OECD – 24th FLA

Czech Organic Farming Structure And Production In FADN 2011-2018

Czech organic farming structure and production development 2011 - 2018

Technical efficiency - Czech livestock farms 2011 – 2016

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FADN FARM ACCOUNTANCY DATA NETWORK CZ
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Content

Czech organic farming structure and production development

- **agricultural land** in organic farming, **number** of farms 1990 - 2018
- **organic farms** in the Czech Republic **by FADN typology** – basic file OF 2017
- **organic production**, share on total agricultural production in 2011 – 2018
- **crops** output, **livestock** and **other** output **per hectare**, total output **per AWU**
- **Farm Net Value Added** and **operating subsidies**, 2011-2018

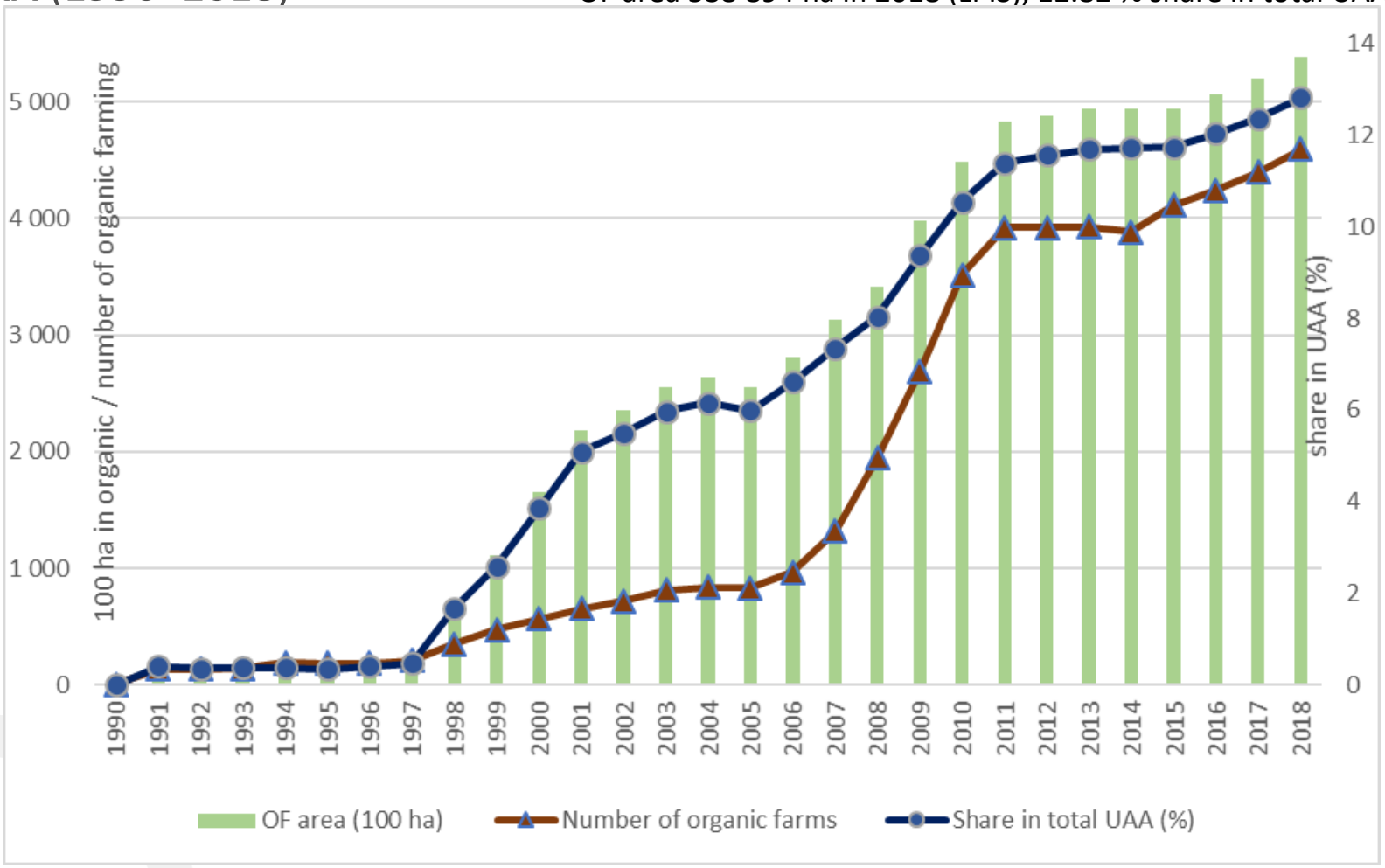
Technical efficiency - Czech livestock farms 2011 – 2016

- **translog stochastic production frontier** - TRE model results
- **descriptive statistics** - quantitative representation of farms in the 1st and 4th quartile of technical efficiency

Summary

Development in **organic agricultural land**, **number of farms** and **share in total UAA** (1990–2018)

OF area 538 894 ha in 2018 (LPIS), 12.82 % share in total UAA



Source: MoA and REP (data as at 31.12. of given year); compiled by IAEI
YEARBOOK 2017 Organic Farming in the Czech Republic
2018 IAEI Statistical surveys of organic farming - Basic statistical data (2018)

