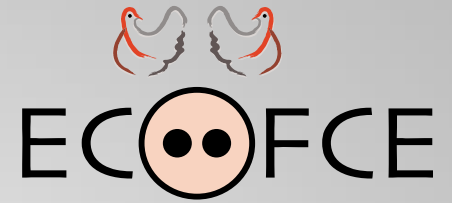


EFFICIENT & ECOLOGICALLY-FRIENDLY PIG AND POULTRY PRODUCTION.

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 – EFFECTS ON CHICKEN TRANSCRIPTOME AND PHYSIOLOGY.



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 *					2040

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



EXPERIMENTAL SETUP



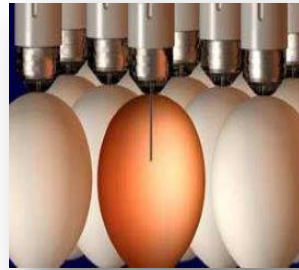
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Incubation -12 days



embryos of broiler chickens (Cobb500FF) were randomly distributed into 3 experimental groups

Synbiotics administered *in ovo* at the **12th day** of embryo development



After hatching birds were sexed and roosters only were reared



Tissues collection at **7th, 14th, 21st and 42nd day** post hatching

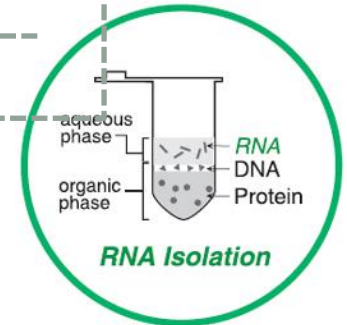


Statistical methods

Whole transcriptome analysis



Physiological analysis



Trizol + additional cleaning

Experimental setup

EXPERIMENTAL RESULTS – WHOLE TRANSCRIPTOME



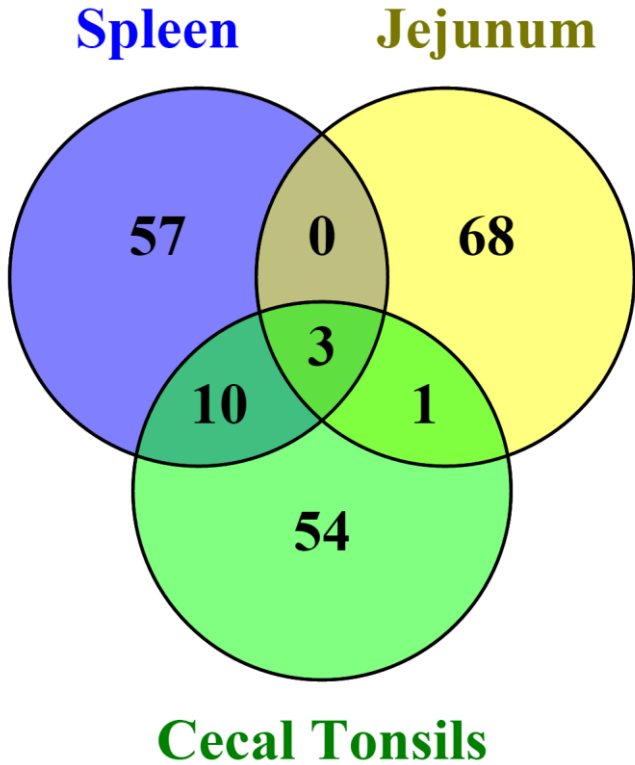
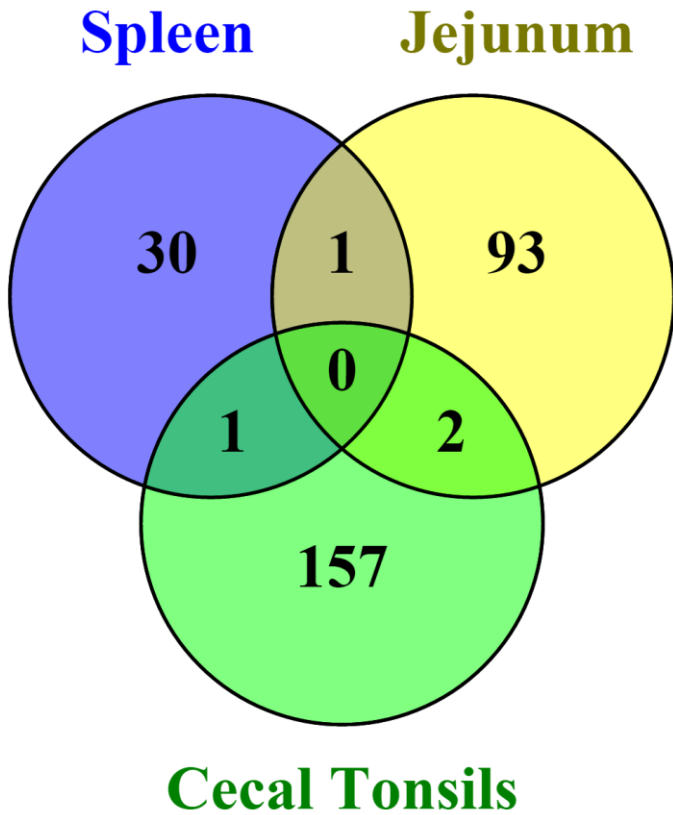
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Microarray – immune and gut tissues – day 21



