- Help implementing mitigation strategies by identifying emission hot spots
- Identifying low emission sources to consolidate and possibly disseminate

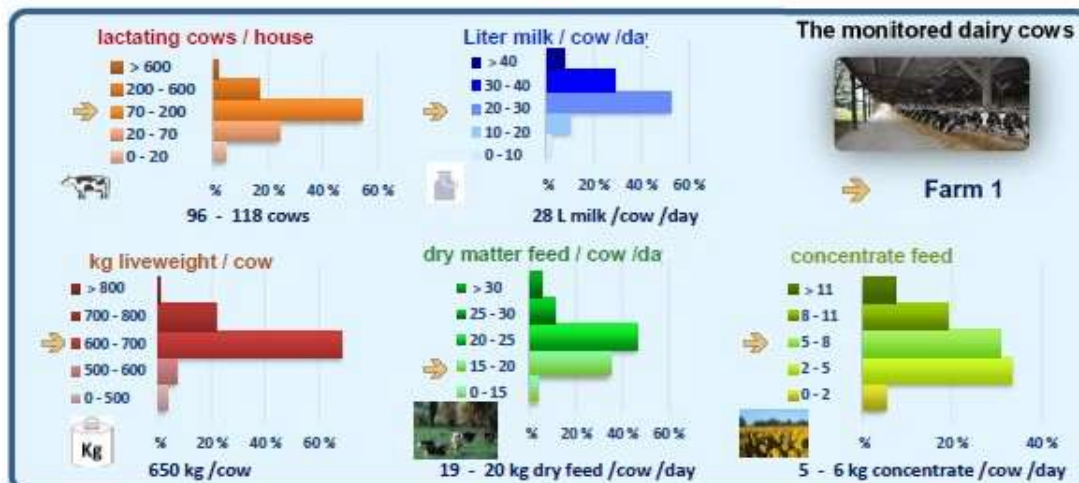


#### Farm observations



### My farm vs the diversity of visited dairy units in all countries

| Tier    | 2b | 2a | 1 | not used | total<br>(3 gases) |
|---------|----|----|---|----------|--------------------|
| nb obs. | 11 | 0  | 1 | 0        | 12                 |





Farm 1 (Lithuania)

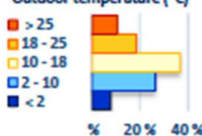
LUHS



#### Take-home messages

- Emissions of ammonia and nitrous oxide are smaller than the population while methane emissions are normal for dairy cows;
- The farmer practices should serve as an example of "low emitting system" to improve similar farms in the same region

#### Outdoor temperature (°C)



#### Ventilation (m<sup>3</sup>/hour/cow)



## Observed emissions

### Observations in all countries

#### Ammonia emissions (g NH<sub>3</sub>/cow/day)



Reference emission factor: EF = 30 g NH<sub>3</sub>/cow/day

#### kg CH<sub>4</sub>/cow/day (kg CH<sub>4</sub>/cow/day)



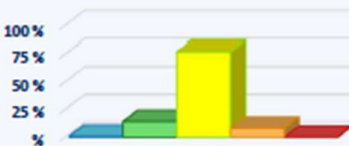
Reference emission factor: EF = 0,38 kg CH<sub>4</sub>/cow/day

#### Nitrous oxide emissions (g N<sub>2</sub>O/cow/day)



Reference emission factor: EF = 1,8 g N<sub>2</sub>O/cow/day

#### GHG emissions (kg eq CO<sub>2</sub>/L milk)

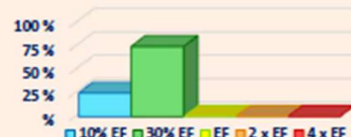


Reference emission factor: EF = 0,40 kg eq CO<sub>2</sub>/L milk

### Observations in my farm

Outdoor temperature -1,4 - 16 °C

Ventilation 280 - 780 m<sup>3</sup>/hour/cow

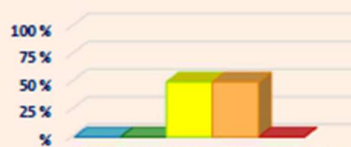


min: 3 g NH<sub>3</sub>/cow/day

max: 13 g NH<sub>3</sub>/cow/day

n: 8 emissions

| min | max | min | max | min | max | min | max | min |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 0   | 4   | 4   | 15  | 15  | 45  | 45  | 101 | 101 |



