



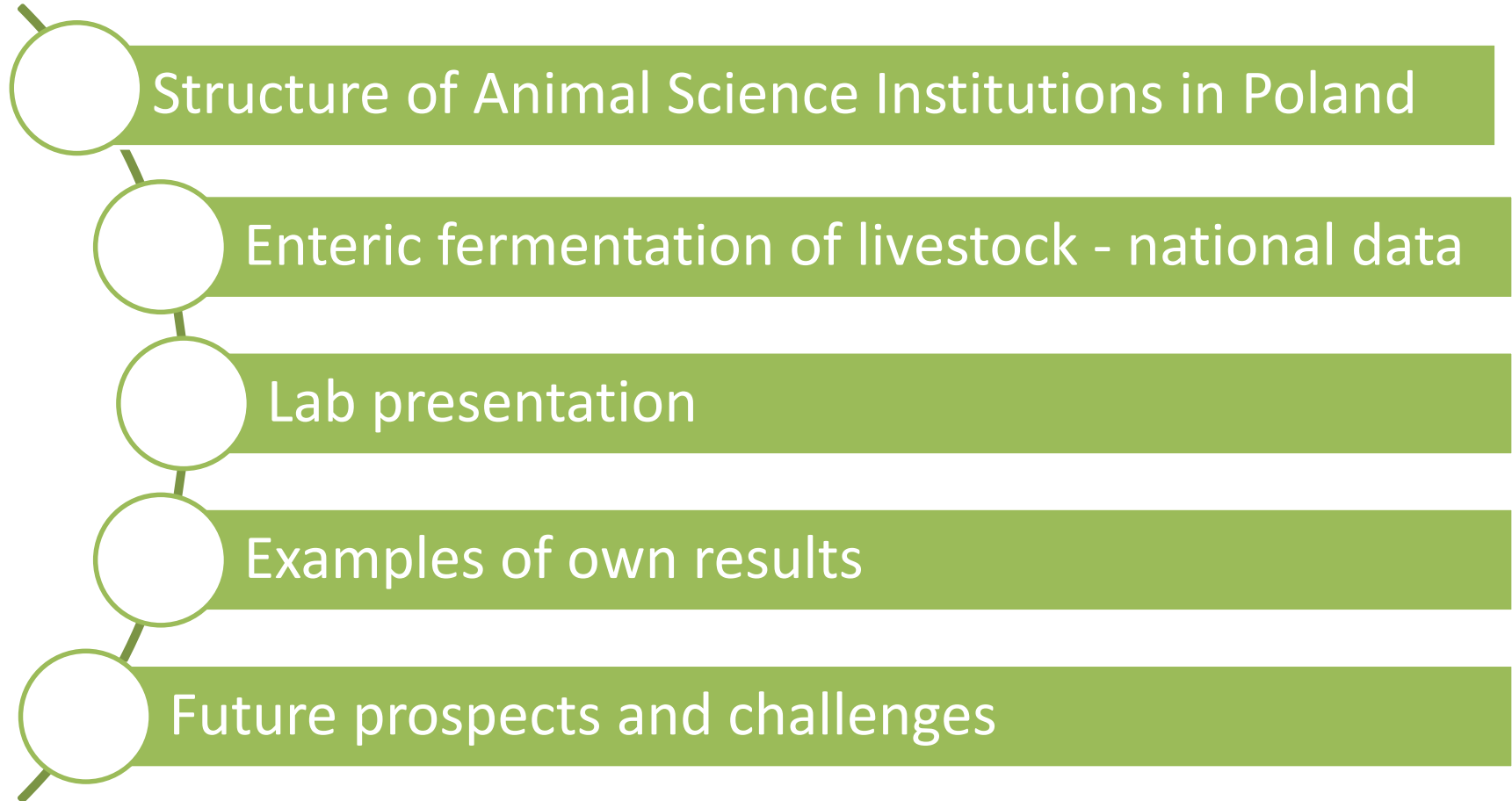
# EFFECT OF NUTRITION ON ENTERIC METHANE - POLAND

**MALGORZATA SZUMACHER-STRABEL, ADAM CIESLAK**

**DEPARTMENT OF ANIMAL NUTRITION AND FEED MANAGEMENT  
POZNAN UNIVERSITY OF LIFE SCIENCES, POLAND**



# SCHEDULE OF PRESENTATION





# STRUCTURE OF POLAND



Population ca.  
38.5 mio of people

Area 312 679 km<sup>2</sup>



# STRUCTURE OF ANIMAL SCIENCE INSTITUTIONS IN POLAND



University of  
Agriculture - 8

Polish Academy of  
Sciences - 3

National Research  
Institute - 2



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# ENTERIC FERMENTATION OF LIVESTOCK

Prediction of national GHG emission – enteric –  
cows – Poland – KOBIZE (2012; published 2014)

	Unit	Value
<b>COWS</b>	thousands of units	2 578
Enteric emission CH <sub>4</sub>	kg/unit/year	99.64
Total enteric emission CH <sub>4</sub>	Mg/year	256 871
Total enteric emission in CO <sub>2</sub> eq	mln Mg/year	5 394



