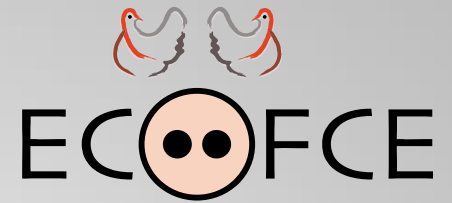


EFFICIENT & ECOLOGICALLY-FRIENDLY PIG AND POULTRY PRODUCTION.

A WHOLE-SYSTEMS APPROACH TO OPTIMISING FEED EFFICIENCY
AND REDUCING THE ECOLOGICAL FOOTPRINT OF MONOGASTRICS.



BASIC DATA

Funding:

EU-FP7
(€ 6 million)

Start date:

1 February 2013

Duration:

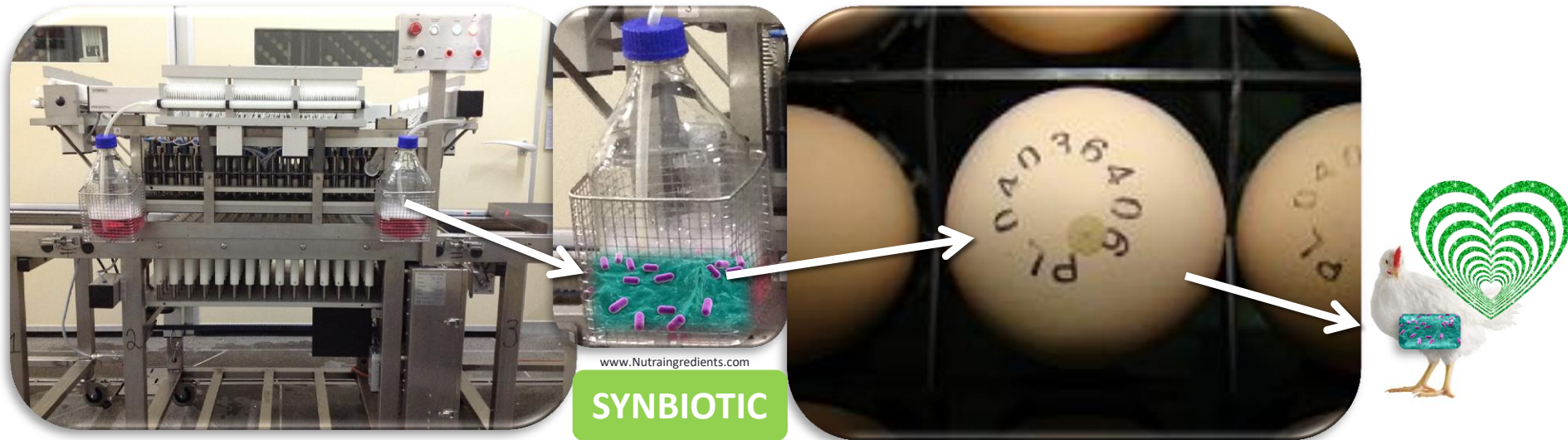
48 months
(2013 to 2017)

This project has received funding from the European Union's Seventh Framework Programme for research, technological development and demonstration under grant agreement No. 311794.





ECO FCE: *IN OVO* MANIPULATION TO INDUCE LONG TERM EFFECT ON MORPHOLOGY OF CHICKEN GUT



This project has received funding from the European Union's Seventh Framework Programme for research, technological development and demonstration under grant agreement No. 311794.



IN OVO TECHNOLOGY TO DELIVER SYNBIOTICS-MOVIE



This prototype is a property of enterprise Drobex-Agro Sp. z o.o., Poland, according to grant agreement THRIVE RITE, No. 315198 (2012-2015)

HIGH TOLERANCE OF EMBRYOS FOR TREATMENT

HIGH HATCHABILITY RATES AFTER INJECTION

This project has received funding from the European Union's Seventh Framework Programme for research, technological development and demonstration under grant agreement No. 311794.



WHAT ARE SYNBIOTICS?

Synbiotic = probiotic + prebiotic



selected bacterial or yeast cultures which task is **beneficial effect** in the gastrointestinal tract

substance present in or introduced into the food to **stimulate the growth of gut flora**

Synbiotic 1–

Lb. salivarius IBB3154 + Bi²tos, Clasado Ltd.



