



NATIONAL AGRICULTURAL  
AND FOOD CENTRE

## **Production profiles and GHG emissions of Simmental cattle farms in Slovakia**

**- pilot study on farm practices towards implementation  
of circular bioeconomy**

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# Dairy production systems in Slovakia

Indicator	Intensive	Extensive	Semi-intensive
Cost per feeding day	>7 €	<4 €	5-6 €
Herd size (dairy cows)	>200	1-100	<200
Geographical location	Southern low lands	Mountainous and foothill areas	Uplands and foothills
Feeding management	All-year round silage based TMR	Dairy cows and heifer on seasonal pastures with minimum concentrate feed	Heifer on seasonal pastures (for dairy cows additional only)
Management target	20 kg lifetime daily yield	Long productive life-span, healthy cows, with good locomotion	Various combinations
Technology level	High level of innovation	Low cost technology	Various combinations
Prevailing breed	Holstein	Pinzgau, Simmental-Fleckvieh	Various cross-breds
Milk sale - processing	Industry	Own processing, direct sale	Various combinations

# Simental in Slovakia

Last year milk recording data for all lactations

Breed	Cows (n)	Mean milk (kg)	Fat %	Protein %
Simental, top 3 farms in Slovakia	867	10075	3,96	3,44
Holstein, breeding farms	10880	10612	3,73	3,31

Simental cows and heifers (2006 – 2019) in the context of management system

Parameter	not grazed	grazed
	mean±SE	mean±SE
Number of heads	15268	2889
Age at 1st calving (days)	907 ± 1,1	970 ± 2,2
Length of productive life (d*)	1178 ± 7,9	1298 ± 16,4
Milk/d* of productive life (kg)	15,29 ± 0,05	11,65 ± 0,10

Huba et al., 2022

# Pilot survey

## Objectives

- to provide accurate information on farm emission profile
- to perform mapping:
  - technology level
  - circularity aspect - bioeconomy