# DEPARTMENT OF ANIMAL NUTRITION AND FEED MANAGEMENT

## POZNAN UNIVERSITY OF LIFE SCIENCES





# EXPERIMENTAL FACILITIES



In vitro



In vivo



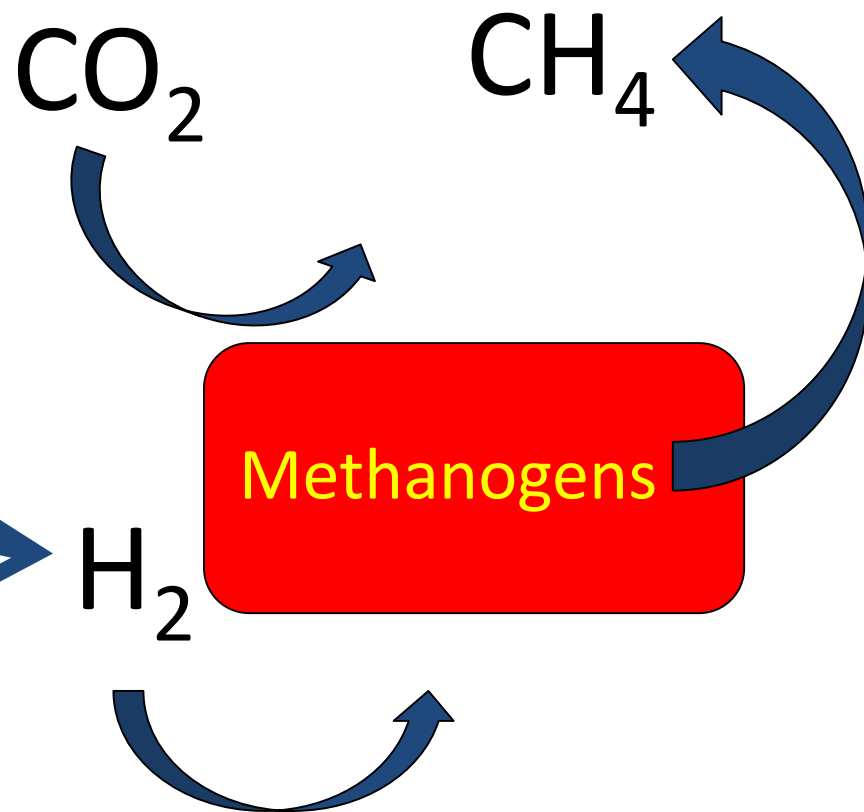
# RESEARCH AREAS





# MAIN IDEA

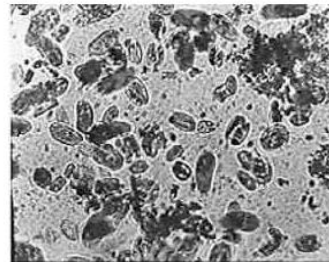
Microorganisms  
involved in rumen  
digestion  
(bacteria, protozoa)



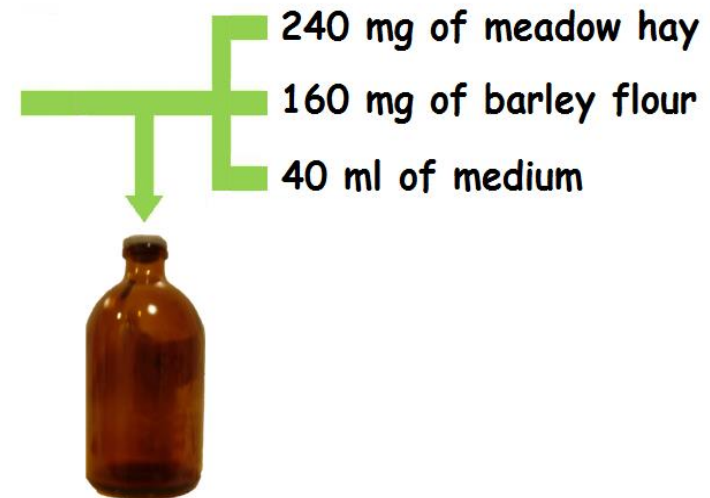


# LAB PRESENTATION

- *Batch culture system*

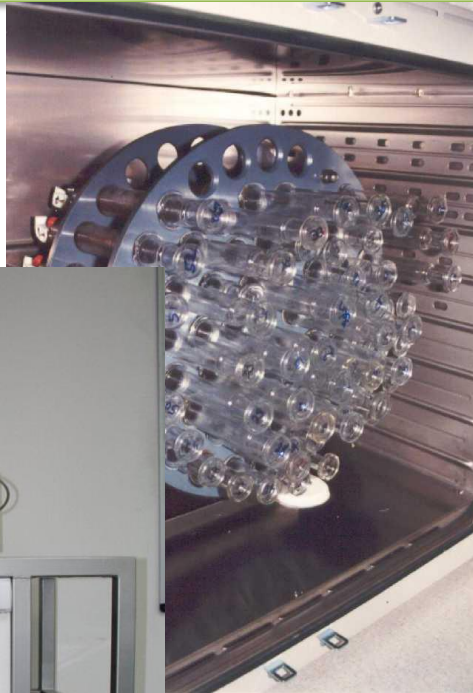


Rumen fluid





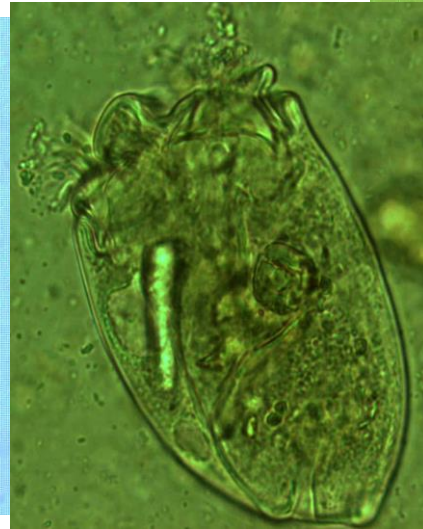
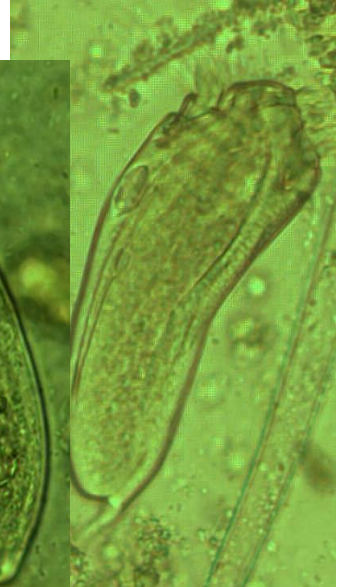
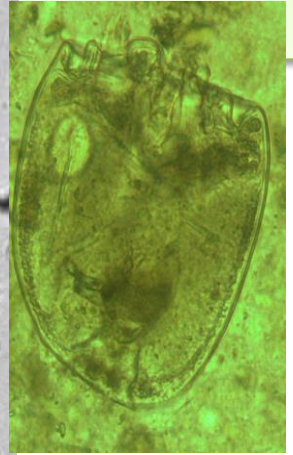
# LAB PRESENTATION



RuminOmics Regional workshop, Improving efficiency of production and reducing environmental impact, 1<sup>st</sup> of September, 2015, Warsaw, Poland