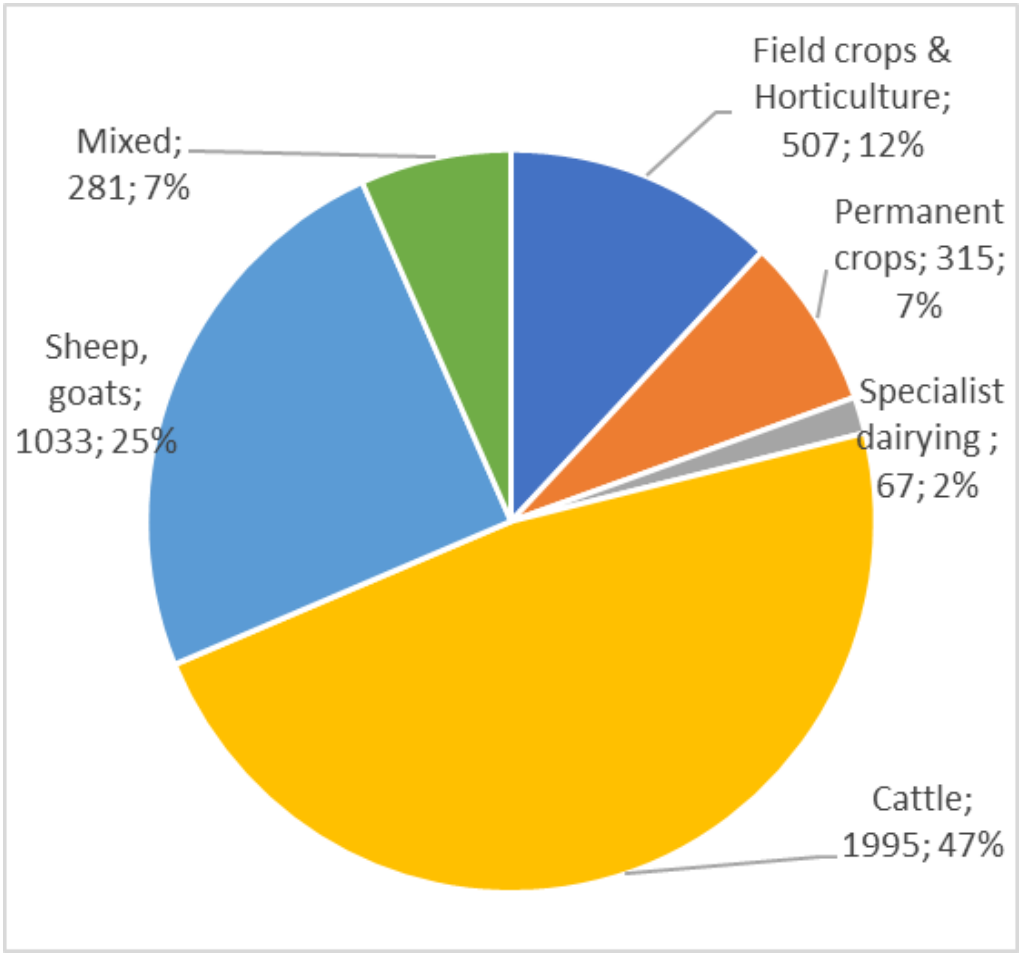
Organic farming in FADN CR

- Special task for the Ministry of Agriculture (since 2012)
- **Aim**: economic evaluation, estimation of the financial value of organic production in the Czech Republic

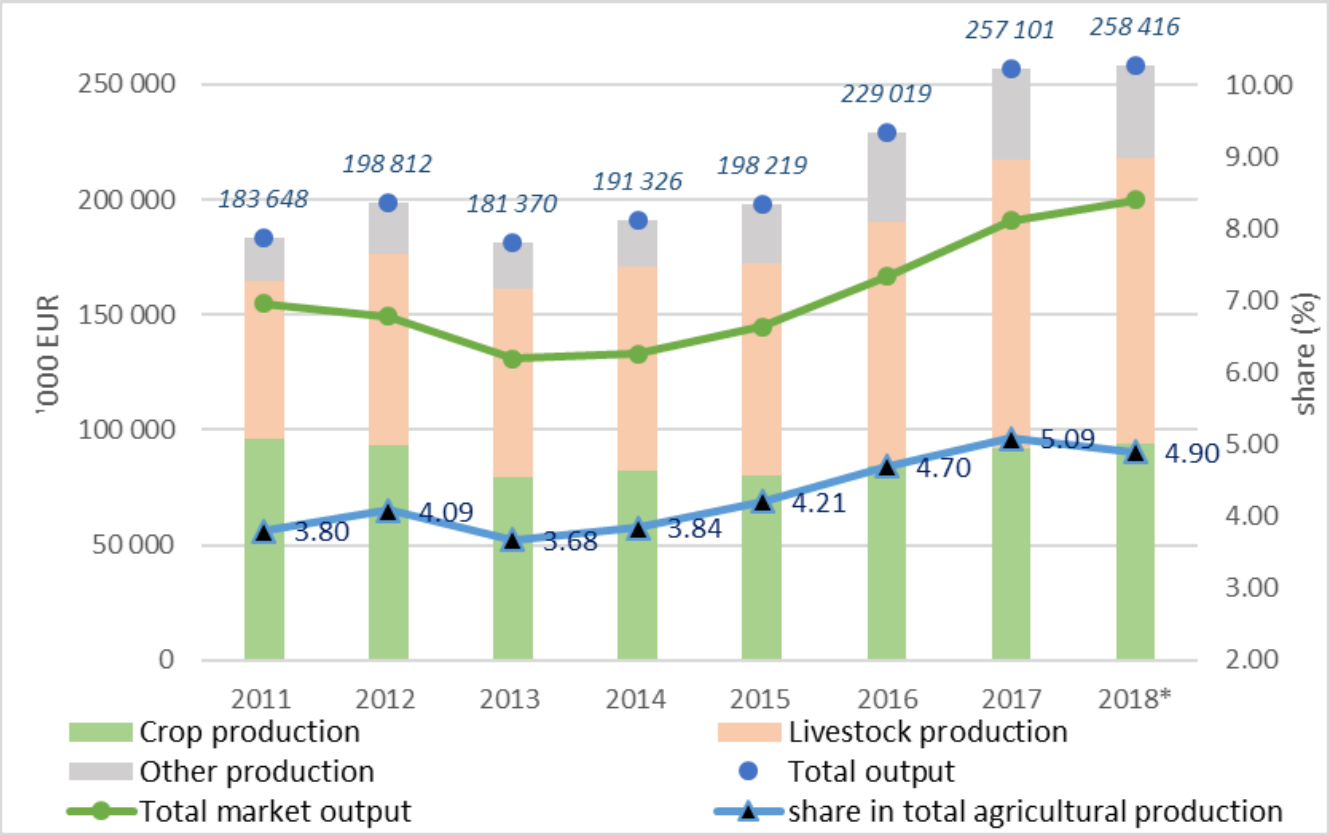
- **Structure of the organic farms** according to type of farming in **2017:**

  3207 (ES 4-14) farms, fully organic;
  266 in **FADN 2017** OF selection





Organic production and share in total agricultural production in 2011 – 2018



the total production of organic farms is growing up permanently from **183.5 mil.** EUR in 2011 (3.80 % of total) to **257 mil.** CZK in 2017 (5.09 %)

Ways of using organic farms production in 2016 (OF YEARBOOK 2017, IAEI Survey)