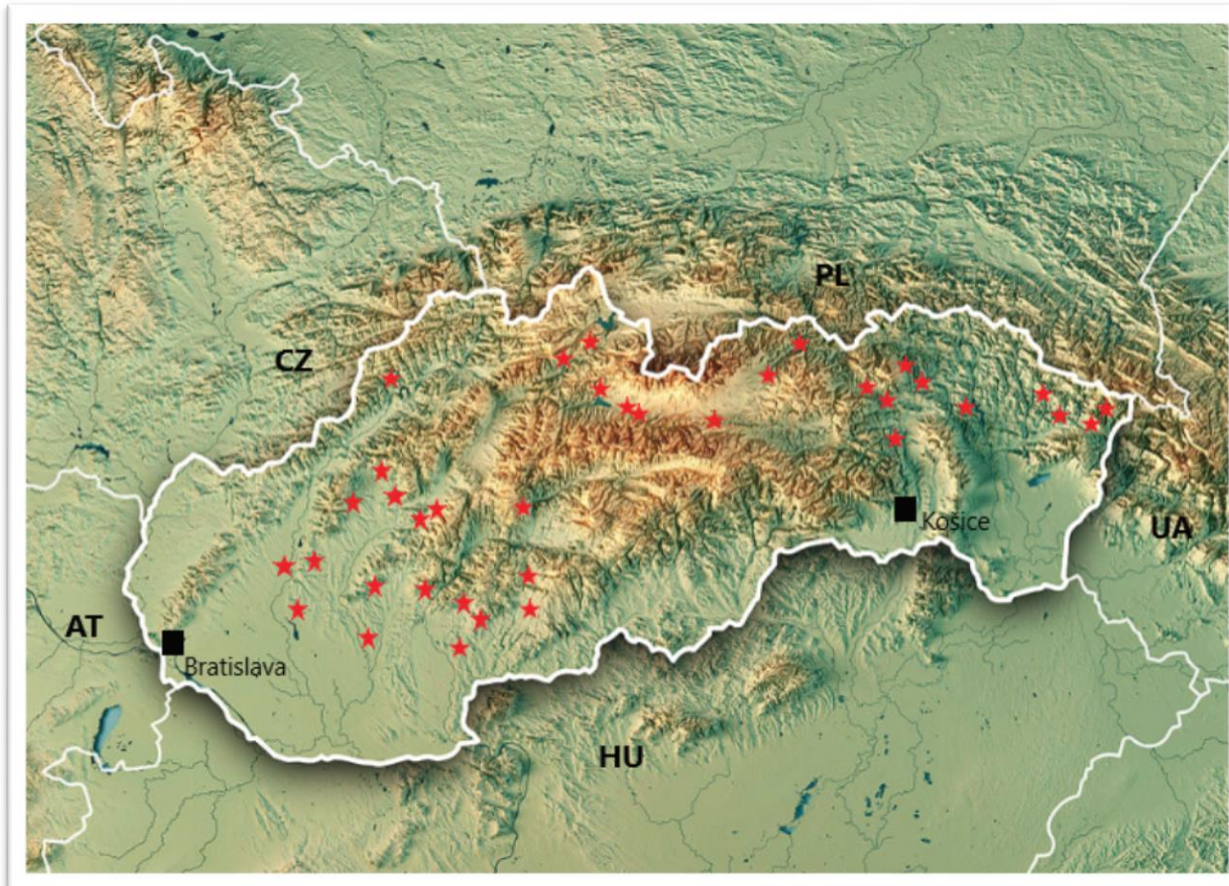
## Survey

- 36 Simmental cattle farms
- data obtained by expert via a face-to-face meetings
- 88 questions



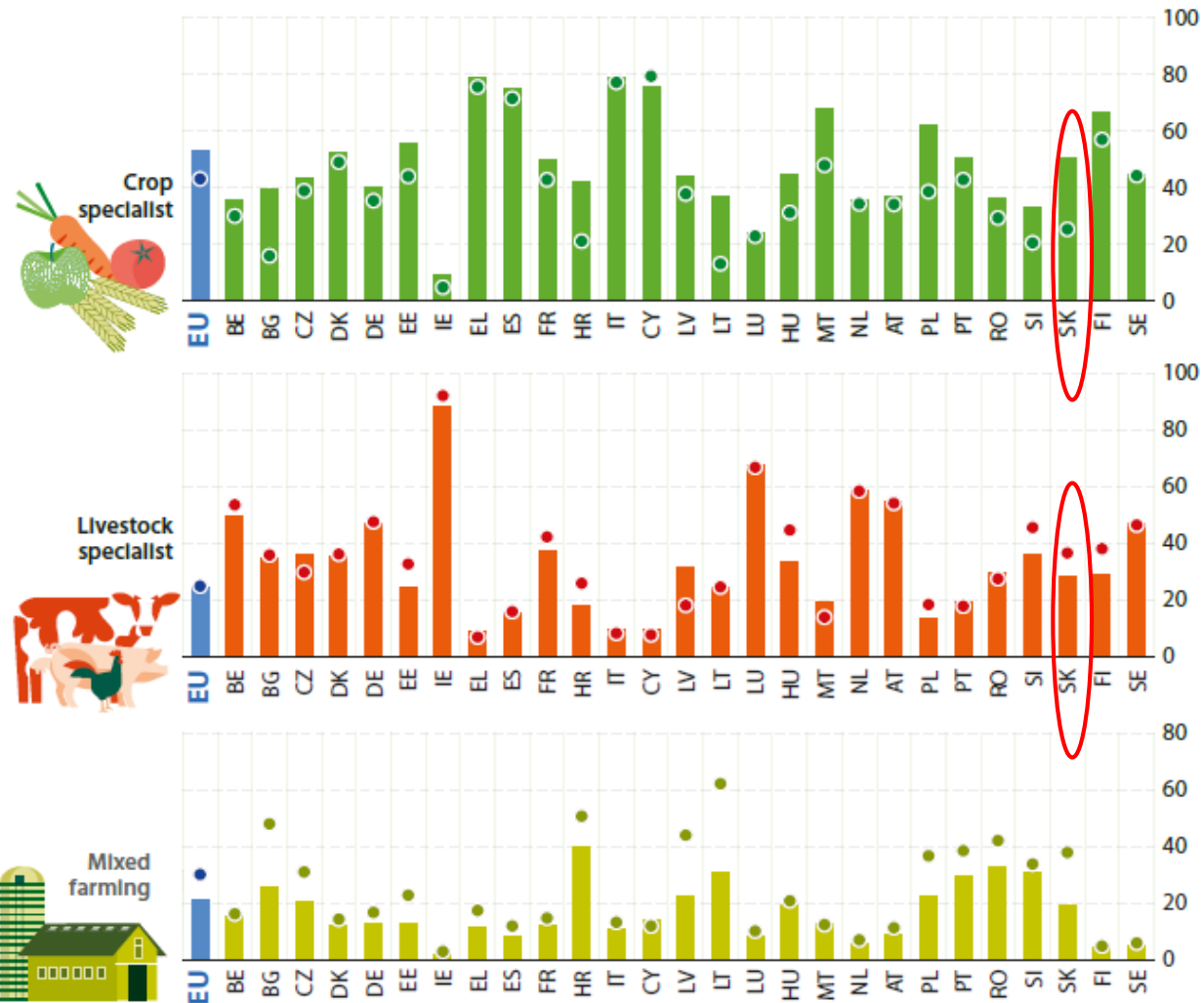
# Geographical distribution of farms in survey