min: 0,4 kg CH<sub>4</sub>/cow/day

max: 0,6 kg CH<sub>4</sub>/cow/day

n: 8 emissions

| min  | max  | min  | max  | min  | max  | min  | max  | min  |
|------|------|------|------|------|------|------|------|------|
| 0,00 | 0,19 | 0,19 | 0,30 | 0,30 | 0,45 | 0,45 | 0,65 | 0,65 |



min: 0,04 g N<sub>2</sub>O/cow/day

max: 2 g N<sub>2</sub>O/cow/day

n: 8 emissions

| min  | max  | min  | max  | min  | max  | min  | max  | min  |
|------|------|------|------|------|------|------|------|------|
| 0,00 | 0,23 | 0,23 | 0,91 | 0,91 | 2,73 | 2,73 | 6,14 | 6,14 |



min: 0,3 kg eq CO<sub>2</sub>/L milk

max: 0,4 kg eq CO<sub>2</sub>/L milk

| min  | max  | min  | max  | min  | max  | min  | max  | min  |
|------|------|------|------|------|------|------|------|------|
| 0,00 | 0,05 | 0,05 | 0,20 | 0,20 | 0,61 | 0,61 | 1,36 | 1,36 |



## Farm 2 (Lithuania)

Survey of housing emissions  
(2021 - 2023)

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Farm visited by Violeta  
Juskiene (2021 - 2022)

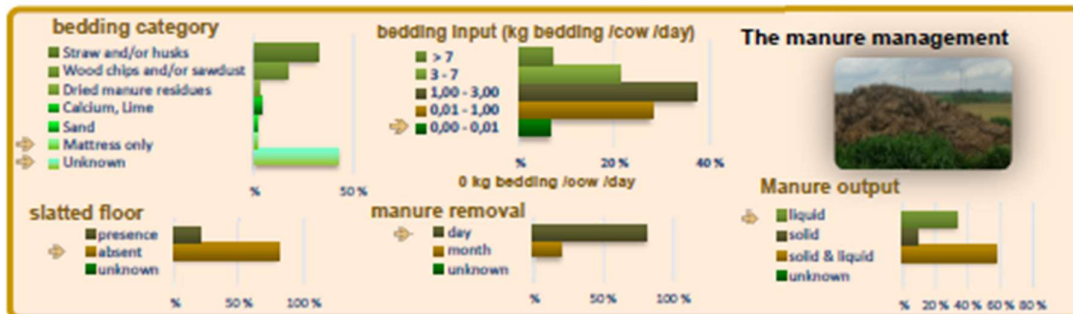
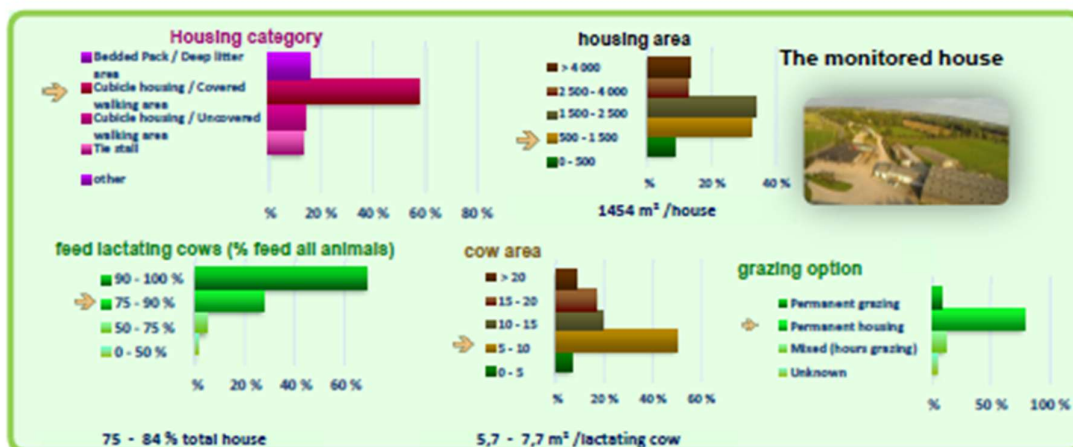
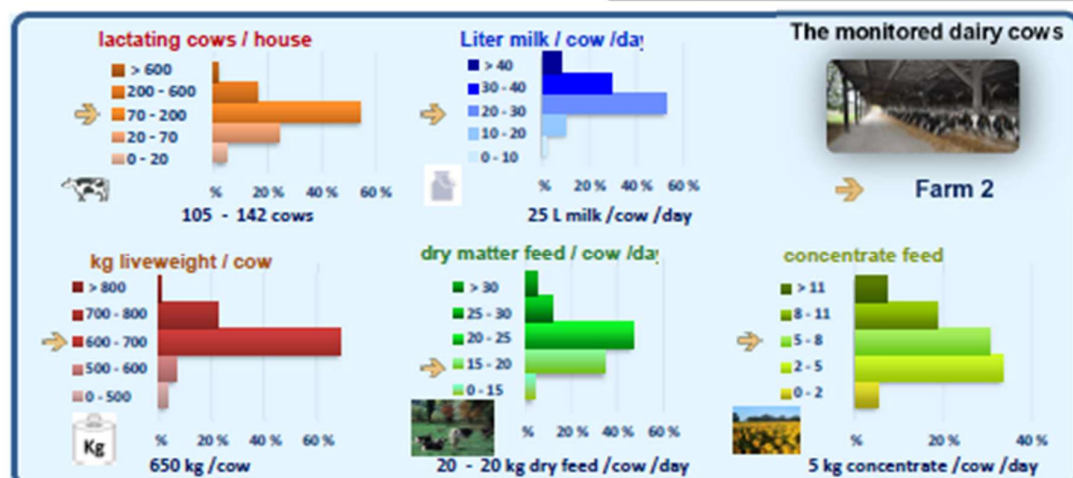
FACCE  
ERA-GAS