3280 farms with BIO certification

74% sell some or all of their organic produce on the conventional market

(52% of OF stated that produced exclusively on conventional production market)

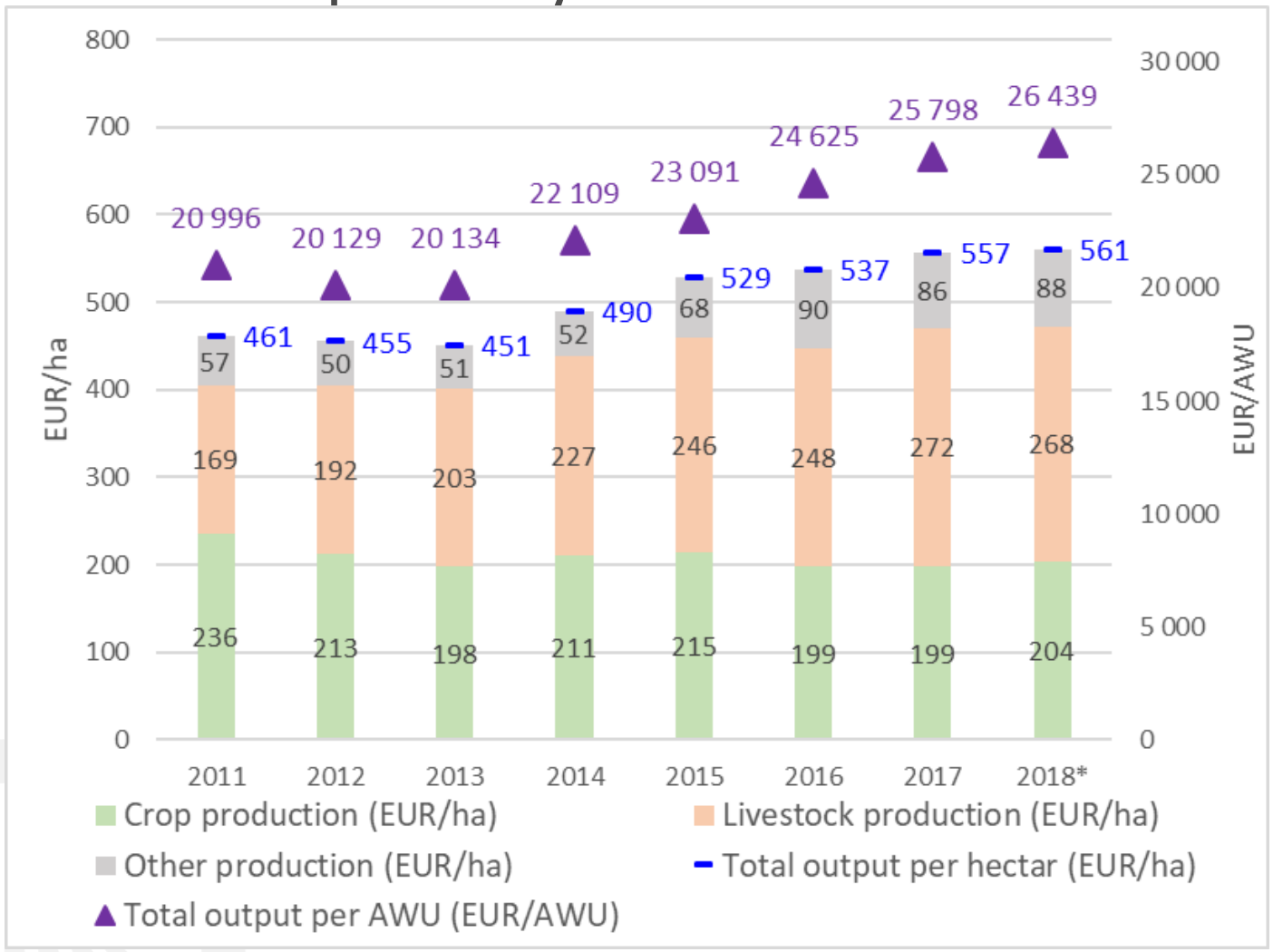
10% sold all their certified organic products; 3.6 % directly on the farm