36 farms, located mainly in uphill regions



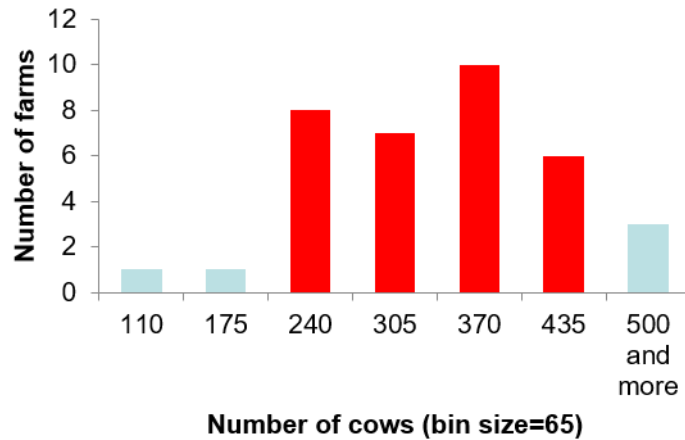
# Change in farm specialisations

(% share of all farms, 2005 and 2016)

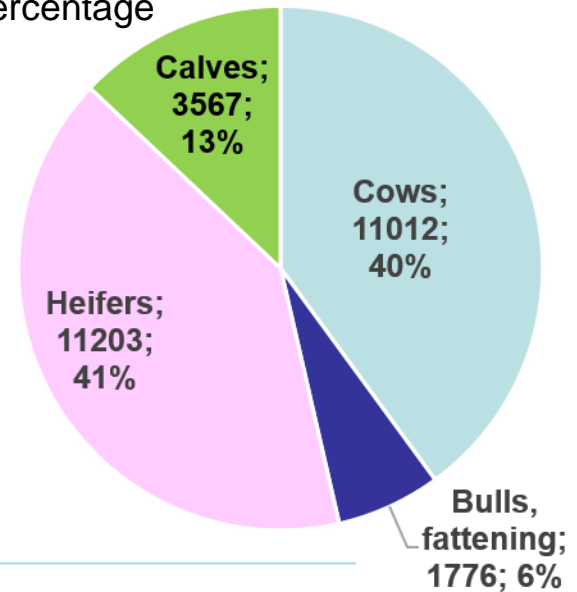


# Farming systems – farm size, herd structure, grazing

86 % (31 farms) had 240 - 500 cows



Categories structure, animals number, percentage



Proportions of farms by management system

Category farming system	Farms (n)	% of farms	farms n grazing	% of cows	% of total animals
Intensive	22	61,1	4	13,6	37,3
Semi-intensive	12	33,3	6	36,3	48,9
Extensive	2	5,6	2	99,3	13,8

# Production profile – milk production

Quartiles by milk production, number of farms, number of cows

Quartile	%	Mean (kg)	N=cows	min	max
Q1	0 - 25	6475	2625	4753	7111
Q2	25 - 50	7507	3142	7112	7914
Q3	50 - 75	8085	2568	7915	8237
Q4	75 - 100	9053	2677	8238	9933

National average milk production<sup>1</sup> (in 2020) 7968 kg.