ICT AGRI  
ERA-GAS

### My farm vs the diversity of visited dairy units in all countries

| Tier    | 2b | 2a | 1 | not used | total<br>(3 gases) |
|---------|----|----|---|----------|--------------------|
| nb obs. | 11 | 0  | 1 | 0        | 12                 |





Farm 2 (Lithuania)

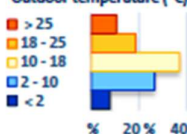
LUHS



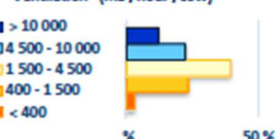
#### Take-home messages

- Emissions of ammonia and nitrous oxide are smaller than the population while methane emissions are normal for dairy cows;
- The farmer practices should serve as an example of "low emitting system" to improve similar farms in the same region

#### Outdoor temperature (°C)



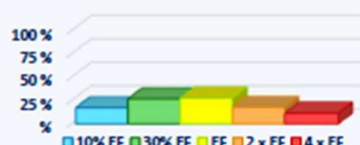
#### Ventilation (m<sup>3</sup>/hour/cow)



## Observed emissions

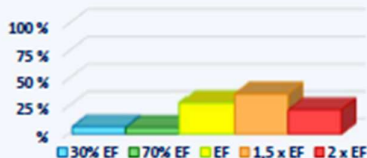
### Observations in all countries

#### Ammonia emissions (g NH<sub>3</sub>/cow/day)



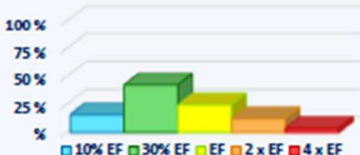
Reference emission factor: EF = 30 g NH<sub>3</sub>/cow/day