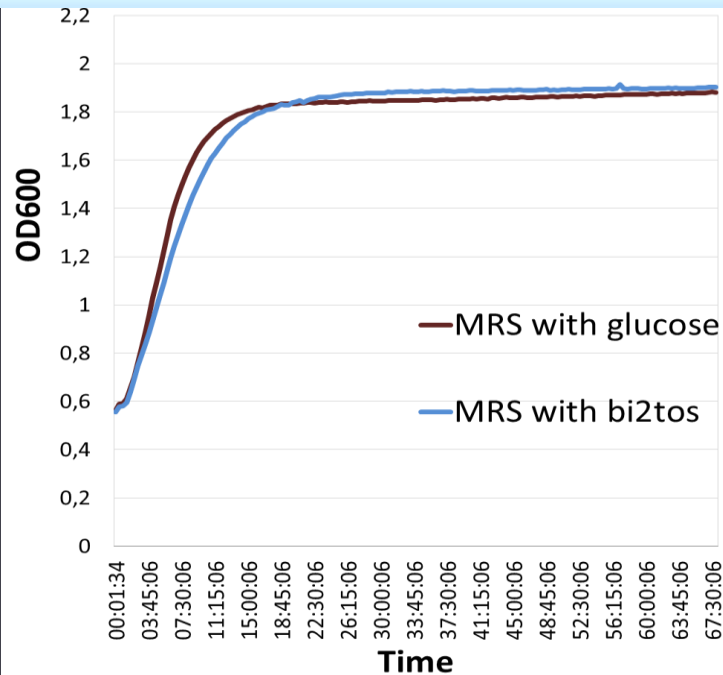
Synbiotic 2 –

Lactobacillus plantarum IBB3036 + lupin RFOs

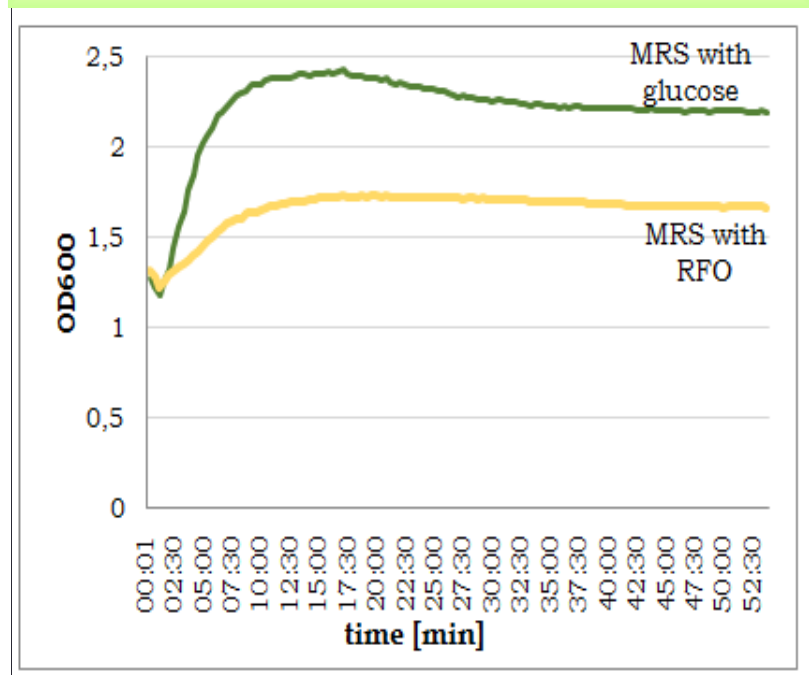
Our Bioscreen result show a perfect match of **Bi²tos** and probiotic against glucose reference