Lb. salivarius 3154 + Bi²tos/ SYN1

Lb. plantarum 3036 + RFO/SYN2



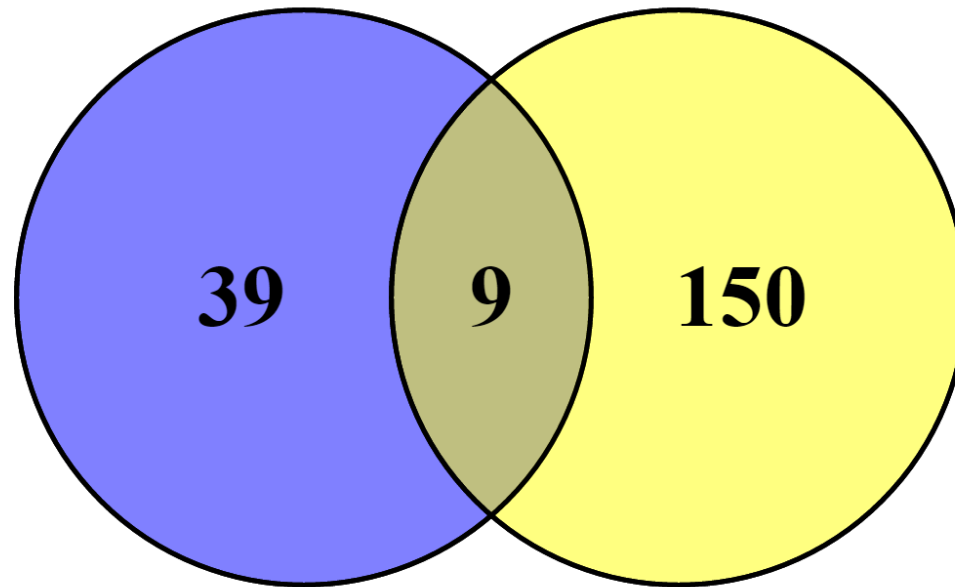
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Microarray – liver – day 21