#### kg CH<sub>4</sub>/cow/day (kg CH<sub>4</sub>/cow/day)



Reference emission factor: EF = 0,38 kg CH<sub>4</sub>/cow/day

#### Nitrous oxide emissions (g N<sub>2</sub>O/cow/day)



Reference emission factor: EF = 1,8 g N<sub>2</sub>O/cow/day

#### GHG emissions (kg eq CO<sub>2</sub>/L milk)

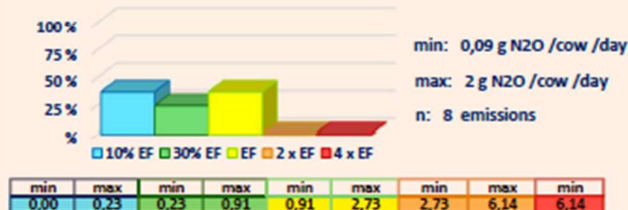
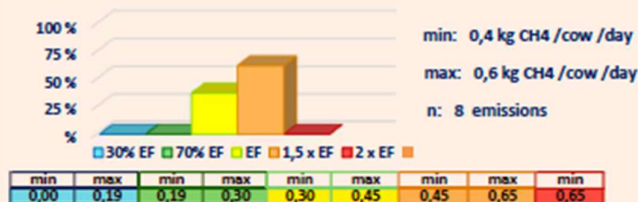


Reference emission factor: EF = 0,40 kg eq CO<sub>2</sub>/L milk

### Observations in my farm

Outdoor temperature -0,1 - 23 °C

Ventilation 510 - 1900 m<sup>3</sup>/hour/cow





## Farm 3 (Lithuania)

Survey of housing emissions  
(2021 - 2023)

## LUHS

Farm visited by Violeta  
Juskiene (2021 - 2022)

FACCE  
ERA-GAS

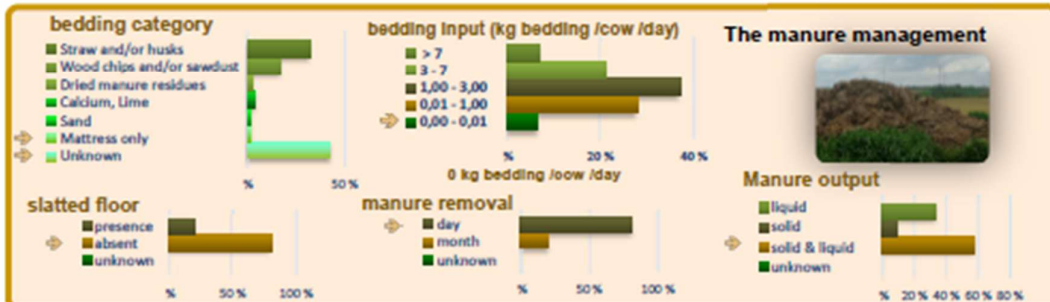
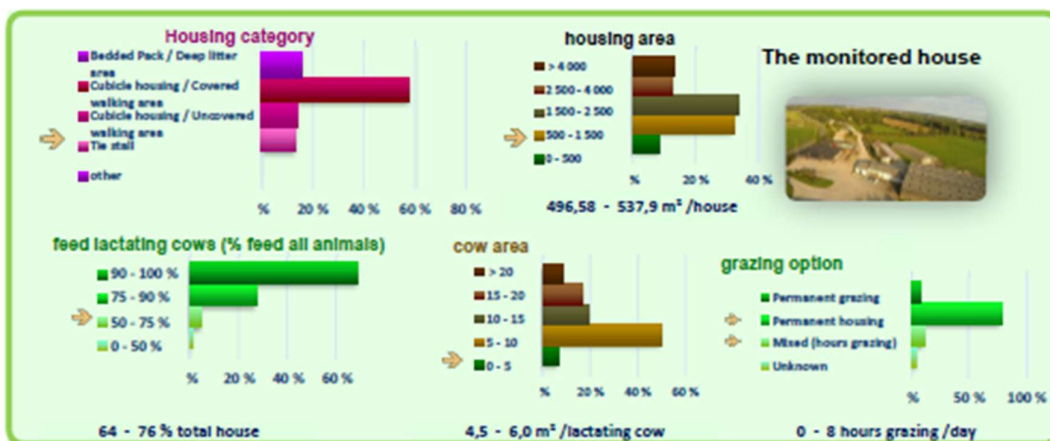
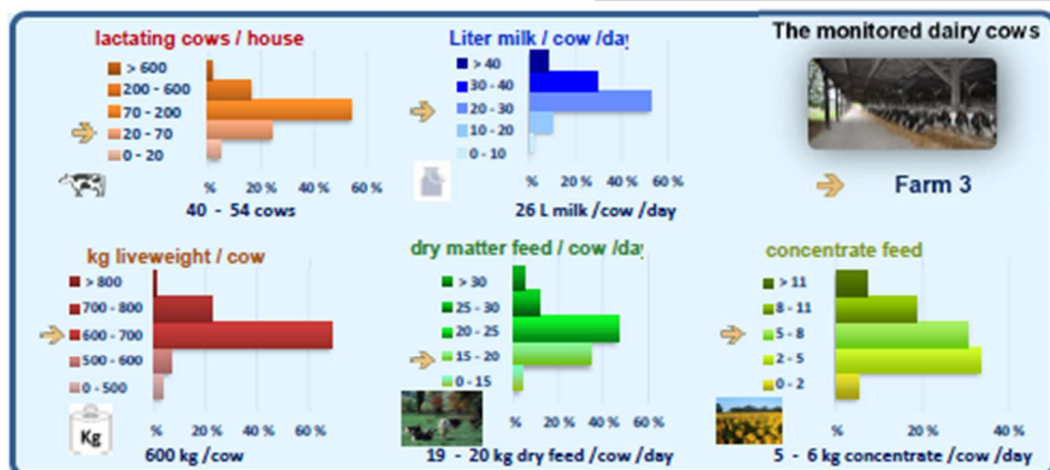