SYN1 *Lb. salivarius* 3154 + Bi²tos



SYN2 *Lb. plantarum* 3036 + RFO

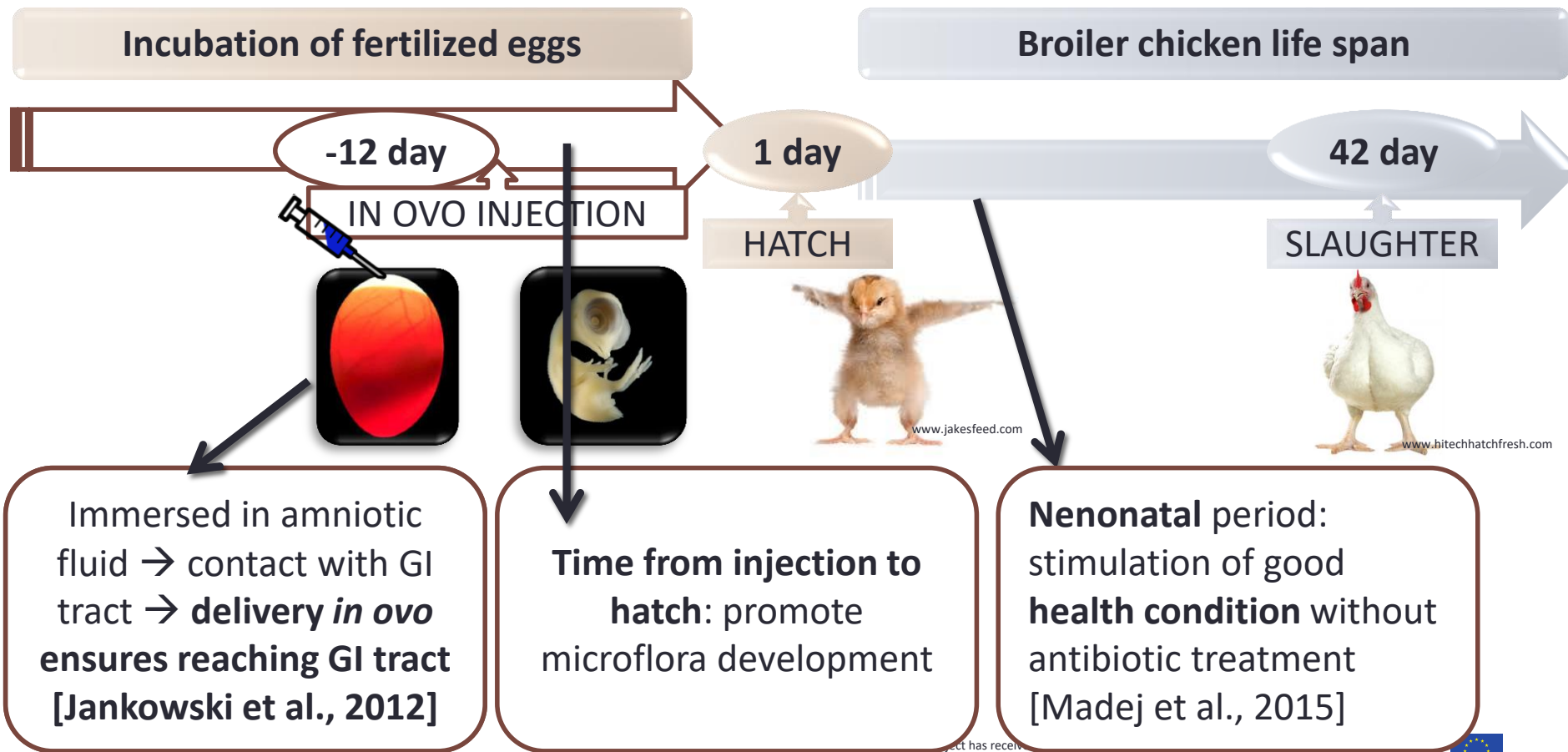


Measured using a broadband filter (420nm-580nm wavelength range)



Why in ovo technology?

To ensure the best protection for the newly hatched individual, the external supplementation should be given as early as possible [Madej and Bednarczyk, 2016]



EXPERIMENTAL METHODS

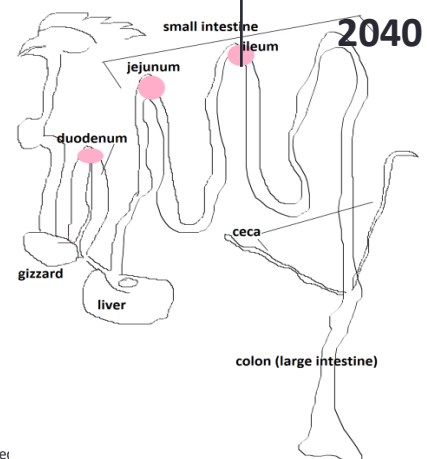


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EXPERIMENTAL REARING IN PRODUCTION CONDITIONS

Performance (including the FCR)			Seperate pens for sampling		
Treatment	Replicates (pens)	No. of chickens males/pen	Replicates (pens)	No. of chickens males/pen	The sume of experimental chickens
SYN1	8	75	8	10	680
SYN2	8	75	8	10	680
CONTROL	8	75	8	10	680

+ 8000 *



- *„chicken house flock”*: 8 000 chickens (not sexed) to fill the space of the chicken house; randomised, group housed experiment
- in ovo injection: 5 850 Cobb 500FF eggs
- **SYN1** *Lb. salivarius* 3154 + Bi²tos, Clasado Ltd.
- **SYN2** *Lb. plantarum* 3036 + RFO, in house developed

This project has received research, technological

mme for L794.



EXPERIMENTAL RESULTS



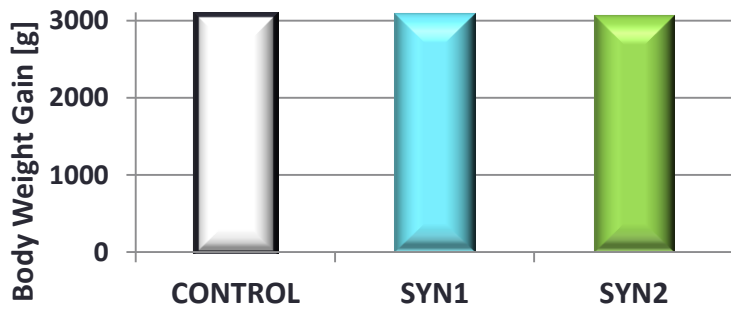
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FINAL BODY WEIGHT & FEED CONSUMPTION

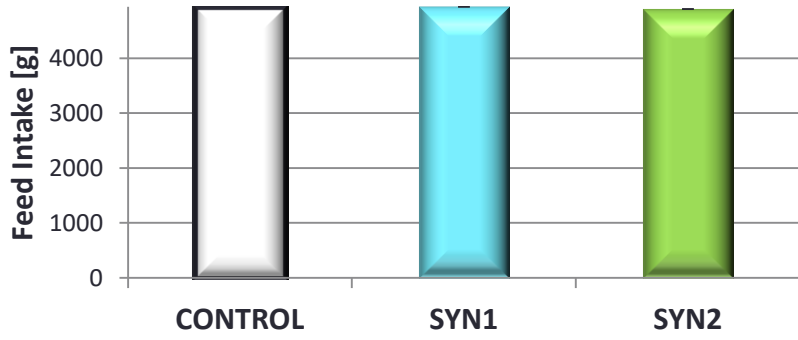


- **SYN1** *Lb. salivarius* 3154 + Bi²tos, Clasado Ltd.
- **SYN2** *Lb. plantarum* 3036 + RFO, in house developed