16% did not sell and consumed all on the farm

Land and labour productivity

2011 – 2018*

*2018 estimates

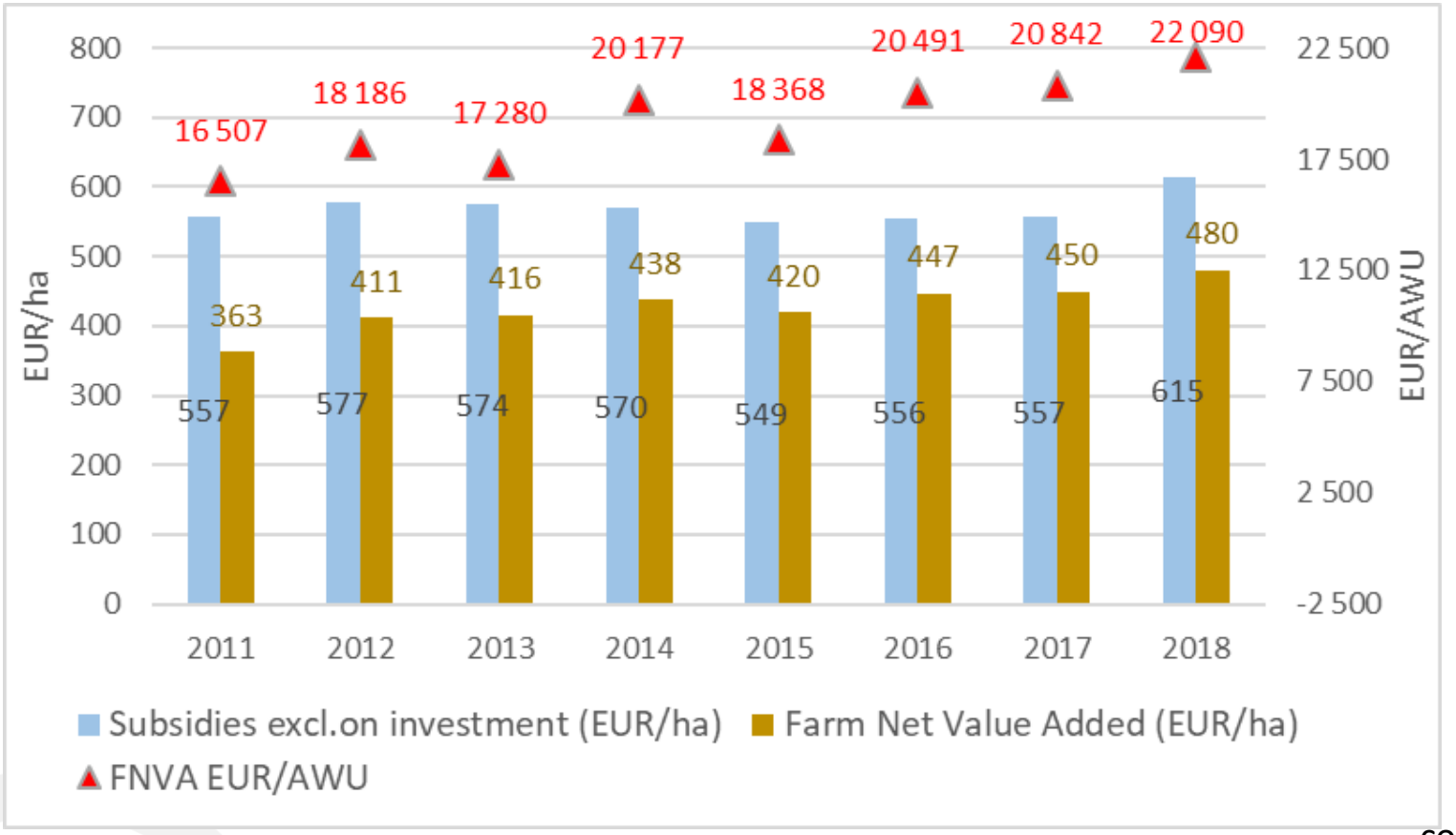


total output / ha
[OF|CF]
30 % in 2013
36 % in 2017

total output / AWU
[OF|CF]
38 % in 2013
44 % in 2017

Application of organic principles and LFA management → lower yields and productivity

Farm Net Value Added/ha, **Subsidies**/ha, **FNVA**/AWU **2011-2018**



Subsidies per ha excluding on investment with minimal changes in 2011 to 2017.
decreasing the share of subsidies in FNVA, from 1.38 to 1.24, i.e. by 10%
FNVA / AWU is growing rapidly, 16 507 (2011) → 20 842 (2017), by 30%

Subsidies compensate farm income and are decisive factor in the profitability of the Organic sector

Technical efficiency and its determinants for Czech livestock farms, 2011-16

translog stochastic production frontier (Coelli et al., 2005)

$$ln\ q_{it} = \ln f\left(t, x_{it}; \beta\ \right) = \alpha + \sum_{j=1}^{K} \beta_j\ \ln x_{ijt} + \frac{1}{2} \sum_{j=1}^{K} \sum_{k=1}^{K} \beta_{jk}\ \ln x_{ijt}\ \ln x_{ikt}$$

$$+\beta_t t + \frac{1}{2}\ \beta_{tt} t^2 + \sum_{j=1}^{K} \beta_{jt}\ \ln x_{ijt}\ t + v_{it} - u_{it}$$

q_{it} is the output of the i-th firm in the t-th year; x_{ijt} denotes a n-th input variable; t is time trend
representing technical change

The "True" Random Effects Model supposing that inefficiency varies over time and at individual farms level (heteroskedastic)

y – **total output**
x1 – **land** (*ha*)
x2 – **livestock units** (*LU*)
x3 – ***AWU***
x4 – **material**

technical efficiency factors:
*d**LFA*** – less favoured area
*d**Organic*** – organic technology
*d**405*** – subsidies on investment
*d**ES4*** – economic size
*d**TF*** – type of farming

Technical efficiency and its determinants for Czech livestock farms, 2011-16

FADN 2011–2016 panel of 440 farms (114 OF, 326 CF)

The Estimation of production function parameters – TRE model results

	All farms (440) 2601 obs.				Organic (114) 670 obs.				Conventional(326)1928 obs.			
y	Coef.	Std. Err.	z	P>|z|	Coef.	Std. Err.	z	P>|z|	Coef.	Std. Err.	z	P>|z|
land	-0.029	0.030	-0.96	0.337	-0.117	0.078	-1.5	0.133	-0.042	0.027	-1.51	0.130
LU	**0.194**	0.026	7.47	**0.000**	**0.475**	0.081	5.89	**0.000**	**0.142**	0.025	5.61	**0.000**
AWU	**0.130**	0.025	5.12	**0.000**	0.101	0.073	1.38	0.169	**0.142**	0.023	6.16	**0.000**
Material	**0.744**	0.029	25.87	**0.000**	**0.482**	0.090	5.35	**0.000**	**0.760**	0.030	25.09	**0.000**
t	**0.070**	0.007	9.68	**0.000**	0.070	0.022	3.18	0.001	**0.072**	0.007	9.84	**0.000**
dOrganic	**0.866**	0.178	4.87	**0.000**								
dES4	-0.711	0.074	-9.56	**0.000**	-0.053	0.190	-0.3	0.779	**-1.114**	0.099	-11.2	**0.000**
dTFMix	-0.451	0.311	-1.45	0.147					-0.197	0.348	-0.57	0.570
dTFMilk	-0.337	0.322	-1.05	0.295					-0.344	0.360	-0.96	0.339
dTFCattle	**1.066**	0.268	3.97	**0.000**	**1.793**	0.388	4.62	**0.000**	1.100	0.391	2.81	0.005
d405	-0.310	0.166	-1.87	0.062	0.262	0.328	0.8	0.424	**-0.676**	0.253	-2.68	**0.007**
cons	-2.744	0.357	-7.68	**0.000**	-4.809	0.917	-5.2	0.000	**-1.938**	0.433	-4.48	0.000

Technical efficiency and its determinants for Czech livestock farms, 2011-16

Descriptive statistics: output-input and efficiency determinates variables, groups of conventional farms (CF) and organic farms (OF), total of farms and groups in the 1st and the 4th quartiles