ERA-NET-SUSAN



### My farm vs the diversity of visited dairy units in all countries

| Tier    | 2b | 2a | 1 | not used | total<br>(3 gases) |
|---------|----|----|---|----------|--------------------|
| nb obs. | 9  | 3  | 0 | 0        | 12                 |





Farm 3 (Lithuania)

LUHS

FACCE  
ERA-GAS

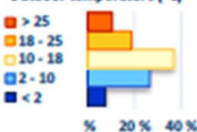
ERA-NET-SUBAN

ICT AGRI  
GreenNet

#### Take-home messages

- Emissions of ammonia and nitrous oxide are smaller than the population while methane emissions are normal for dairy cows;
- The farmer practices should serve as an example of "low emitting system" to improve similar farms in the same region

#### Outdoor temperature (°C)



#### Ventilation (m3 /hour /cow)



### Observed emissions

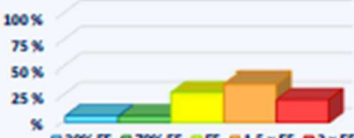
#### Observations in all countries

##### Ammonia emissions (g NH3 /cow /day)



Reference emission factor: EF = 30 g NH3 /cow /day

##### kg CH4 /cow /day (kg CH4 /cow /day)



Reference emission factor: EF = 0,38 kg CH4 /cow /day

##### Nitrous oxide emissions (g N2O /cow /day)



Reference emission factor: EF = 1,8 g N2O /cow /day

##### GHG emissions (kg eq CO2 /L milk)



Reference emission factor: EF = 0,40 kg eq CO2 /L milk

#### Observations in my farm

Outdoor temperature -0,2 - 25 °C

Ventilation 170 - 1400 m3 /hour /cow



min: 2 g NH3 /cow /day

max: 7 g NH3 /cow /day

n: 8 emissions

| min | max | min | max | min | max | min | max | min |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 0   | 4   | 4   | 15  | 15  | 45  | 45  | 101 | 101 |



min: 0,4 kg CH4 /cow /day

max: 0,5 kg CH4 /cow /day

n: 8 emissions

| min  | max  | min  | max  | min  | max  | min  | max  | min  |
|------|------|------|------|------|------|------|------|------|
| 0,00 | 0,19 | 0,19 | 0,30 | 0,30 | 0,45 | 0,45 | 0,65 | 0,65 |