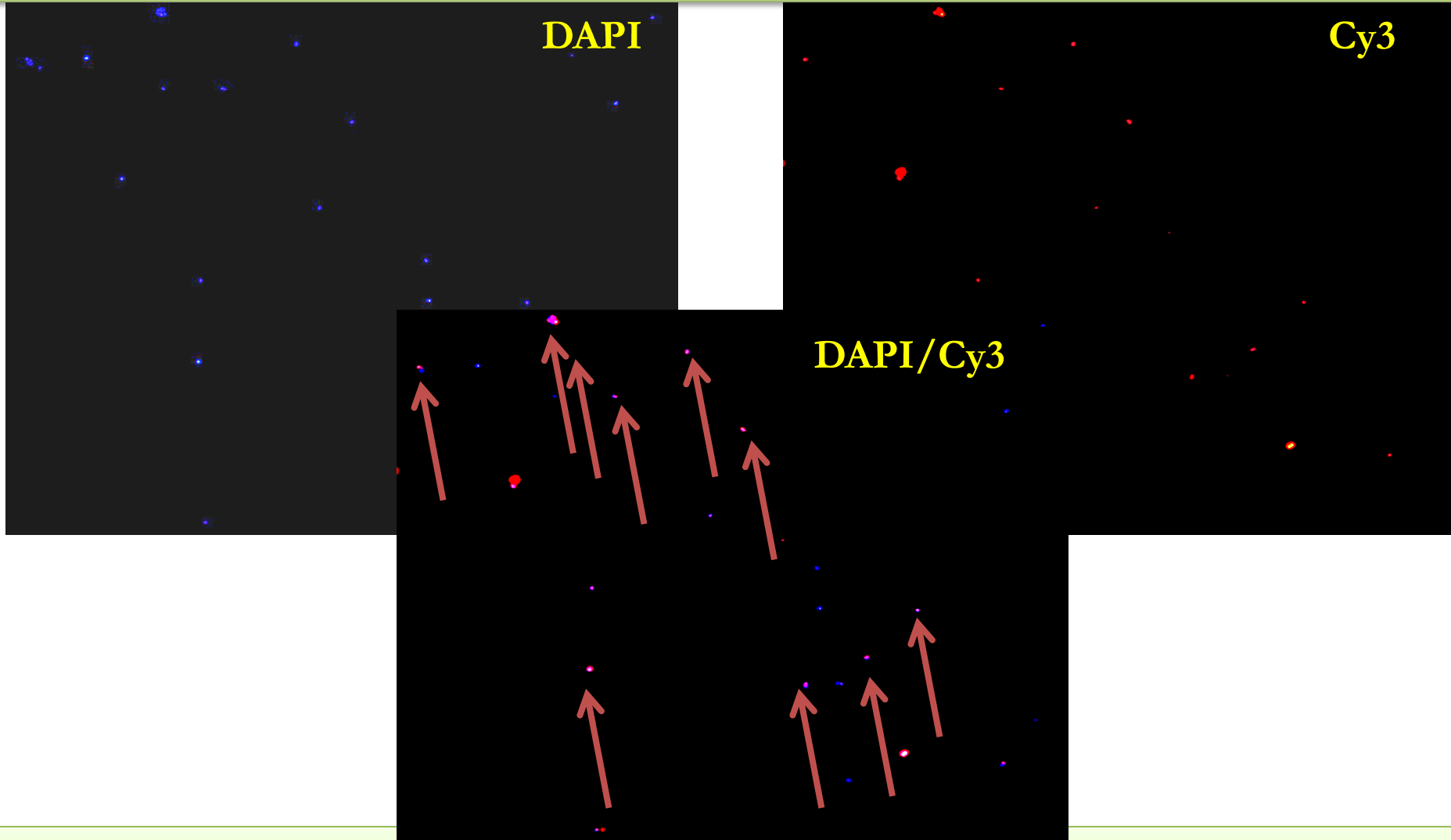
# LAB PRESENTATION



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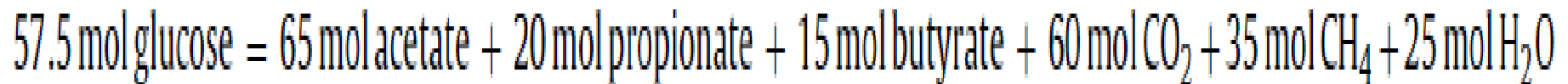


# METHANOGENS - FLUORESCENCE IN SITU HYBRIDIZATION (FISH)





# IN VIVO EXPERIMENTS







# IN VIVO EXPERIMENTS



RuminOmics Regional workshop, Improving efficiency of production and reducing environmental impact,  
1<sup>st</sup> of September, 2015, Warsaw, Poland



# FARM EXPERIMENTS



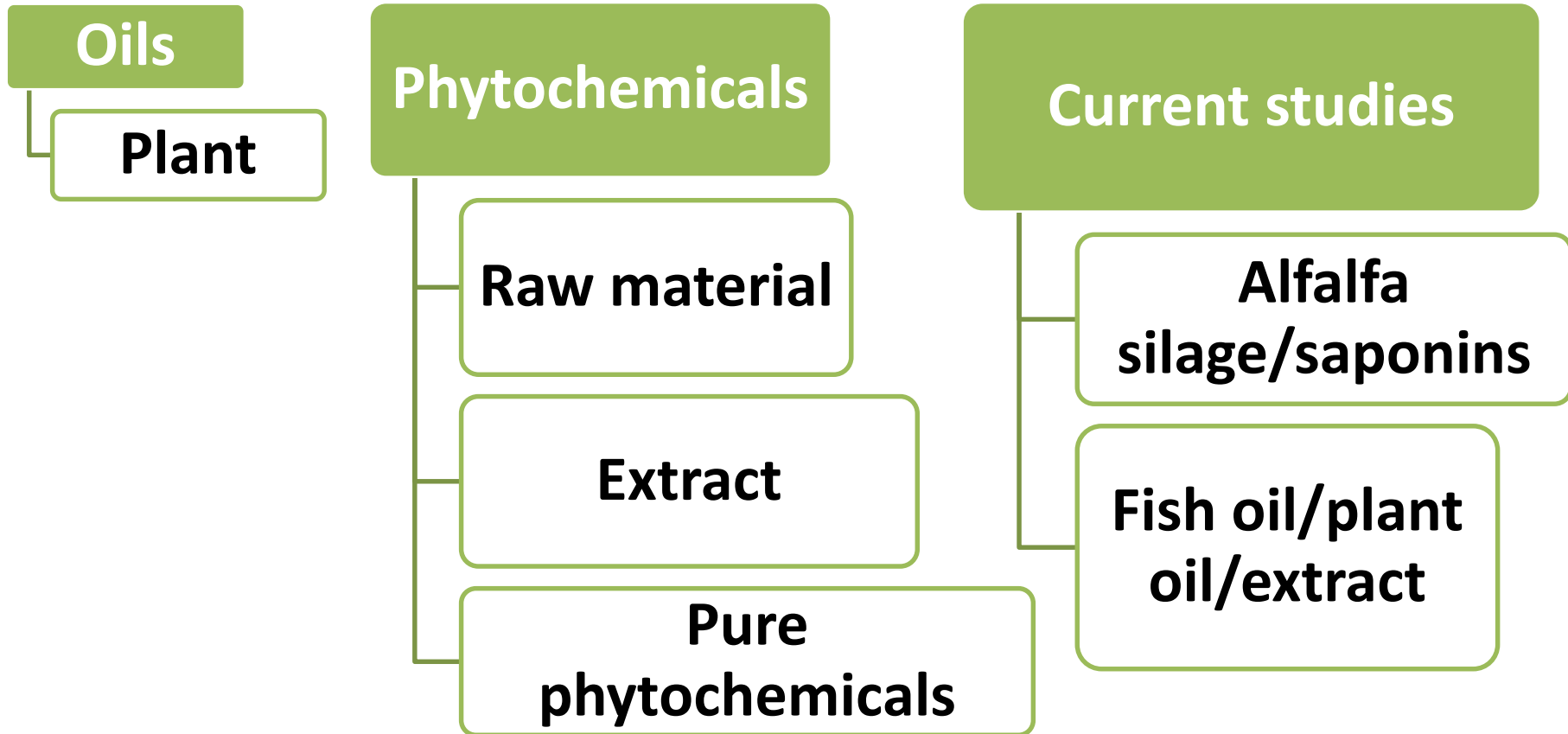
RuminOmics Regional workshop, Improving efficiency of production and reducing environmental impact,  
1<sup>st</sup> of September, 2015, Warsaw, Poland