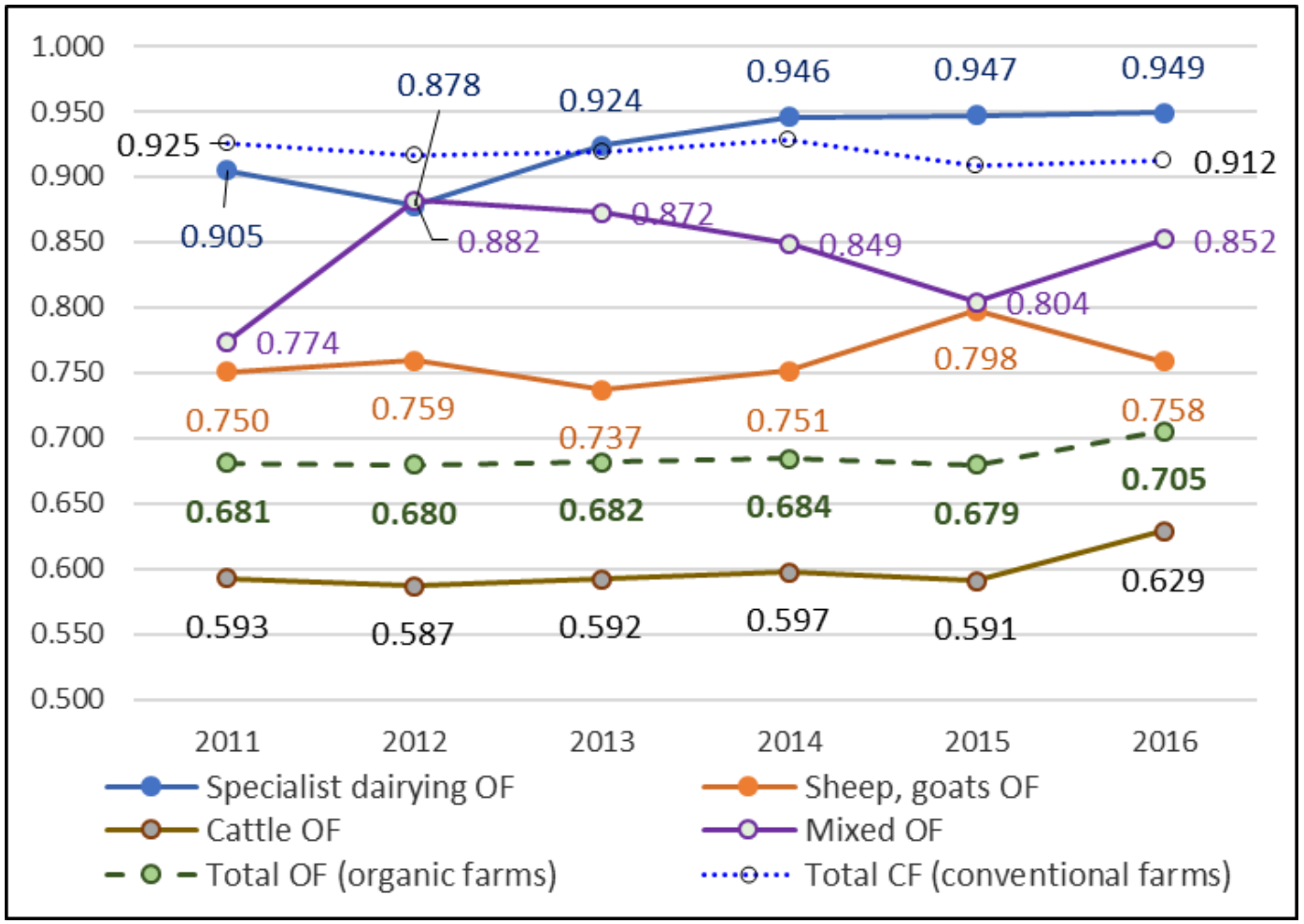
	total	CF	OF	CF		OF	
obs.	2601	1929	672	1 quartile	4 quartile	1 quartile	4 quartile
technical efficiency (TE), TRE average	0.858	0.918	0.685	0.642	0.981	0.418	0.962
Std.Dev	0.175	0.108	0.211	0.126	0.005	0.074	0.029
year-on-year TE change index (te_LAG)	1.008	0.999	1.033	0.930	1.006	0.924	1.048
technical efficiency (treX6), OF and CF separately, average	0.884	0.903	0.828	0.590	0.977	0.633	0.967
Total Utilised Agricultural Area (ha)	758	938	239	185	780	286	116
Total livestock units (LU)	399	500	110	91	393	122	62
Total labour input (AWU)	23.7	30.4	4.6	5.2	27.2	5.5	2.2
LFA (1,2,3)	2.00	1.86	2.40	2.33	1.57	2.54	2.25
LU / 100 ha	59.4	62.4	50.9	65.4	59.9	44.4	55.9
AWU / 100 ha	3.54	3.78	2.85	4.34	3.86	2.68	3.69
d405 (1/0 Investment subsidies yes/no)	0.169	0.184	0.128	0.041	0.172	0.085	0.111
Total subsidies excluding on investment / Total output (share)	0.609	0.335	1.396	0.813	0.214	2.219	0.596
Subsidies excl.on investment / Total inputs excl. Wages (share)	0.473	0.331	0.883	0.551	0.278	0.958	0.635
Total inputs excl. Wages / Total output (share)	1.113	0.966	1.535	1.485	0.786	2.364	0.919
SAPS / Total subsidies excl.investment (share)	0.516	0.566	0.375	0.511	0.614	0.361	0.407
AEO / Total subsidies excl.investment (share)	0.150	0.083	0.343	0.167	0.058	0.359	0.323
LFA / Total subsidies excl.investment (share)	0.110	0.088	0.173	0.193	0.053	0.190	0.142

Technical efficiency for Czech livestock farms, 2011-16

FADN 2011–2016 panel of 440 farms (114 OF, 326 CF)