min: 0,02 g N2O /cow /day

max: 5 g N2O /cow /day

n: 8 emissions

| min  | max  | min  | max  | min  | max  | min  | max  | min  |
|------|------|------|------|------|------|------|------|------|
| 0,00 | 0,23 | 0,23 | 0,91 | 0,91 | 2,73 | 2,73 | 6,14 | 6,14 |



min: 0,3 kg eq CO2 /L milk

max: 0,4 kg eq CO2 /L milk

| min  | max  | min  | max  | min  | max  | min  | max  | min  |
|------|------|------|------|------|------|------|------|------|
| 0,00 | 0,05 | 0,05 | 0,20 | 0,20 | 0,61 | 0,61 | 1,36 | 1,36 |



## Farm 4 (Lithuania)

Survey of housing emissions  
(2021 - 2023)

## LUHS

Farm visited by Violeta  
Jušklėnė (2021 - 2022)

FACCE  
ERA-GAS

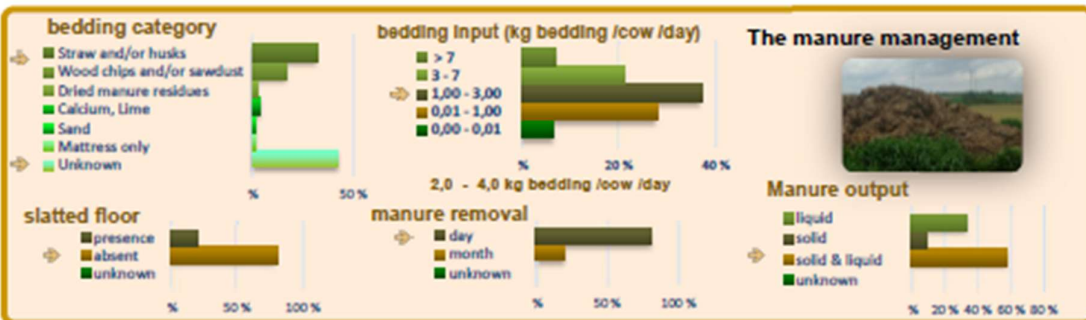
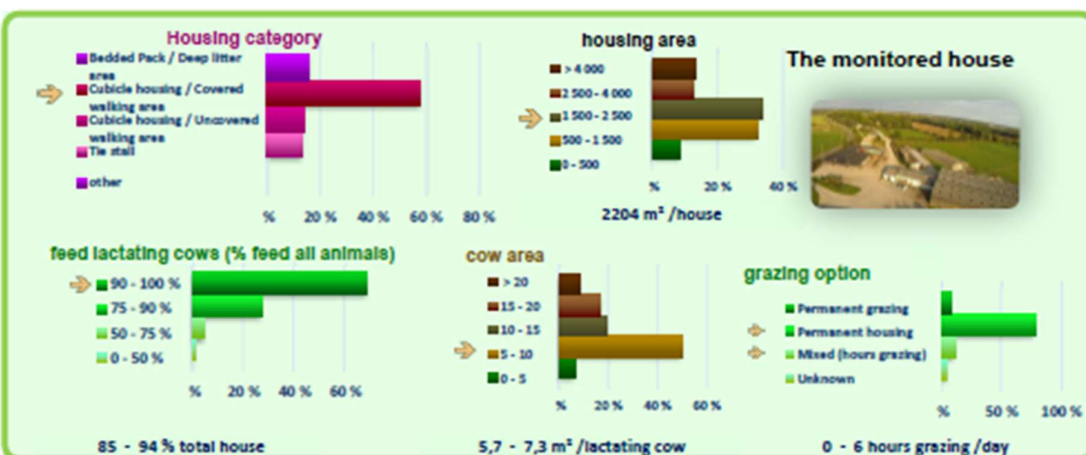
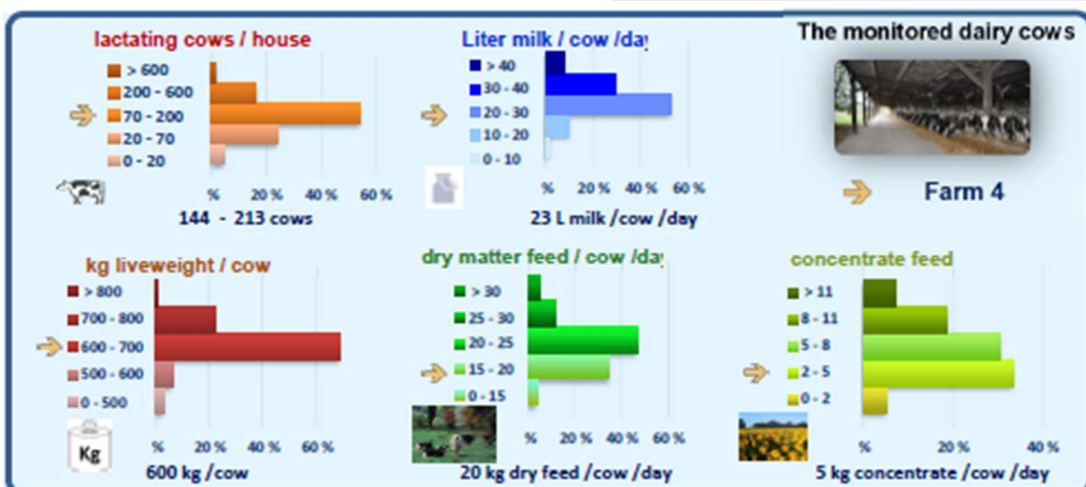