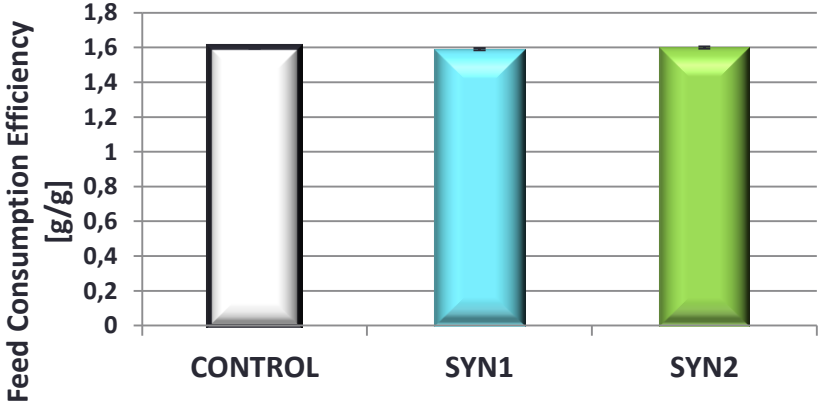
BWG [1-41d]



FI[g]



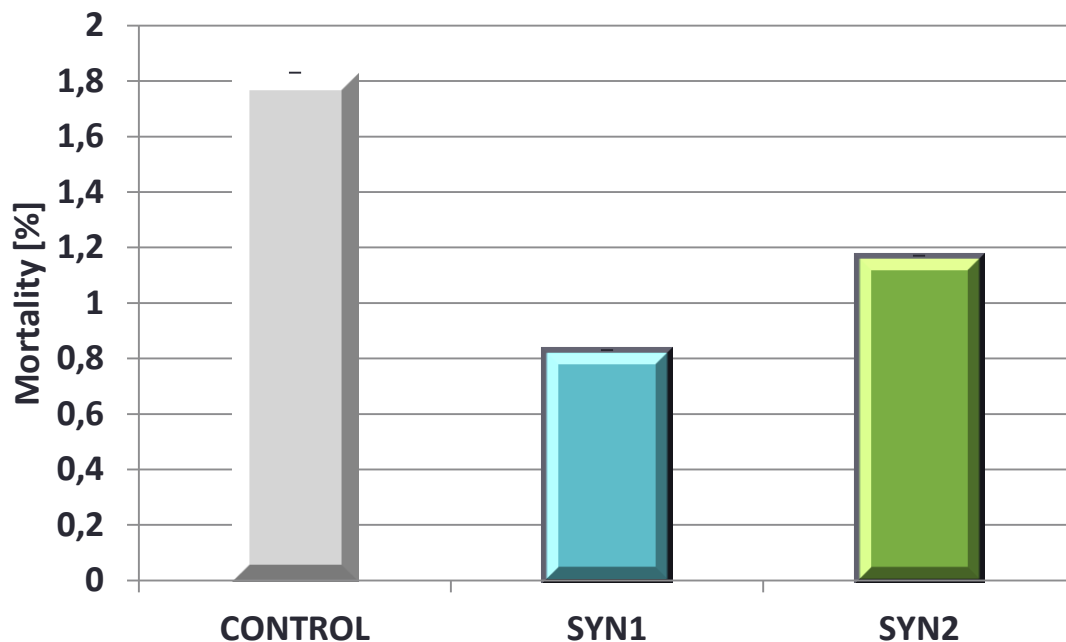
FCE [1-41d]



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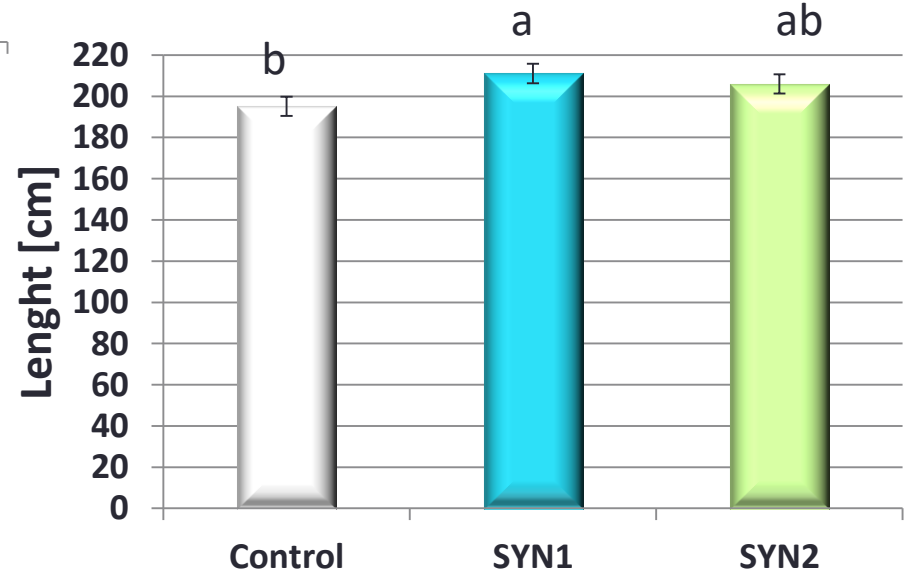
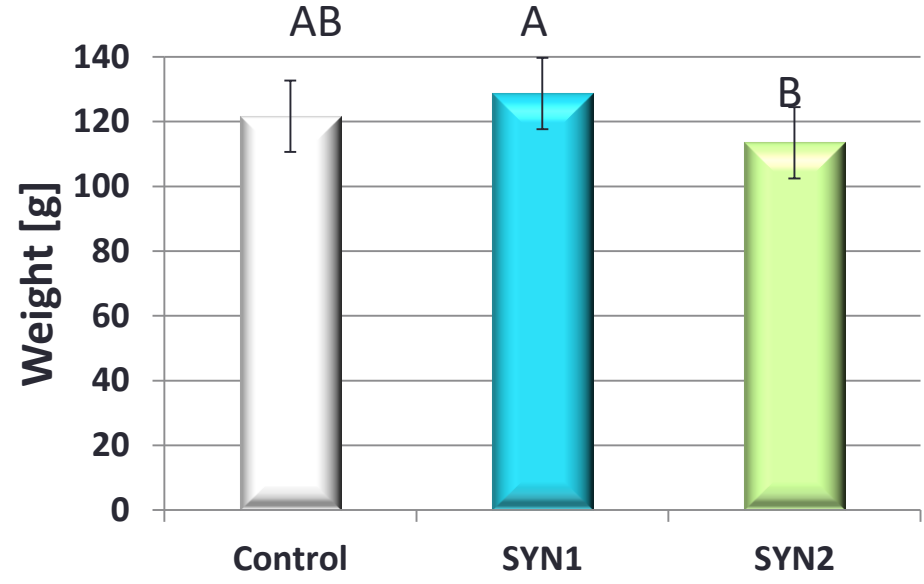
MORTALITY