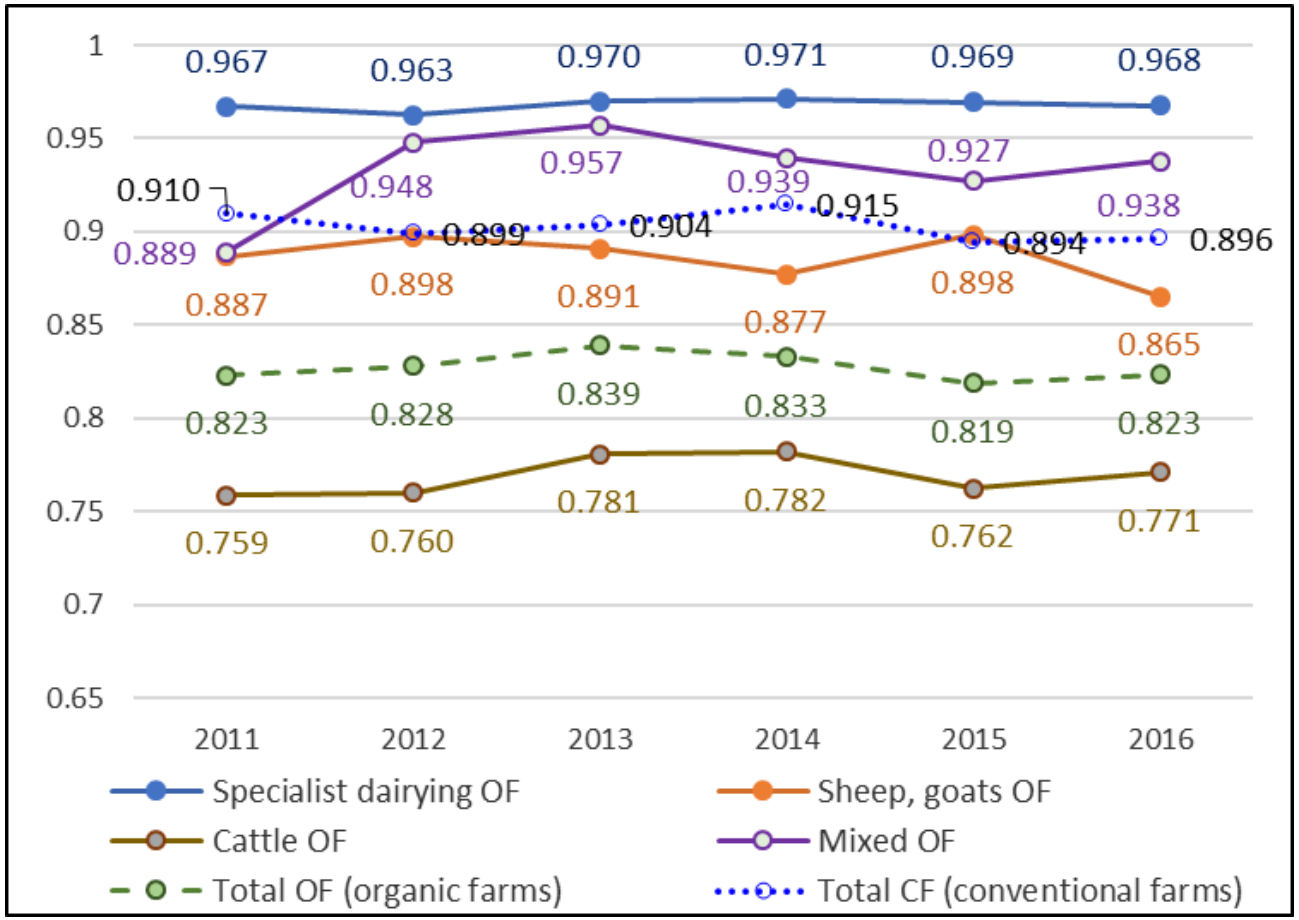
Organic farms, although with lower TE, show **consistent performance** over the reporting period and a significant improvement in 2016

TE development by TF groups with livestock production



Technical efficiency for Czech livestock farms, 2011-16

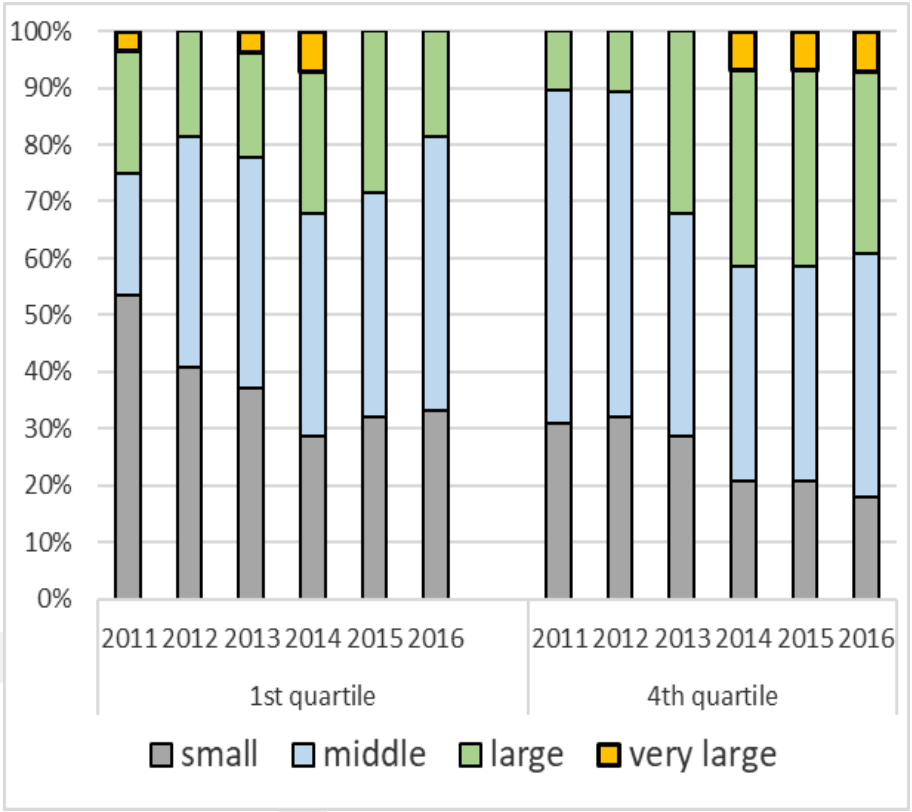
Development of TE according to TF with livestock production, model SFA separately for OF and CF