Lb. salivarius 3154 + Bi²tos/ **SYN1**

Lb. plantarum 3036 + RFO/**SYN2**

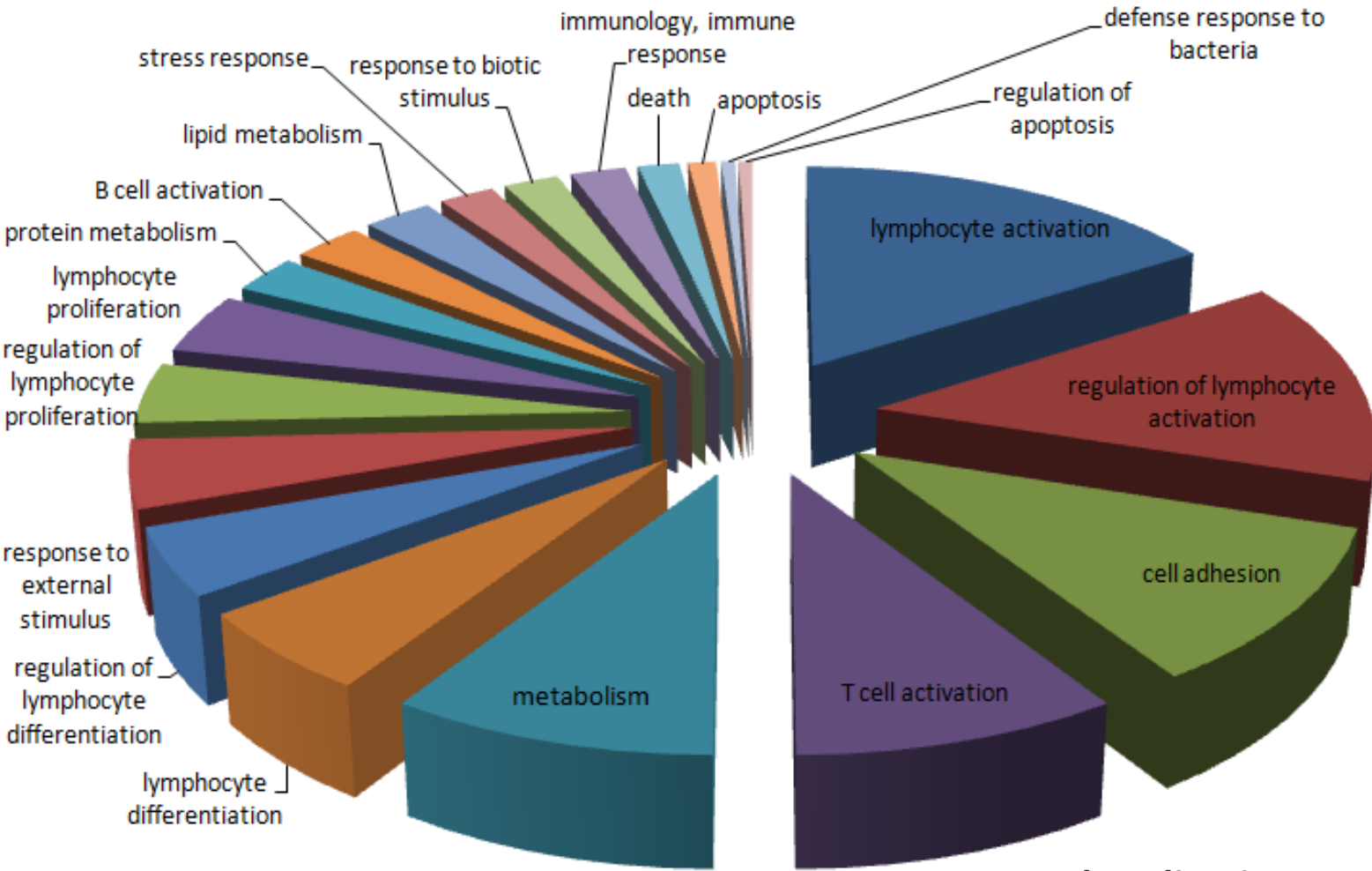


Treatment with synbiotics **can modulate gene expression** of important metabolic (**SYN2**) and immunological paths (**SYN1**).