- Very low, <2% mortality in farm conditions
- FCE did not significantly increase after synbiotics. In previous studies, an increase in prebiotic treated groups was observed



Weight and length of small gut at 42d

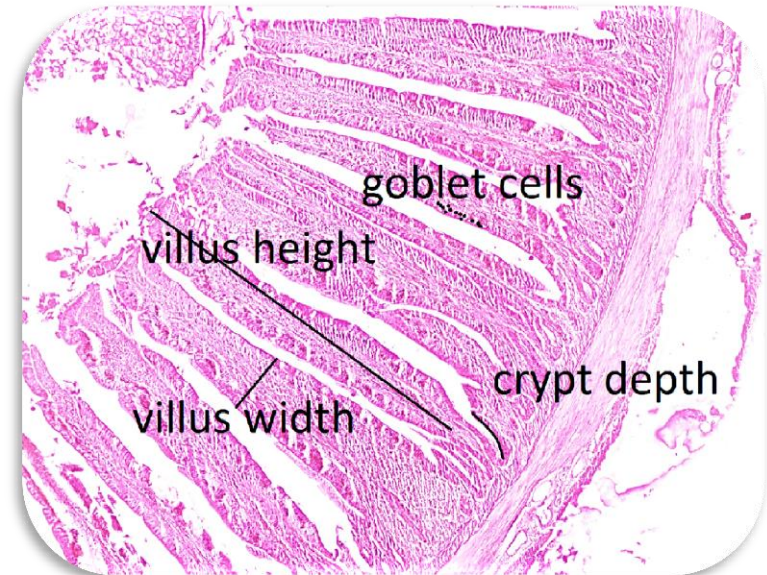
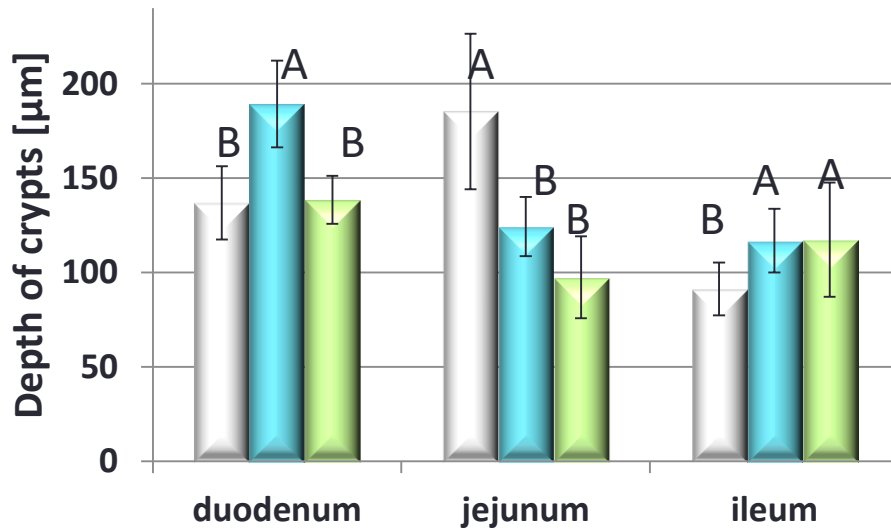
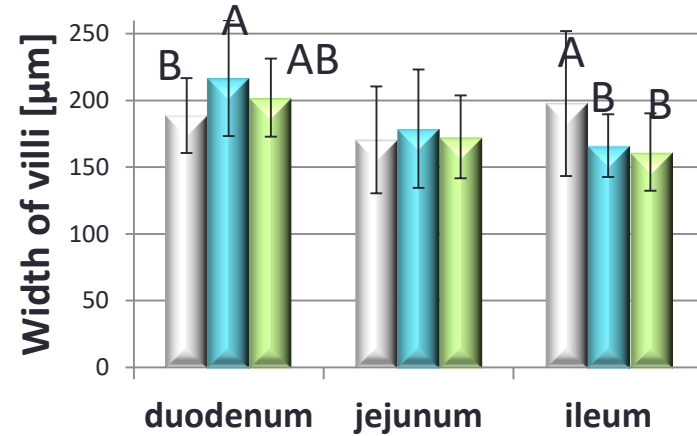
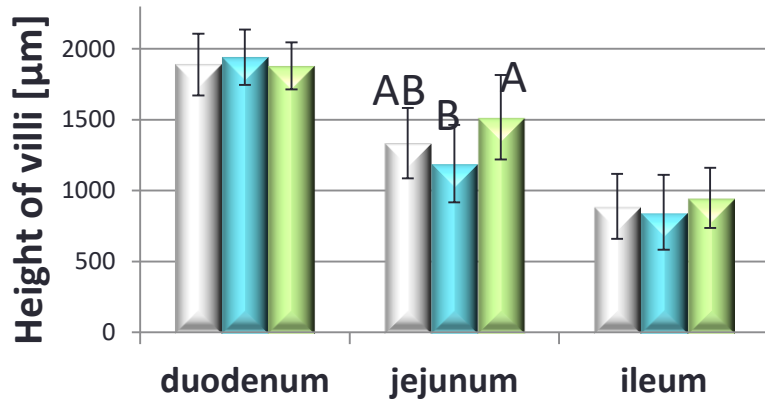