# OUR STUDIES



Poznań University of Life Sciences





# OWN RESULTS

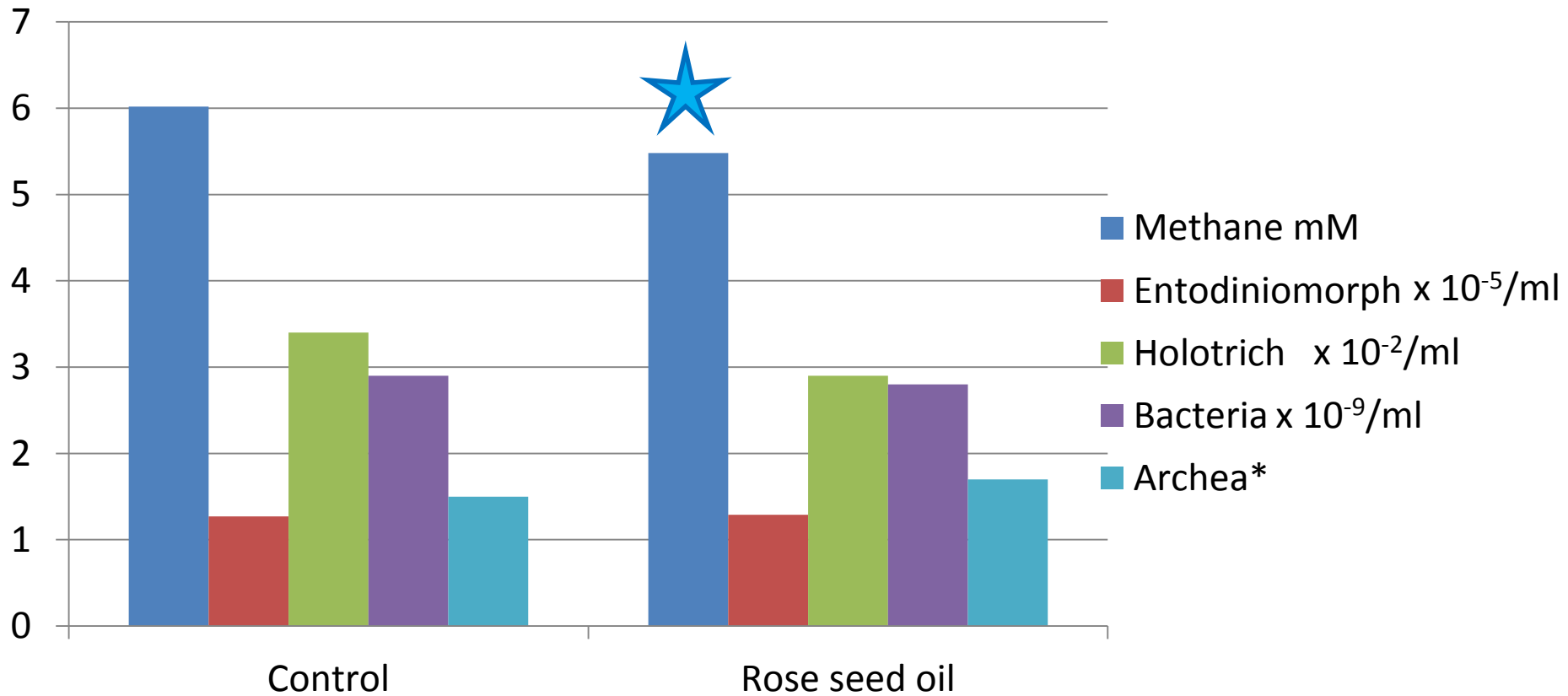


## WILD DOG ROSE OIL

## GRAPE/BLACK CURRANT OILS



# OWN RESULTS – WILD DOG ROSE

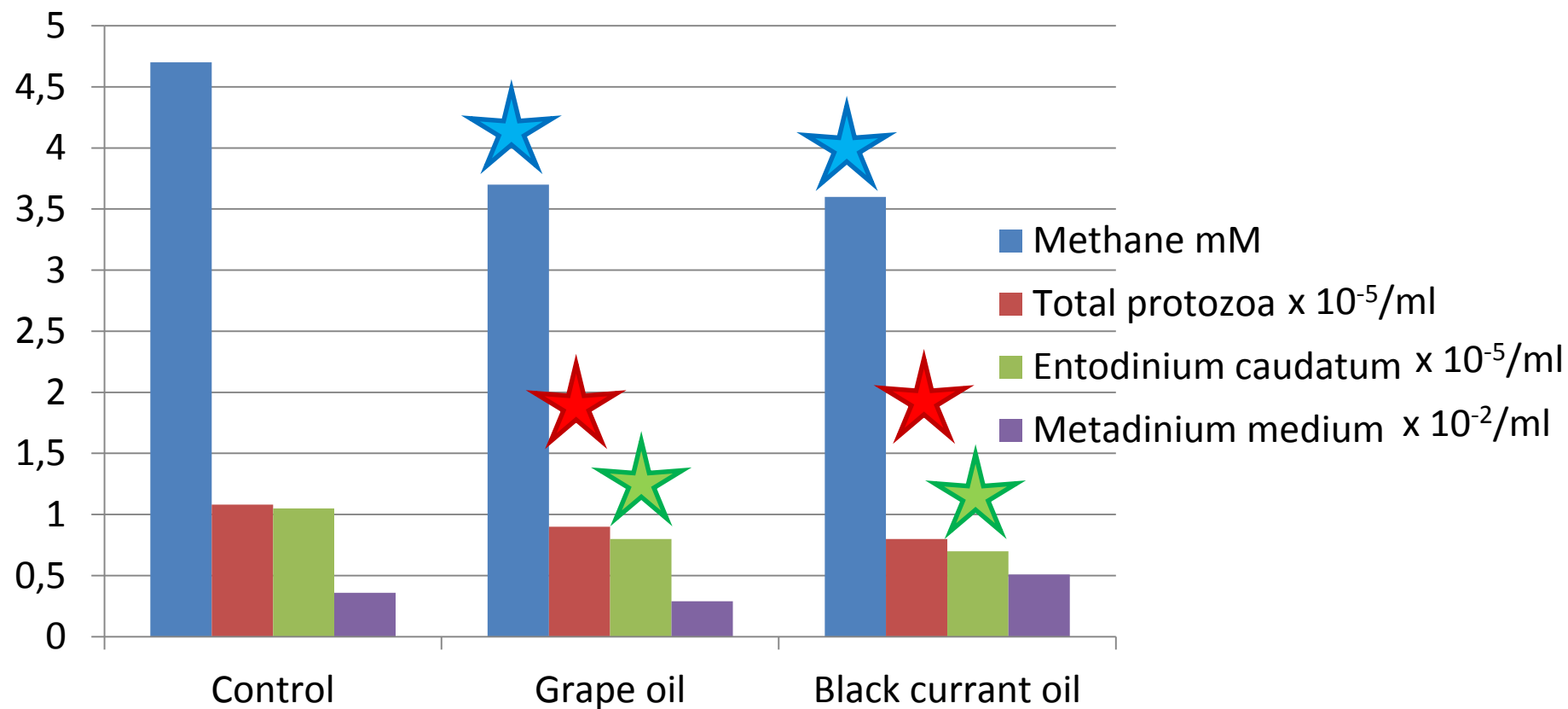


\*The ratio of Archea in the population of microorganisms dyed with DAPI.

Szumacher-Strabel et al., 2011, *Journal of Animal and Feed Sciences*, 20: 285-299