11,012 cows in the study represent 31 % of the total Simmental population in the national milk recording scheme



Source: <sup>1</sup>Statistical Office of the Slovak Republic, 2021



# Mapping of practices

27 questions covering from housing technology down to application

## Housing

- roof insulated stalls and air ventilation (22)
- slated floor (9)

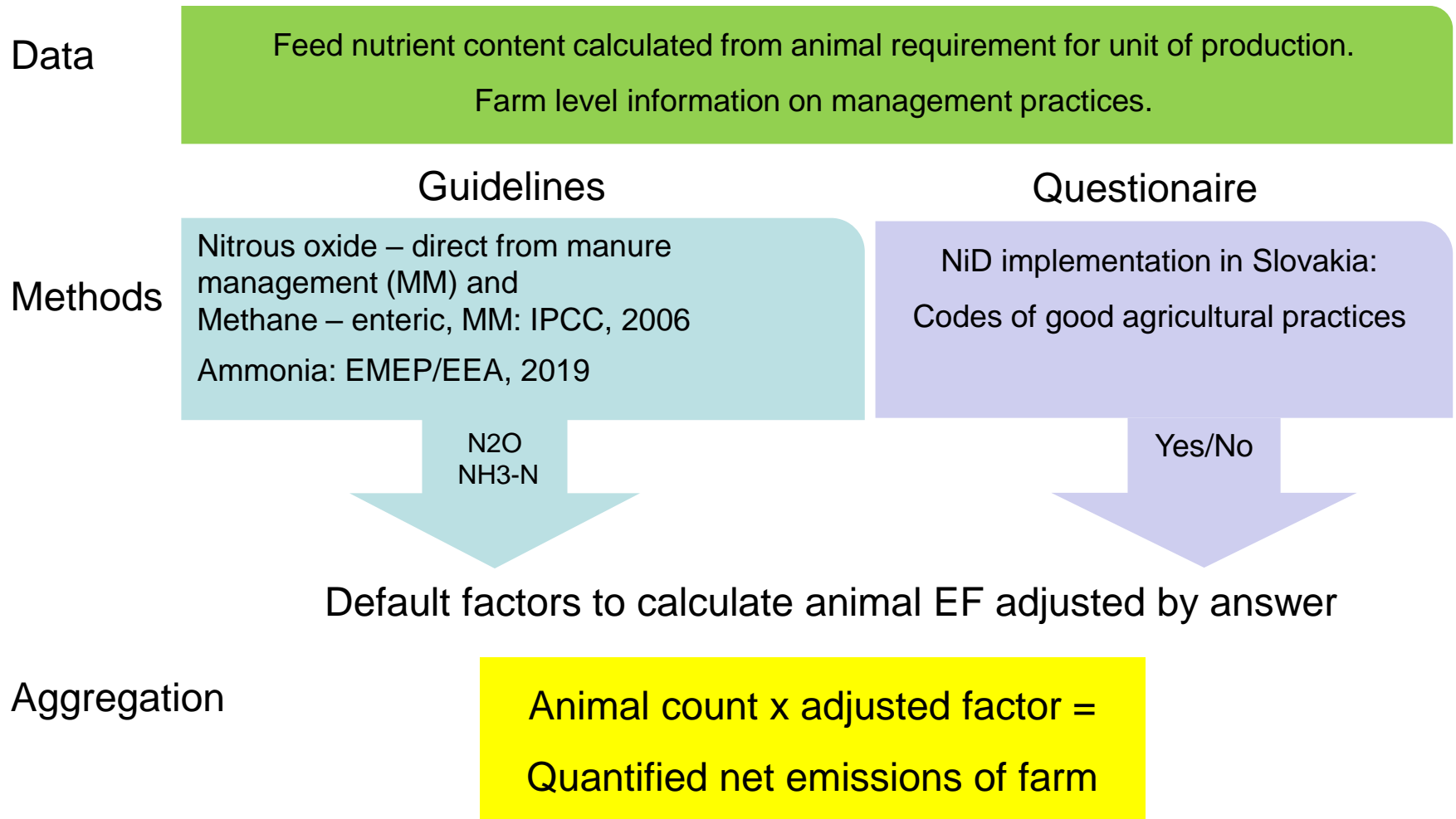
## Number of farms by manure type

Manure type	Bedding
solid (30)	straw
liquid (6)	solids after separation, sawdust

- natural crust on liquid manure (4)
- application: in case farmers utilising liquid system for cows, 4 out of 6 preferred subsurface injection to soil