A,B,C- $P < 0.01$, a,b,c- $P < 0.05$



Villi height, width and crypt depth

CONTROL SYN1 SYN2

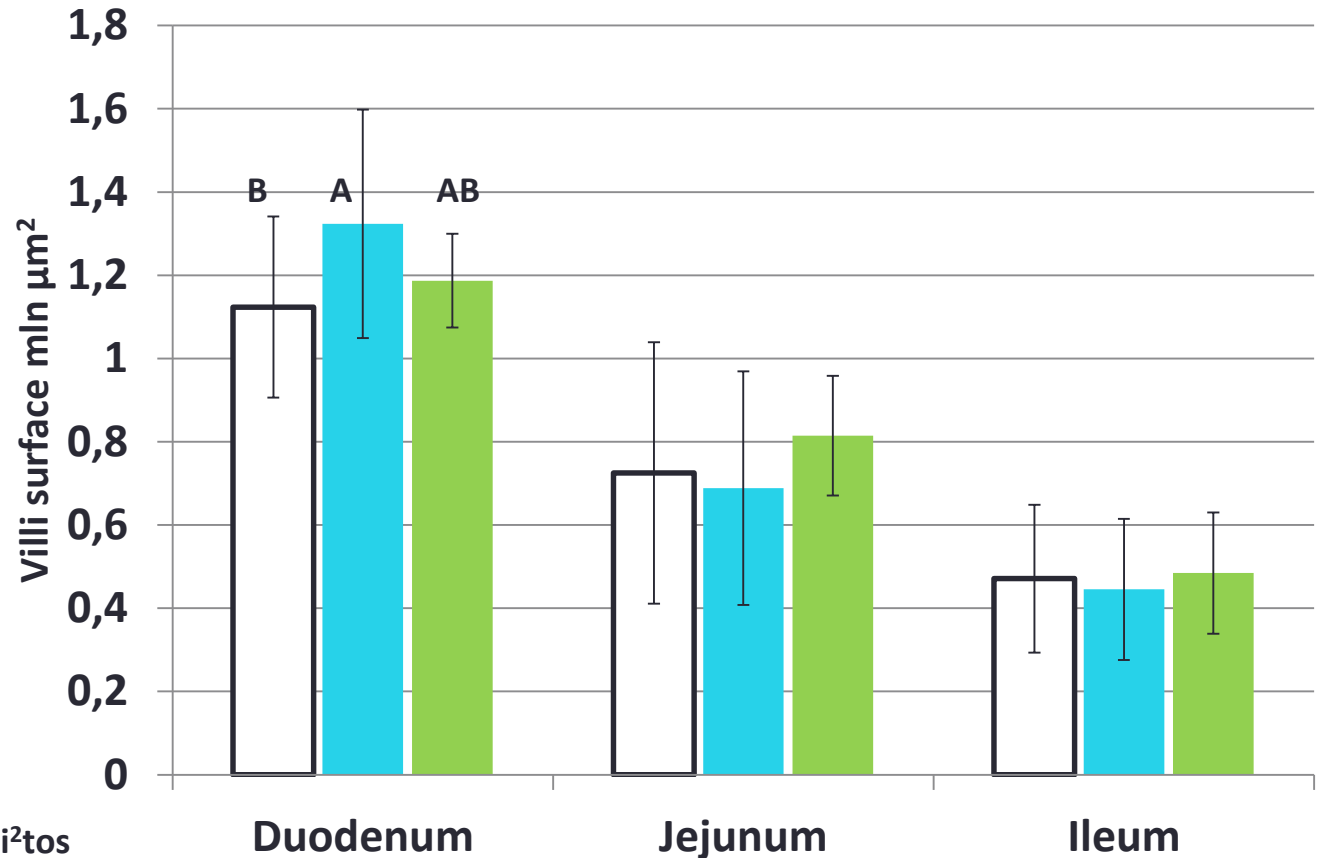


A,B,C- P<0.01

Histomorphology- villi surface

Day 42

CONTROL SYN1 SYN2



SYNBIOTICS positively affected surface of the villi.