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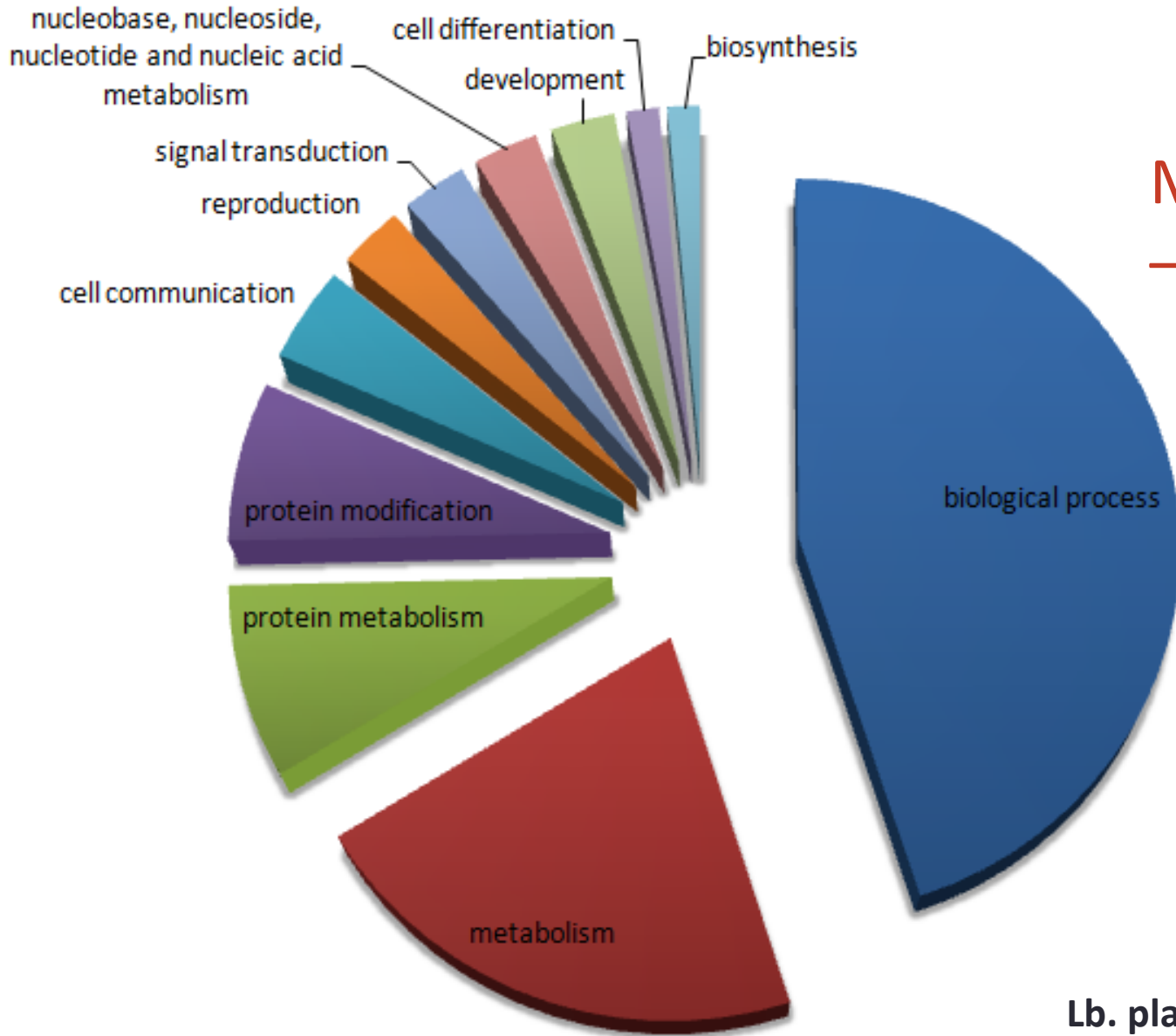
Microarray – CECAL TONSILS – day 21