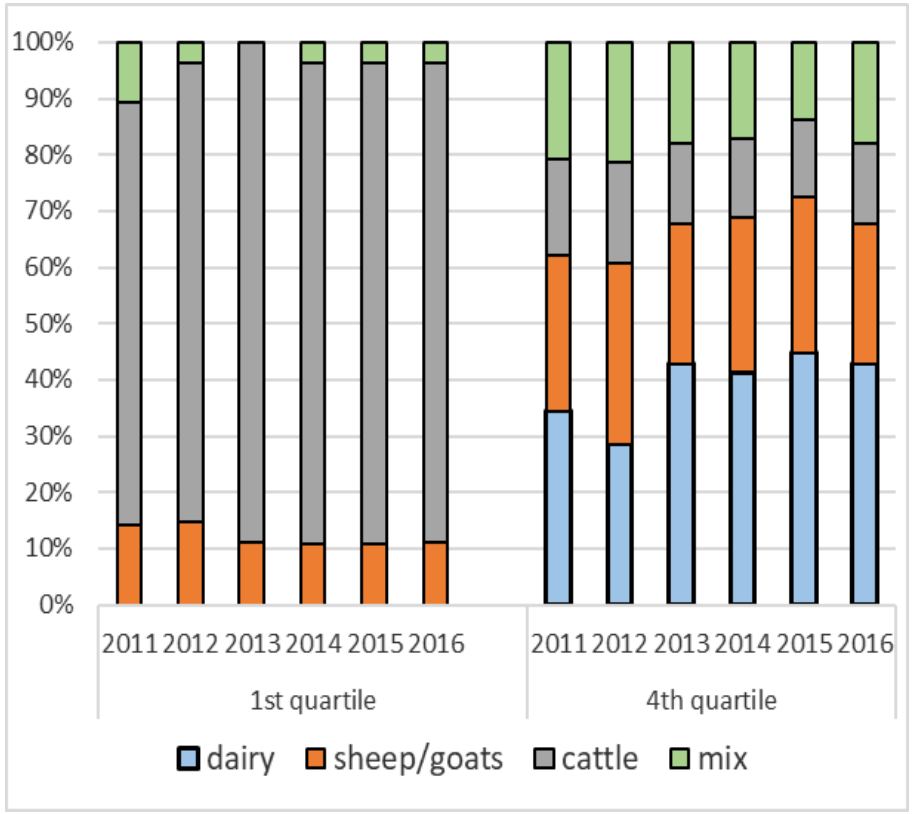


Technical efficiency and its determinants for Czech livestock farms, 2011-16

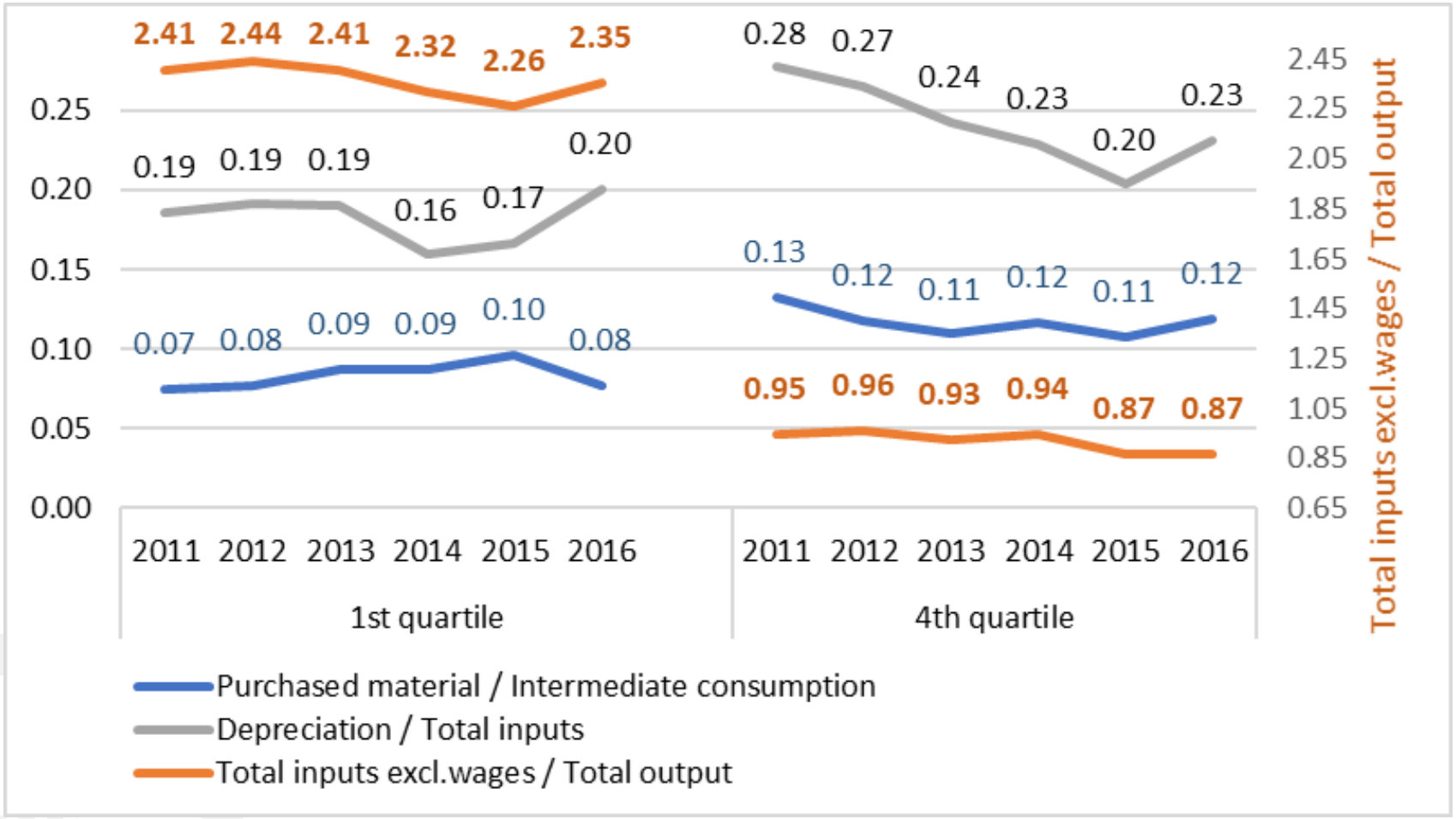
FADN 2011–2016 panel of 440 farms (114 OF, 326 CF)

Quantitative representation of organic farms in the 1st and 4th quartile of technical efficiency according to the **economic size groups** and the **types of farming groups**