# OWN RESULTS – GRAPE/BLACK CURRANT OILS



Cieślak et al., 2013, *Journal of Animal and Feed Sciences*, 22 (1): 26-34



# OWN RESULTS

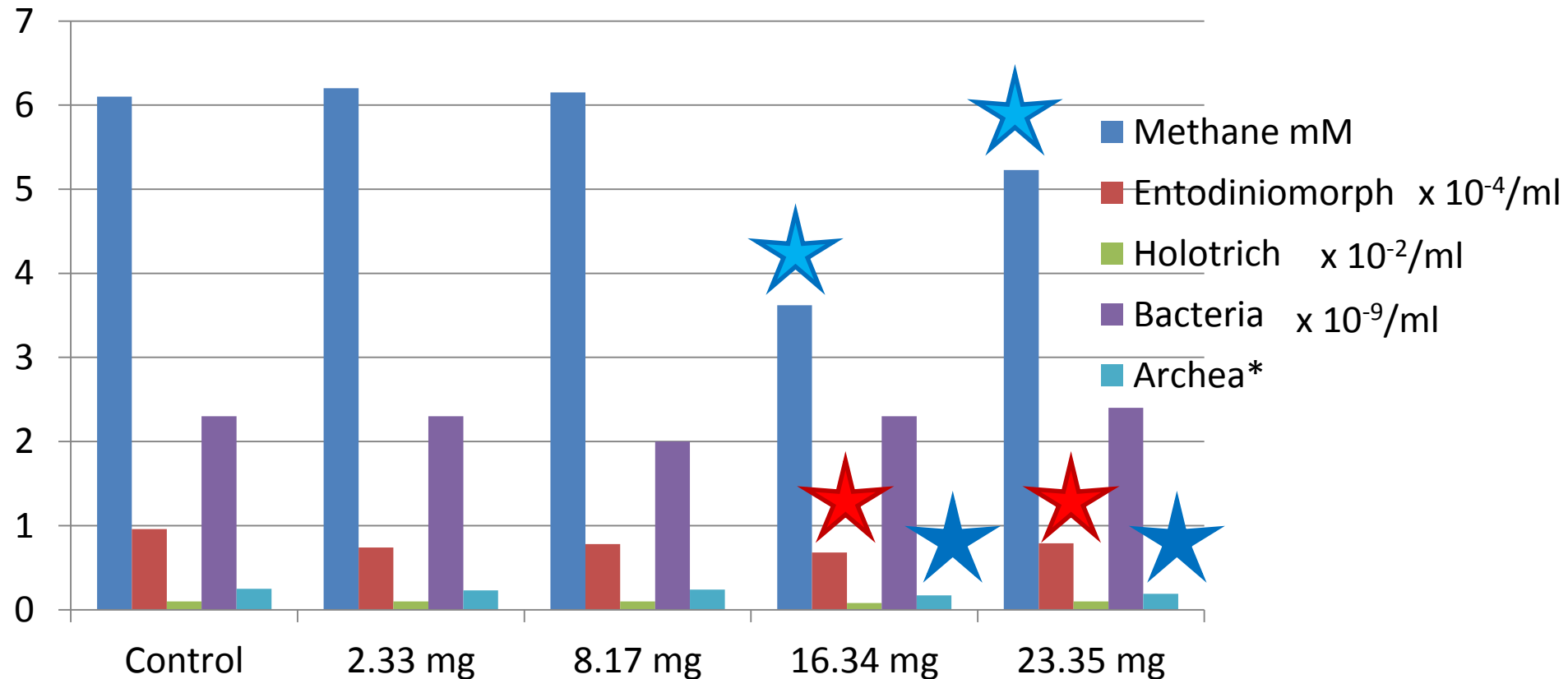


***MENTHA PIPERITA* DRY LEAVES**

**XANTHOHUMOL  
FROM HOPS (*HUMULUS LUPULUS*)**



# OWN RESULTS – MENTHA PIPERITA LEAVES



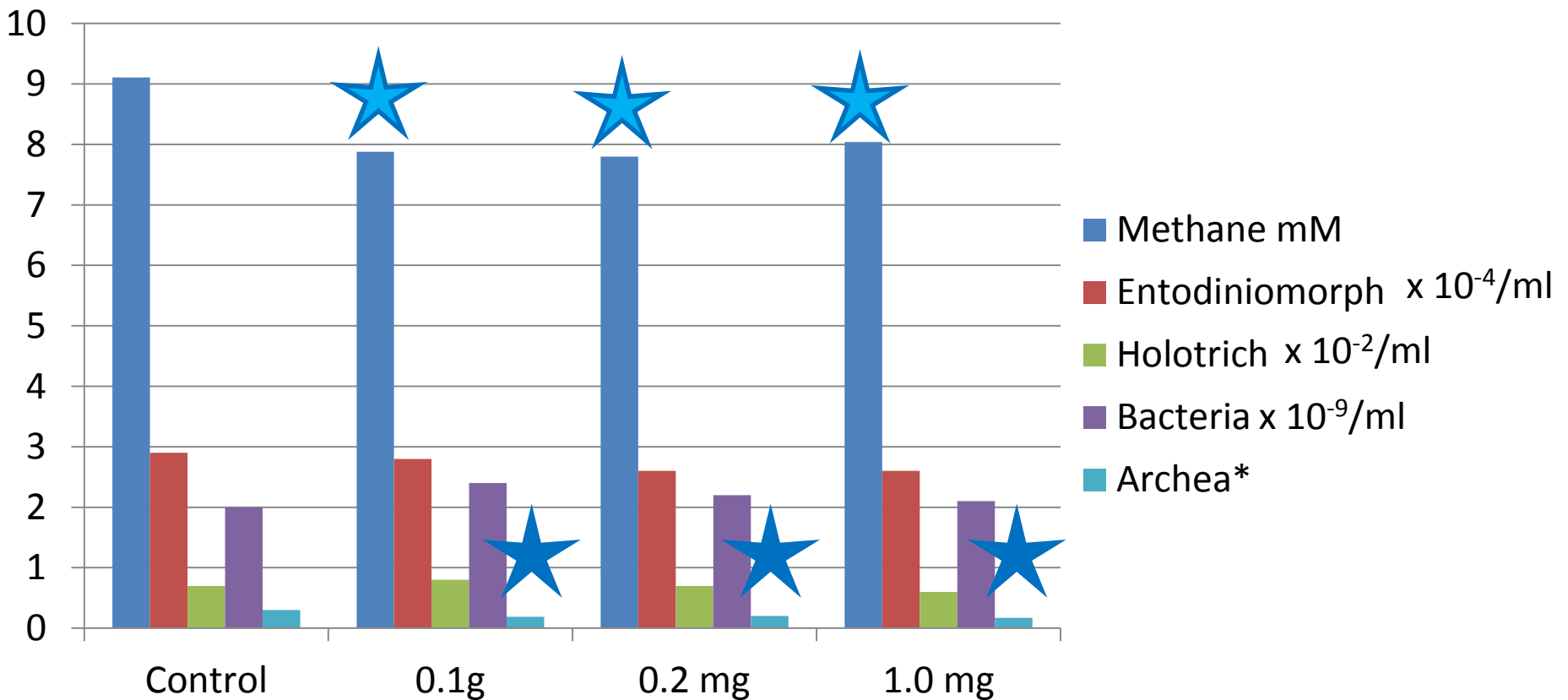
\*The ratio of Archea in the population of microorganisms dyed with DAPI.

Zmora et al., 2012, *Acta Agriculturae Scandinavica, Section A – Animal Science*, 62: 46-52





# OWN RESULTS – XANTHOTHUMOL



\*The ratio of Archea in the population of microorganisms stained with DAPI.