CECAL TONSILS
Lb. salivarius 3154 + Bi²tos/ SYN1

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





Microarray – LIVER – day 21

LIVER
Lb. plantarum 3036 + RFO/SYN2

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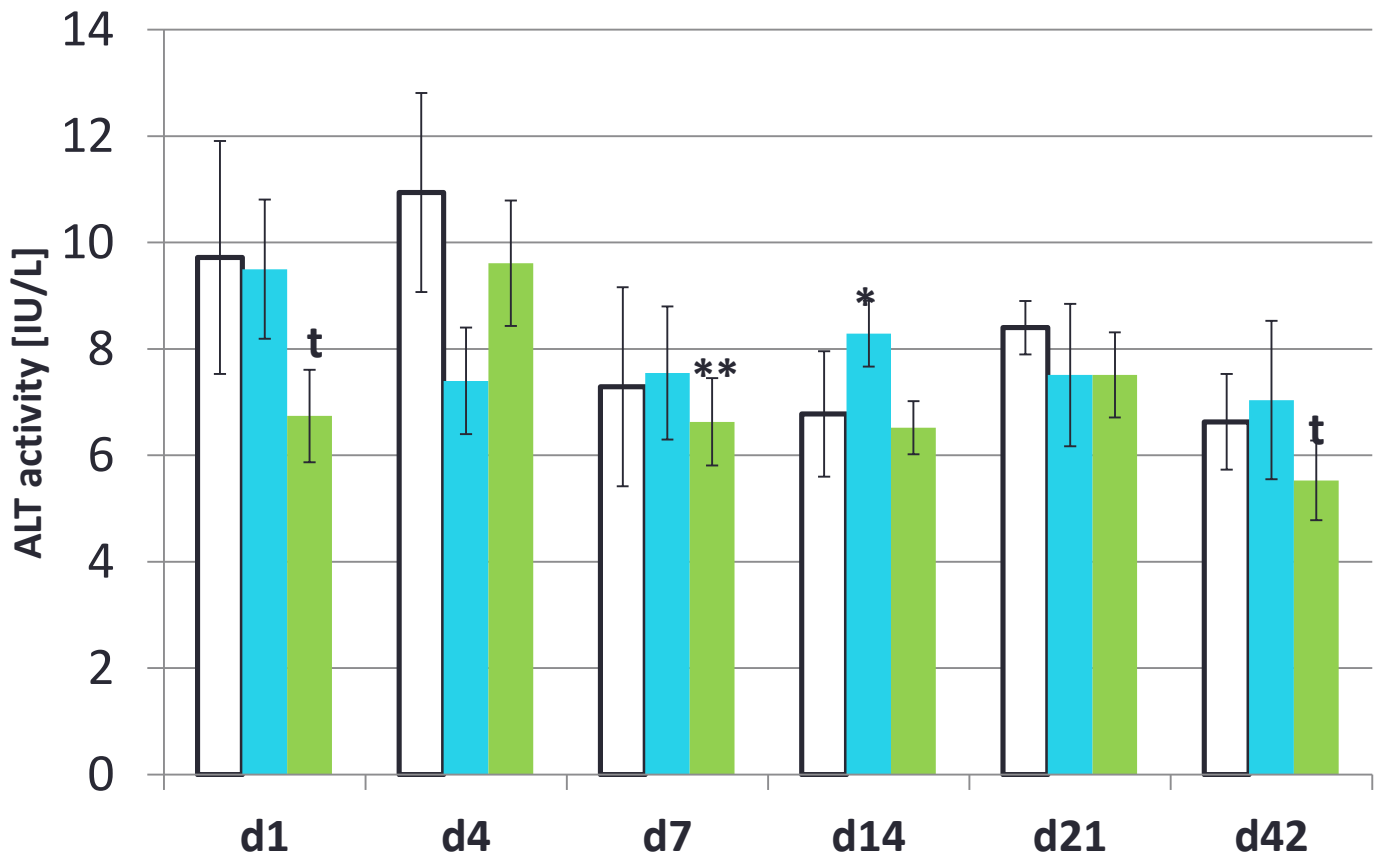