ERANET-SUSAN



### My farm vs the diversity of visited dairy units in all countries

| Tier    | 2b | 2a | 1 | not used | total<br>(3 gases) |
|---------|----|----|---|----------|--------------------|
| nb obs. | 8  | 3  | 1 | 0        | 12                 |





Farm 4 (Lithuania)

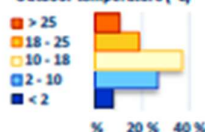
LUHS



#### Take-home messages

- Emissions of ammonia and nitrous oxide are smaller than the population while methane emissions are normal for dairy cows;
- The farmer practices should serve as an example of "low emitting system" to improve similar farms in the same region

#### Outdoor temperature (°C)



#### Ventilation (m<sup>3</sup>/hour/cow)



### Observed emissions

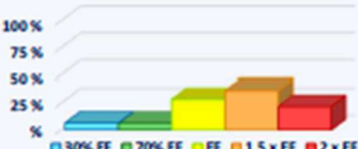
#### Observations in all countries

##### Ammonia emissions (g NH<sub>3</sub>/cow/day)



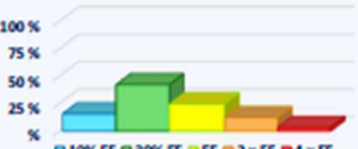
Reference emission factor: EF = 30 g NH<sub>3</sub>/cow/day

##### kg CH<sub>4</sub>/cow/day (kg CH<sub>4</sub>/cow/day)



Reference emission factor: EF = 0,38 kg CH<sub>4</sub>/cow/day

##### Nitrous oxide emissions (g N<sub>2</sub>O/cow/day)



Reference emission factor: EF = 1,8 g N<sub>2</sub>O/cow/day

##### GHG emissions (kg eq CO<sub>2</sub>/L milk)



Reference emission factor: EF = 0,40 kg eq CO<sub>2</sub>/L milk

#### Observations in my farm

Outdoor temperature -3,2 - 21 °C

Ventilation 140 - 1600 m<sup>3</sup>/hour/cow



min: 1 g NH<sub>3</sub>/cow/day

max: 8 g NH<sub>3</sub>/cow/day

n: 8 emissions

| min | max | min | max | min | max | min | max | min |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 0   | 4   | 4   | 15  | 15  | 45  | 45  | 101 | 101 |



min: 0,4 kg CH<sub>4</sub>/cow/day

max: 0,6 kg CH<sub>4</sub>/cow/day

n: 8 emissions

| min  | max  | min  | max  | min  | max  | min  | max  | min  |
|------|------|------|------|------|------|------|------|------|
| 0,00 | 0,19 | 0,19 | 0,30 | 0,30 | 0,45 | 0,45 | 0,65 | 0,65 |