Zmora et al., 2012, *Archives of Animal Nutrition*, 66: 66-71



# OWN RESULTS



***SAPONARIA OFFICINALIS:***

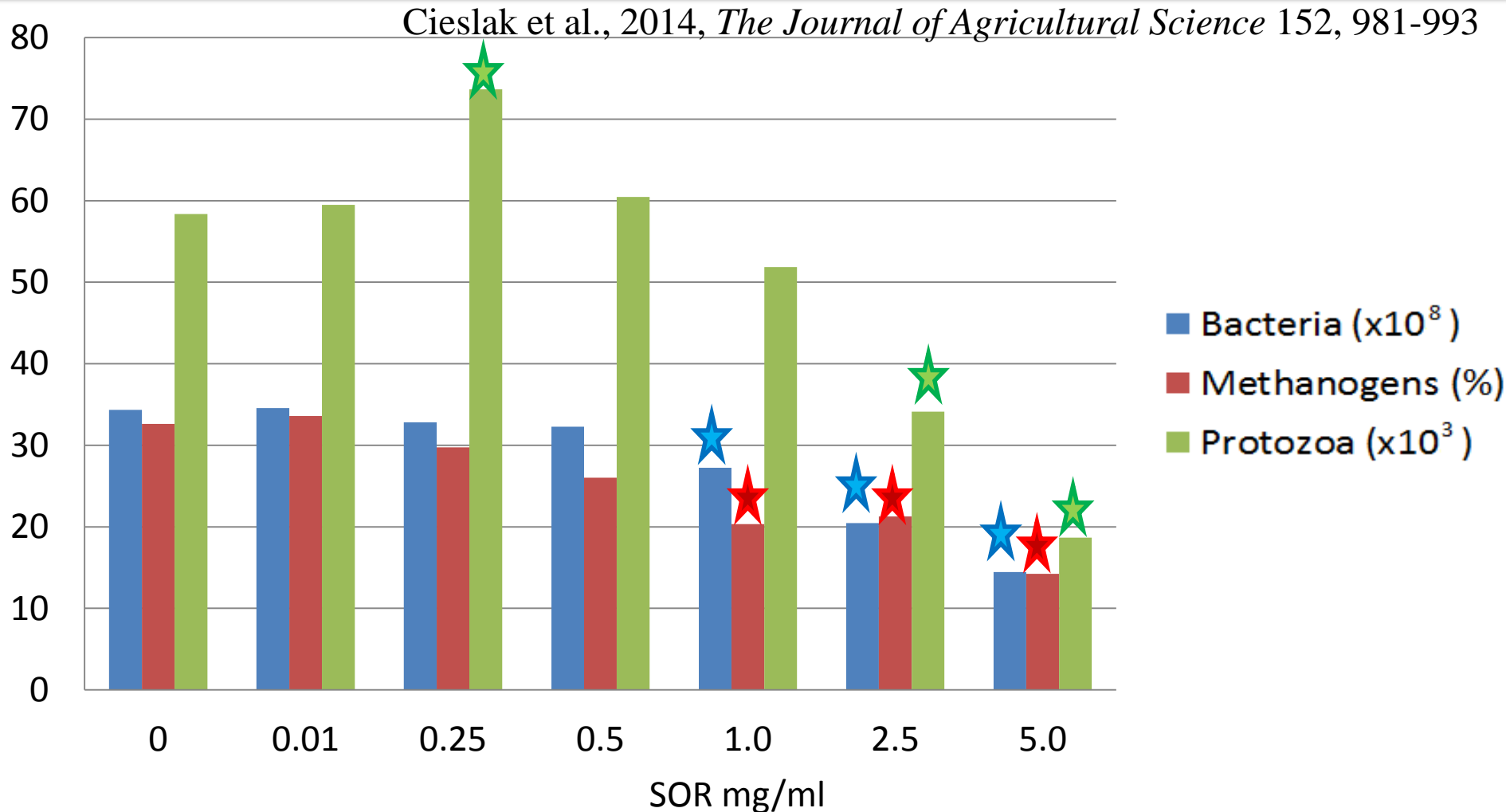
***POWDERED ROOT (SOR)***

***EXTRACT OF THE S. OFFICINALIS ROOT (SOE)***

***SEPARATED FRACTIONS (POLYSACCHARIDES,  
SAPONINS AND PHENOLICS)***

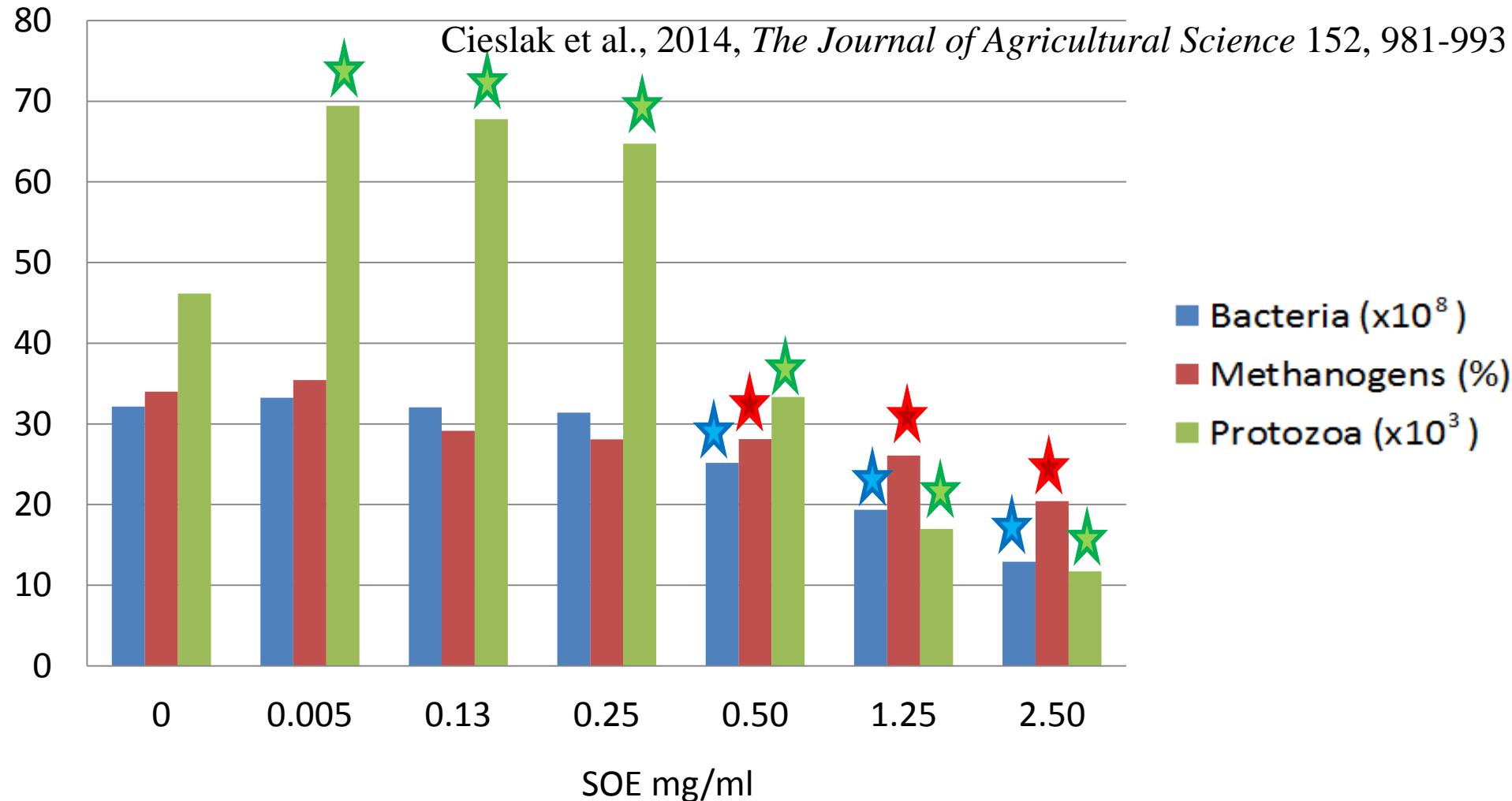
# RESULTS – EXPERIMENT 1

## SOR supplementation



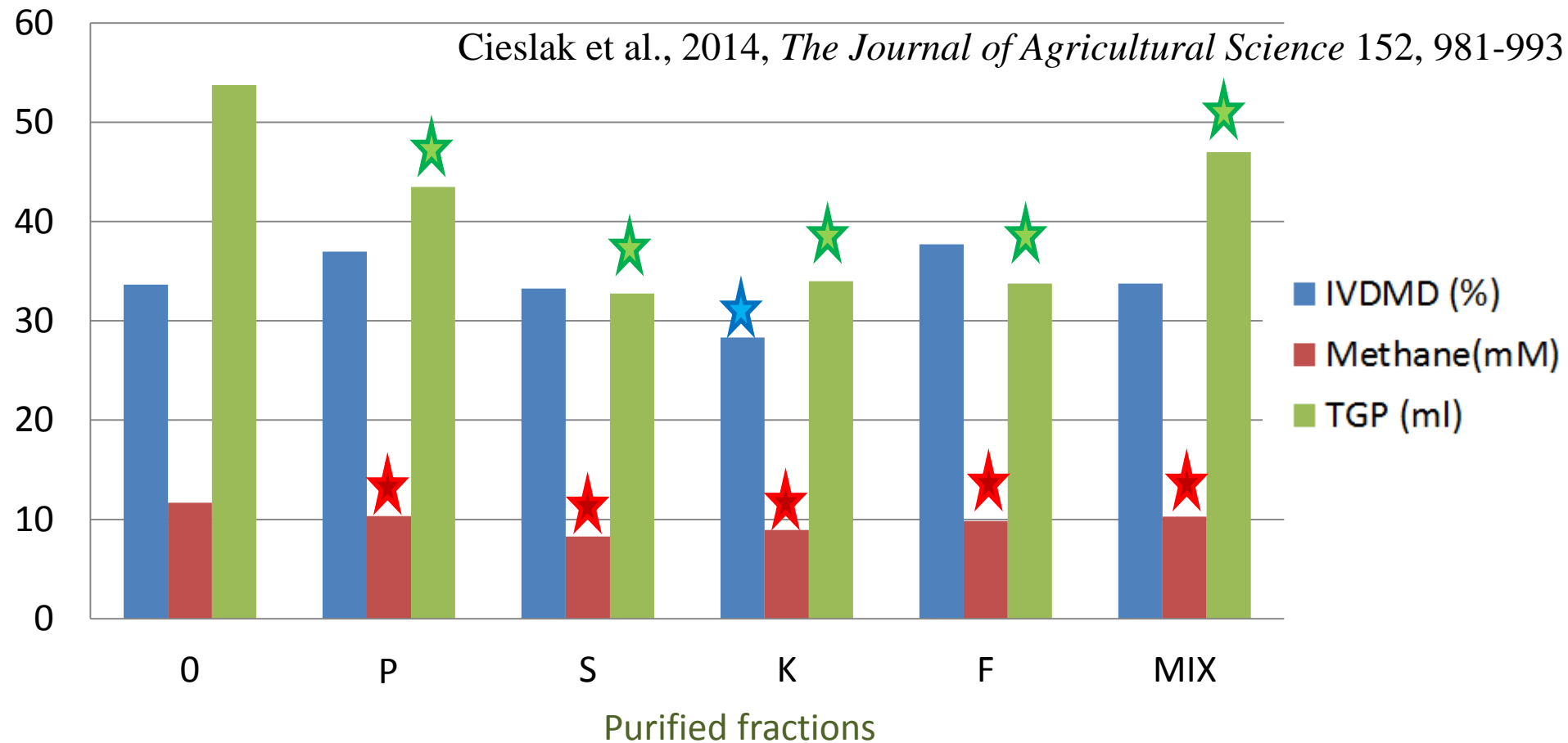
# RESULTS – EXPERIMENT 2

## SOE supplementation



# RESULTS – EXPERIMENT 3

Cieslak et al., 2014, *The Journal of Agricultural Science* 152, 981-993