EXPERIMENTAL RESULTS - PHYSIOLOGY



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Metabolic effects- Alanine Transaminase



CONTROL
SYN1
SYN2

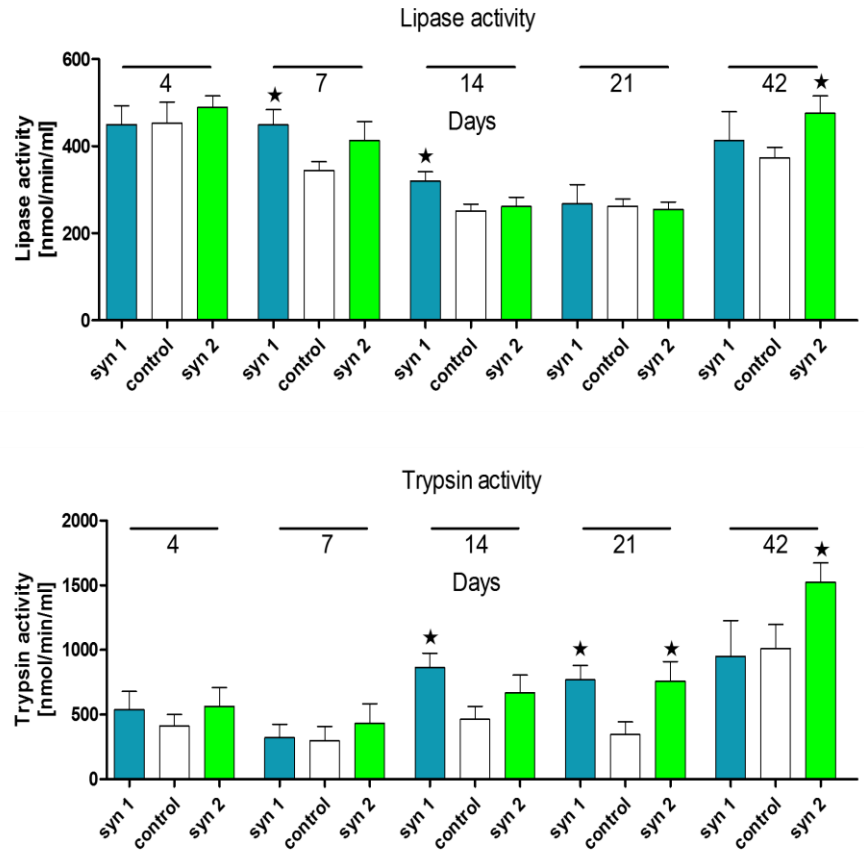
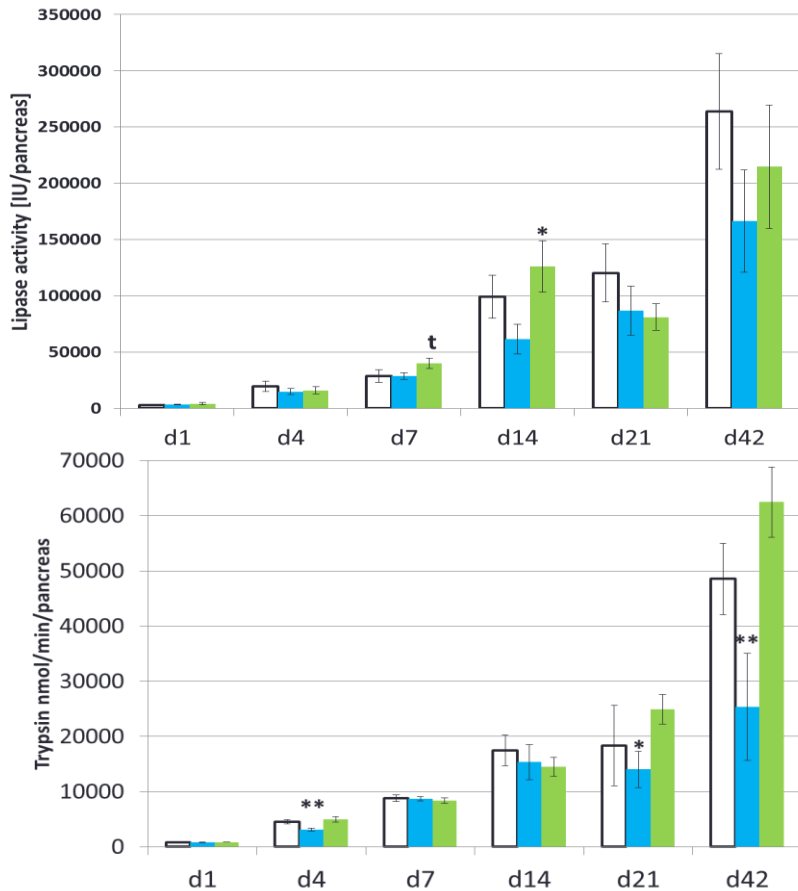
Decrease of ALT in **SYN1** and **SYN2** indicates good work of a liver