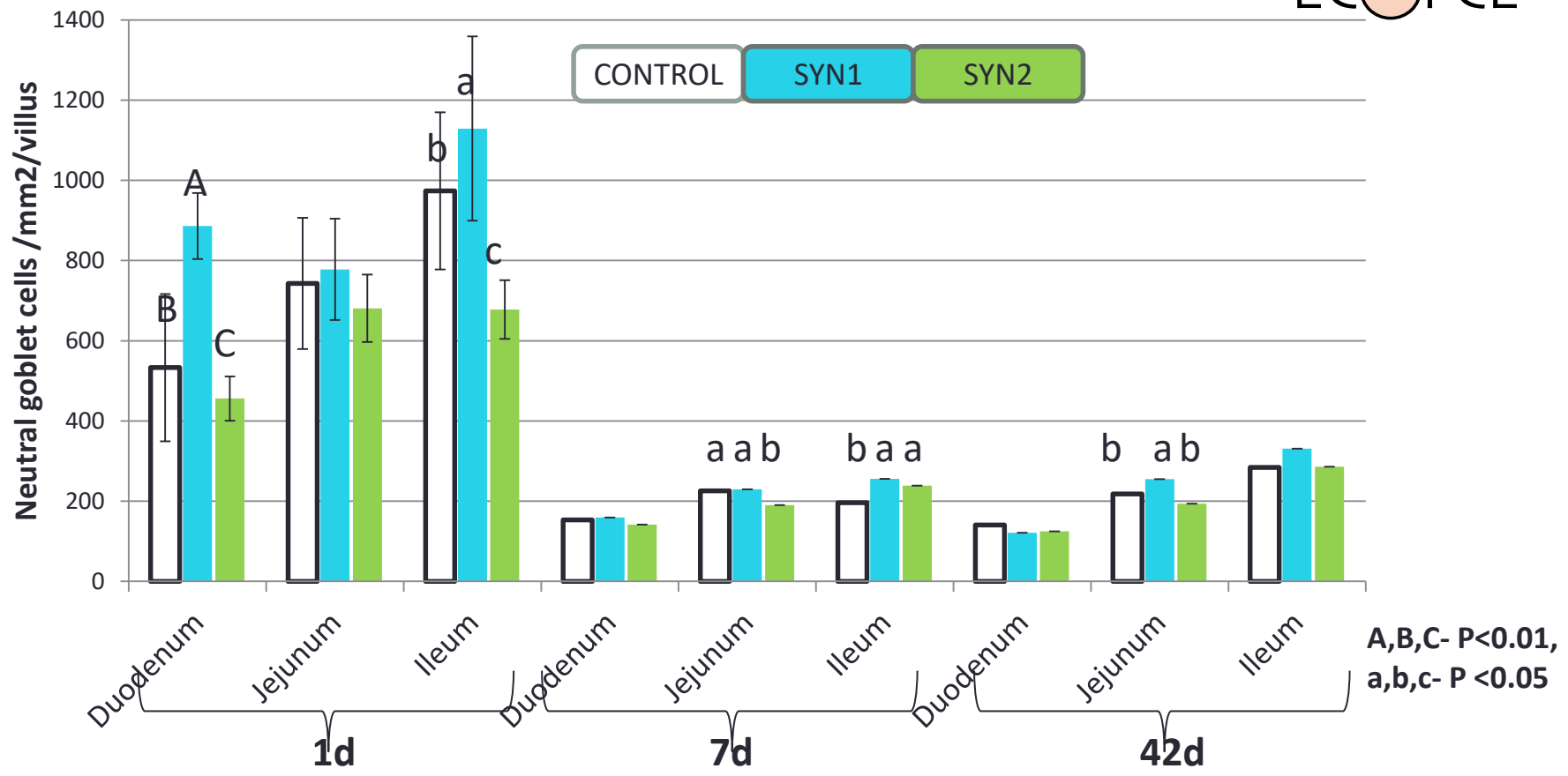
SYN1 and SYN2 increased the villi surface in duodenum.

- SYN1 *Lb. salivarius* 3154 + Bi²tos
- SYN2 *Lb. plantarum* 3036 + RFO

A,B- P<0.01



Number of neutral goblet cells/mm² villus



SYN1 –shielding effect from goblet cells + low mortality is a good effect during 1st period of rearing

SYN1 and **SYN2** – did not affect neutral goblet cells at the end of rearing. Maintained good status. Displayed **DIFFERENT MODE OF ACTION**.