min: 0,02 g N<sub>2</sub>O/cow/day

max: 0,6 g N<sub>2</sub>O/cow/day

n: 8 emissions

| min  | max  | min  | max  | min  | max  | min  | max  | min  |
|------|------|------|------|------|------|------|------|------|
| 0,00 | 0,23 | 0,23 | 0,91 | 0,91 | 2,73 | 2,73 | 6,14 | 6,14 |



min: 0,3 kg eq CO<sub>2</sub>/L milk

max: 0,5 kg eq CO<sub>2</sub>/L milk

| min  | max  | min  | max  | min  | max  | min  | max  | min  |
|------|------|------|------|------|------|------|------|------|
| 0,00 | 0,05 | 0,05 | 0,20 | 0,20 | 0,61 | 0,61 | 1,36 | 1,36 |

# Livestock building emission assessment

## Guidelines for interpretations





### Take home message



### Take Home Message based on the graphs below

The emission estimates are « Much higher » for  $CH_4$  and « Higher » and « Much higher » for  $N_2O$  than the reference EF.

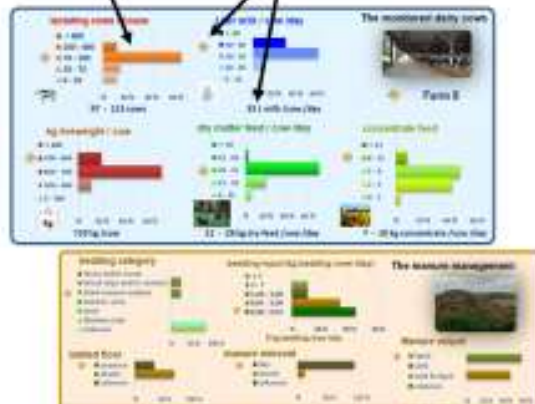
Looking at the farm description:

- the use of slatted floor could explain the  $CH_4$  result;
- dried manure is used for bedding material and higher uses of concentrates (arrows) than the average could explain the  $N_2O$  results.

### Horizontal bars are for the farm description

#### 1- Graphs present the country situation

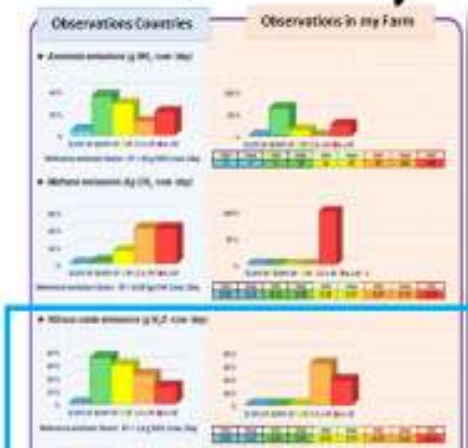
#### 2- Arrow and numbers below graphs present the farm situation



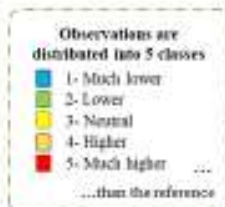
### Vertical bars are for the emission calculations

#### 1- Left graphs for the country situation

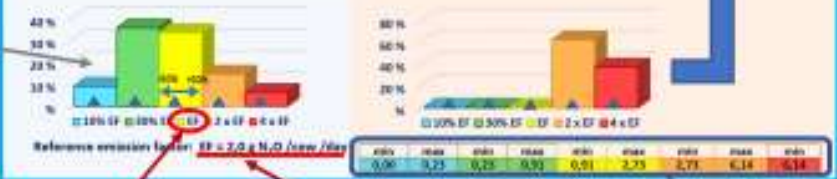
#### 2- Right graphs for the farm situation



### Gas emission distribution of the country (or farm) (emissions are not presented through only one value)



#### Nitrous oxide emissions (g $N_2O$ /cow /day)



The neutral class corresponds to reference emission factor (EF) for each gas which is found in the National Inventory Report

### farm signature

Limits of the classes