****P<0.01, *P<0.05 t: P=0.061**

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Activity of pancreatic enzymes lipase and trypsin indicating the potential of pancreas (left panel) and in duodenum content (right panel)



CONTROL SYN1 SYN2

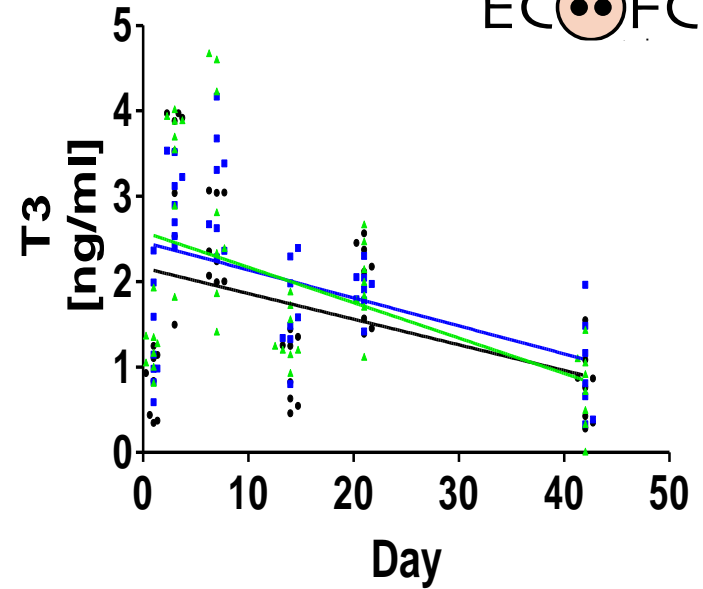