**P** – polysaccharides; **S** – saponins; **K**- catechins; **F**- phenolics



# OWN RESULTS

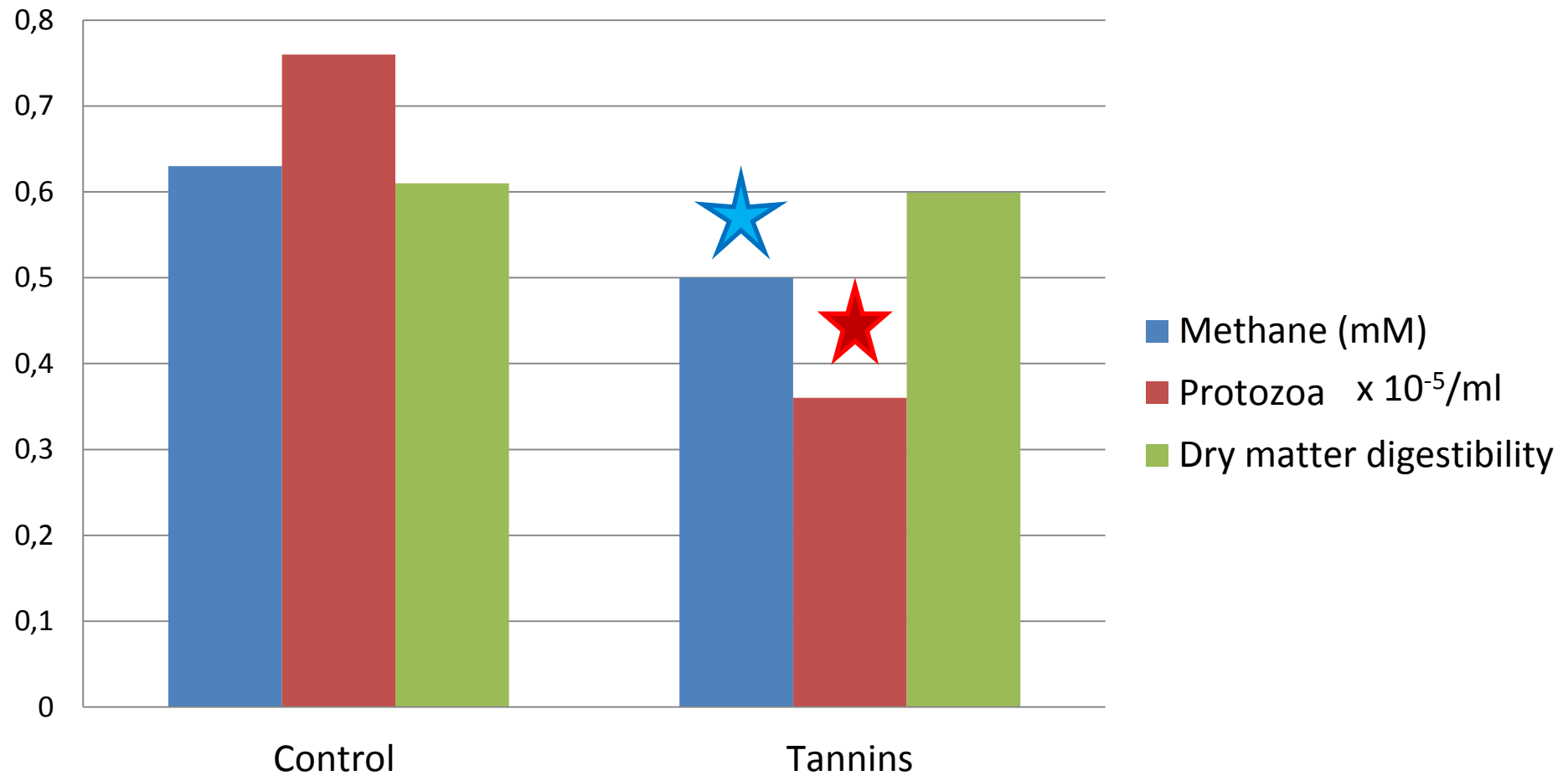


***IN VIVO***

***VACCINIUM VITIS IDAEA  
(LINGONBERRY)***



# OWN RESULTS - *VACCINIUM VITIS IDAEA*



Cieslak et al., 2012, *Animal Feed Sciences and Technology*, 176: 102-106



# CURRENT IN VIVO EXPERIMENTS



National Science Center, POLAND

**Alfalfa saponins - from  
microorganisms to environmental  
protection (2014-2017)**

**Małgorzata Szumacher-Strabel, Adam Cieślak  
Dep. Anim. Nutr. and Feed Management, PULS**





# CURRENT IN VIVO EXPERIMENTS



National Science Center, POLAND

Secondary metabolites from  
lingonberry and oils as a natural  
modulators of ruminal  
biohydrogenation **(2014-2016)**

Joanna Szczechowiak, Adam Cieślak Dep.  
**Anim. Nutr. and Feed Management, PULS**



# FUTURE PROSPECTS AND CHALLENGES

- International and national cooperation
- Implementation of new techniques
- Increase of suitable funding
- More applicable research

# Thank you for your attention!



RuminOmics Regional workshop, Improving efficiency of production and reducing environmental impact, 1<sup>st</sup> of September, 2015, Warsaw, Poland