# Methods to account farm GHG and ammonia



# EF comparison national inventories vs dataset

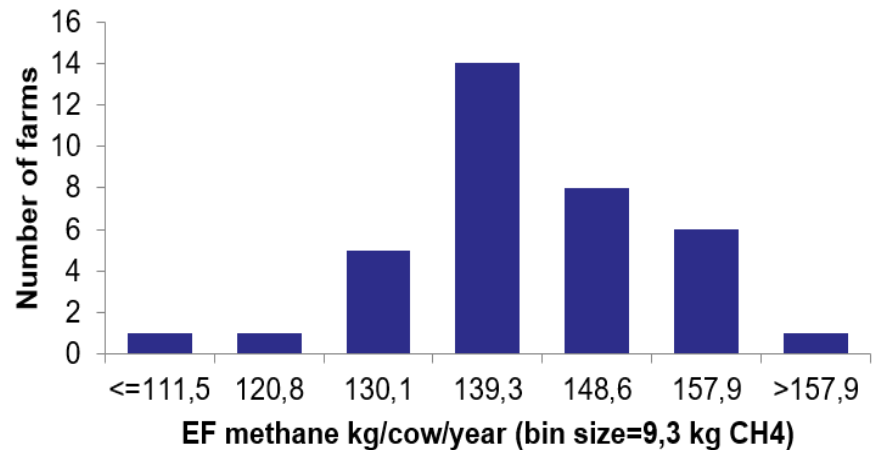
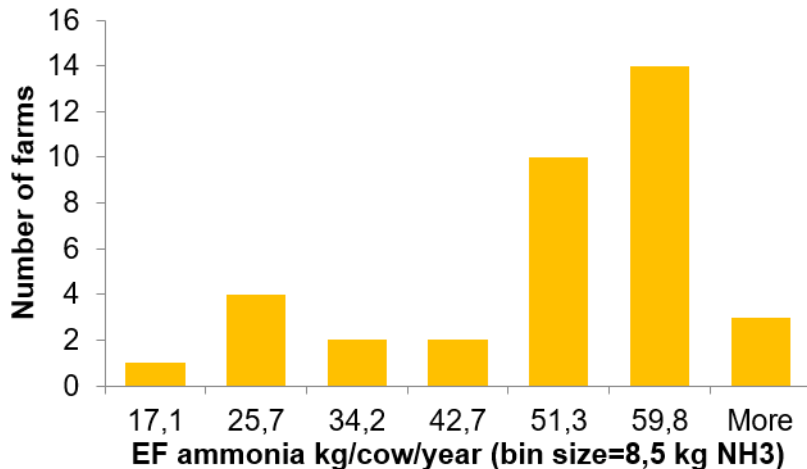
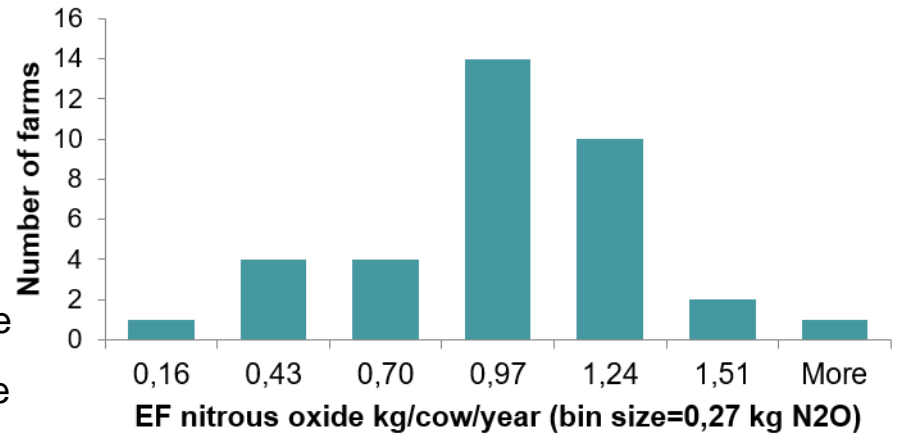
EF in kg per dairy cow

	SVK 2020	Pilot
methane	130,5	138,7
ammonia	41,3	47,2
nitrous oxide	0,786	0,850

24 farms - 67 % had N2O EF > national average

28 farms - 78 % had NH3 EF > national average

29 farms - 81 % had CH4 EF > national average



# Sources of reductions quantified on farm level – preliminary findings

## Ammonia

Cat. 1 mitigation practices from Codes of good agricultural practices for housing:

1. slated floor -25%
2. roof insulated stalls and air ventilation -20%

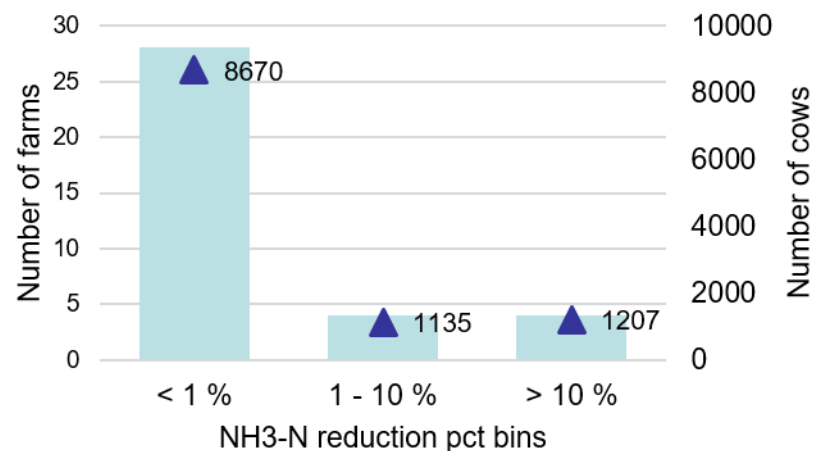
Ammonia reduction of more than 10% was achieved on 4 farms (max. 11.97%)

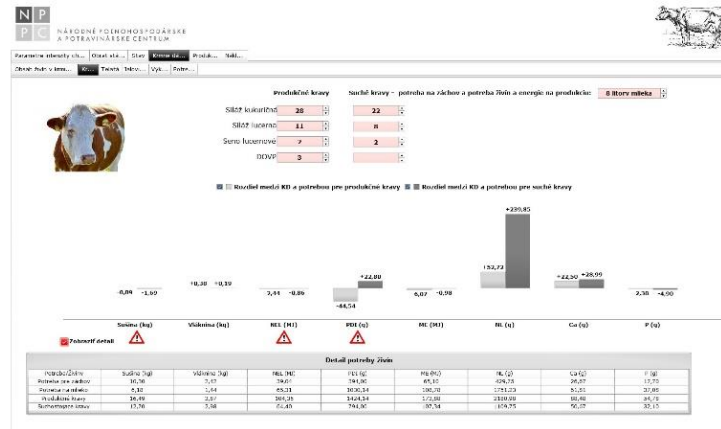
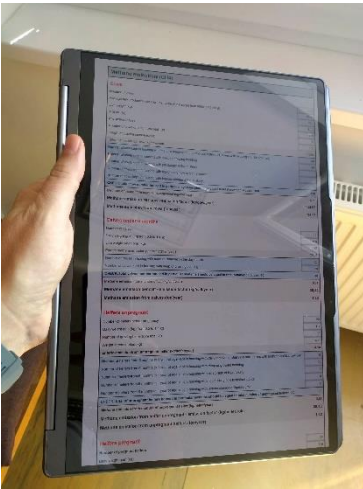
## Nitrous oxide

Slight reduction in total given by specific single farm case

## Futher analysis:

Downstream elements of farming practices such as storing and application.





Screenshots displaying various web calculators under the umbrella of EkonMOD platform



- Environmental and economic sustainable beef cattle breeding in Slovakia
- Optimising milk production and emissions in Slovakia



- Participation in EIT Government Executive Academy 2021
- EIT Food RIS Policy Council 2021-2022

# References

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J. Huba, M. Oravcová , I. Pavlík, O. Pastierik, J. Tomka, M. Záhradník  
Effects of grazing system and further factors on lifetime performance and longevity of Holstein and Slovak Spotted cattle, send to JCEA

Codes of good agricultural practices to reduce ammonia emissions from animal husbandry and fertilizers application updated May 2020

EEA. 2019. European Environment Agency. EMEP/EEA Guideline 2019.  
<https://www.eea.europa.eu/publications/emep-eea-guidebook-2019>.

IPCC. 2006. Agriculture, Forestry and other Land Use Methodology  
Guideline. s.l. : ISBN4-87888-032-4, 2006.

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# Thank you for your attention !

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