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SUMMARY



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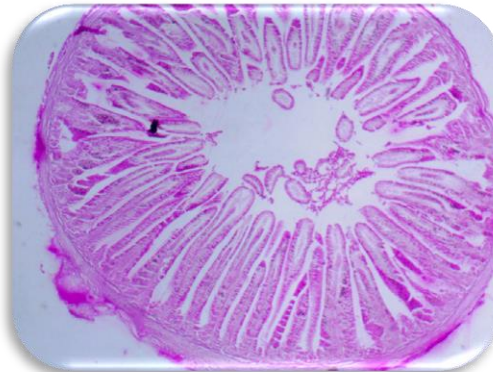
LONG TERM EFFECTS ON GUT

SYN1 Lb. salivarius 3154 + Bi²tos

SYN2 Lb. plantarum 3036 + RFO

↔ **versus Control** ↔

length of dudodenum & jejunum



length of intestine

surface of villi in dudodenum



surface of villi in small intestine (dudodenum & jejunum)- **NS**

depth of crypts



depth of crypts

goblet cells profile



goblet cells profile

MAJOR CONCLUSIONS ON GUT MICROSTRUCTURE



Different synbiotics show **differential effect** on the microstructure of individual sections [duodenum, jejunum, ileum] of small intestine


SYN1 and SYN2 **positively affect (increase) the surface area** of the absorbent villi of the small intestine throughout the rearing period

SYN1 and SYN2 **positively affected number of goblet cells** which might be cause of observed lower mortality

Synbiotics stimulated changes in duodenum and jejunum- **2 segments responsible for the most intensive absorption** of nutrients in chicken gut

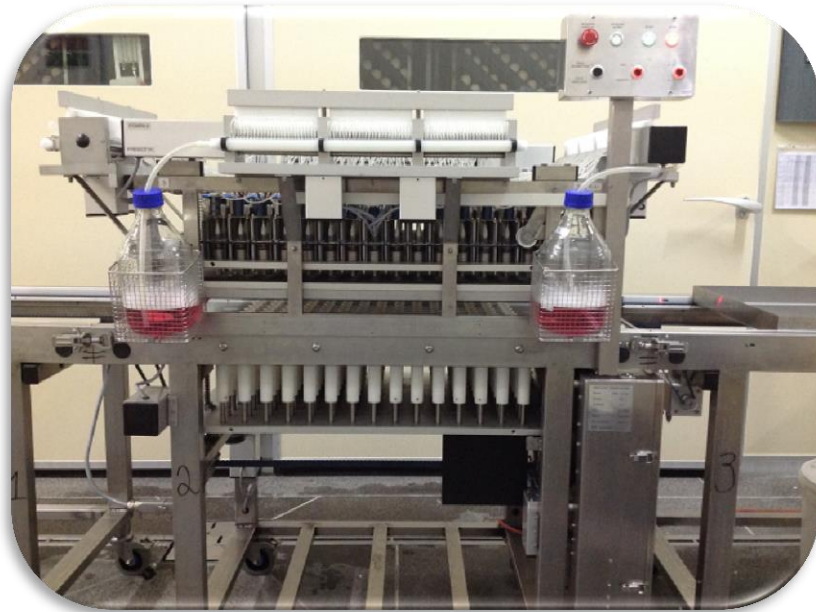
A single in ovo treatment with a low dose of synbiotic beneficially affects the gut microstructure (reflecting physiological state of a gut) at day 42



Inulin + L.Lactis ssp. lactis	Bi2tos + L.Lactis ssp. cremoris	RFO + L.Lactis ssp. lactis	RFO + L.Lactis ssp. cremoris	RFO+ L.plantarum	Bi2tos + L.salivarius	Duolac		RFO	Inulin	Bi2tos	DiNovo			
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>							BW [1-3]	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									BW [1-6]	<input checked="" type="checkbox"/>			
<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>							FINAL BW			<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
			<input checked="" type="checkbox"/>						<input checked="" type="checkbox"/>	Breast muscle			<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	<input checked="" type="checkbox"/>						<input checked="" type="checkbox"/>			Microvilli lenght		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
	<input checked="" type="checkbox"/>							<input checked="" type="checkbox"/>		Microvilli surface				
			<input checked="" type="checkbox"/>							Bursa fabricius to spleen	<input checked="" type="checkbox"/>			
								<input checked="" type="checkbox"/>		IgG (Y) concentr.				
							<input checked="" type="checkbox"/>			Genes cecal tonsils				
			<input checked="" type="checkbox"/>					<input checked="" type="checkbox"/>		Genes spleen				
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>				<input checked="" type="checkbox"/>		Genes intest.							
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						Peripheral lymphocytes B		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>				
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						Intestine Lymphocytes B			<input checked="" type="checkbox"/>				
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						Cecal tonsils lymphocytes		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>				
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>			Pancreas potential							

MAJOR IMPLICATIONS-FUTURE R&D

To reduce the production costs of healthy poultry meat, without use of antibiotics



In ovo & synbiotics

- Technical alignment with HATCHERY production line (the compatible elements)
- Improved FCE
- Focus on meat quality (white stripping reduction, beneficial fatty acid composition)
- challenge tests –stress conditions + infections (Salmonella, Campylobacter)
- To lower coccidia oocysts in young chickens.



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UTP Leader: Prof. Marek Bednarczyk

THE WHOLE TRANSCRIPTOME ANALYSIS

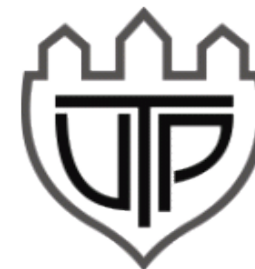
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