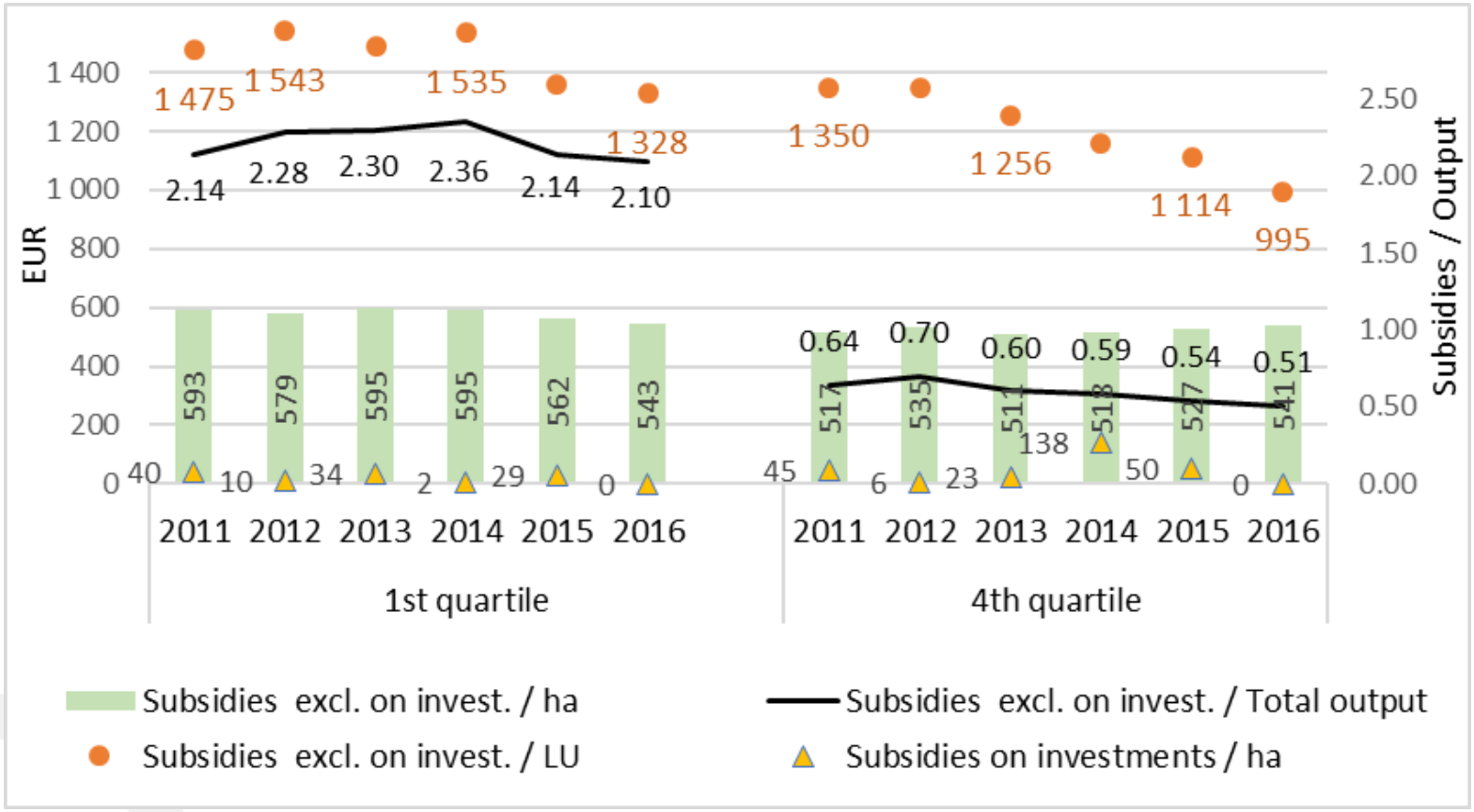




Percentage of production costs - 1 and 4 quartiles by TE of organic farms



Organic farming subsidies - 1 and 4 quartiles by TE



Technical efficiency and its determinants for Czech livestock farms, 2011-16

Results: The farming methods and type of farming influences the TE significantly.

The economic size of farms does not have a significant influence on the economic results in OF. That is the opposite to conventional agriculture.

- **subsidies supporting investment** and **innovation** activity positively influence overall competitiveness by increasing TE
- **differences** in the TE of OF and CF are related both to the different farming methods and to the production conditions
- granted *LFA* and *AES* **subsidies compensate** these differences, and for TE, they are decisive but with negative impact on TE
- type of farming and economic size of farms **influence** the farms' profitability, economic performance and comparability with conventional farms
- FNVA/AWU indicator of profitability **confirmed** that subsidies are an important part which **compensate** farming methods and to the production conditions for organic
- farms with growing TE show a **decline in the proportion of operating subsidies to production**, irrespective of their classification in quartiles by the TE estimate

Summary

- **The representative sample of OF** in FADN CR database

  The data from this FADN survey has been **used** for

  - Organic production estimate (**EGSS**)
  - Share of total output of Agriculture calculation, compared to **CSO EAA**
  - **Czech Action plan for development of organic farming**, 2016–2020 evaluation
  - other research projects – IAEI, MoA, OECD FLA

- **Czech OF characteristics**

  - Cattle, sheep, goats and other grazing livestock are **prevailing type of organic farming**
  - **Positive** long-term trend in **productivity**
  - **Importance of specialization** in term of value added products
  - **Insufficient use** and placement of organic production on the market

- **Czech Action Plan** for development of organic farming 2016–2020

  - **Increase the share** of production income in total OF's **income compared to subsidies**
  - **Increase** the **value of organic farm production by 15%** (according to FADN method)
  - Achieve a **15% organic share of total agricultural land** in CZ
  - Achieve a **3% share of organic foods in total** food and drink **consumption**

Thank you for your attention

References:

- YEARBOOK 2017 Organic Farming in the Czech Republic (MoA, 2018), ISBN 978-80-7434-470-1
- FADN 2013..2017 Publication, Hanibal et al., FADN CR, ISBN 978-80-7271-236-6 (2014..2018)
- Czech Action plan for development of organic farming 2016–2020 (MoA, 2016), ISBN 978-80-7434-193-9
- Technical efficiency and its determinants for Czech livestock farms Vladimír Kostlivý, Zuzana Fuksová, Agric. Econ. – Czech, 65 (2019): 175-184, https://doi.org/10.17221/162/2018-AGRICECON