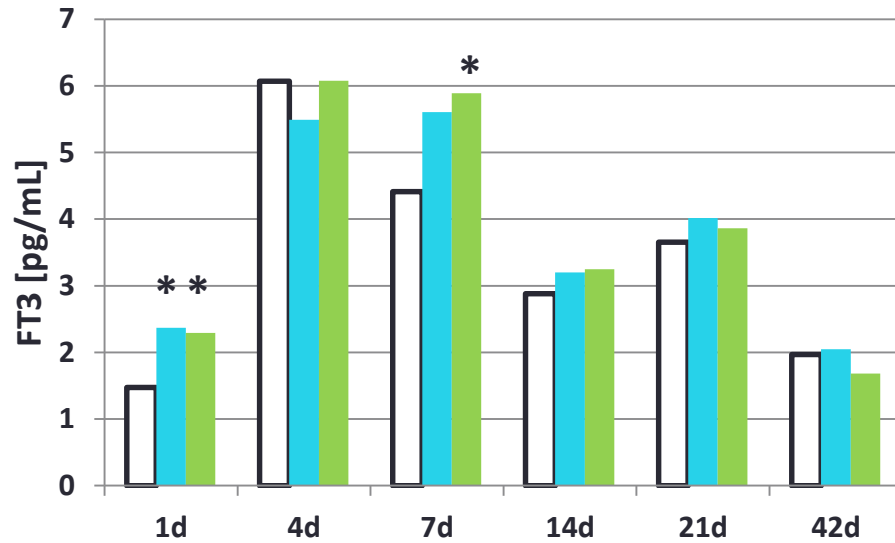
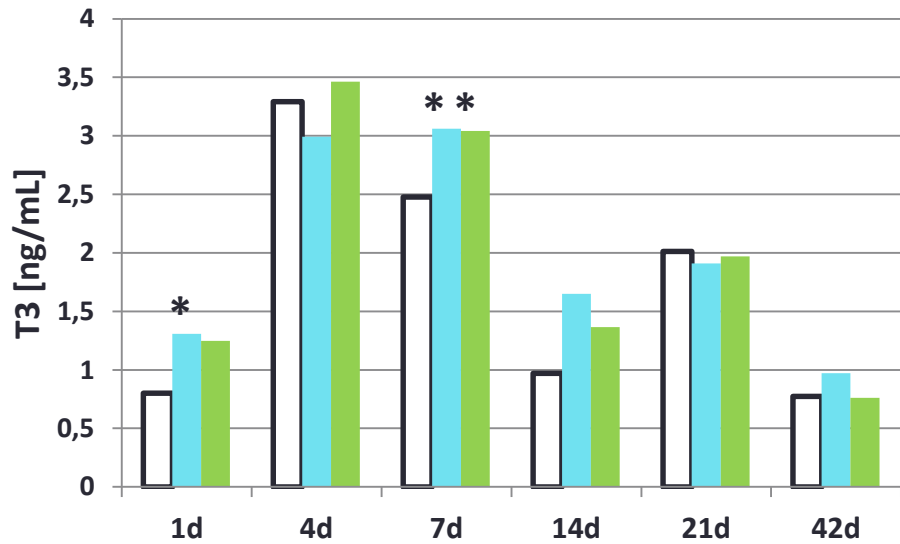
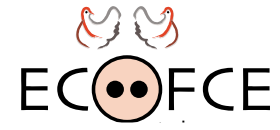
The potential of pancreas increases after SYNBIOTIC treatments.

*P<0.05, t:P=0.067

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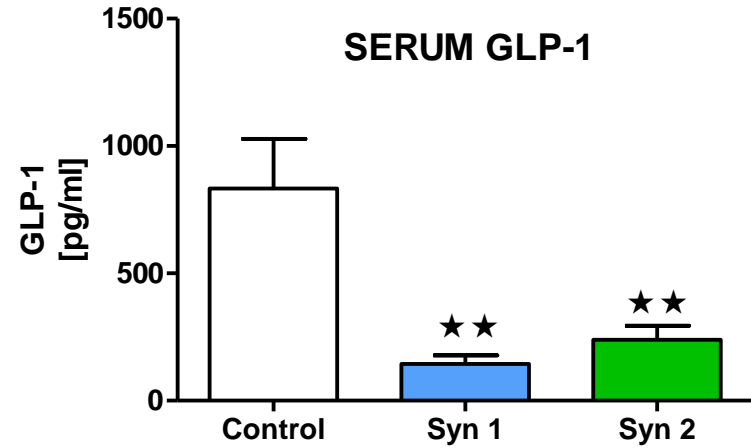
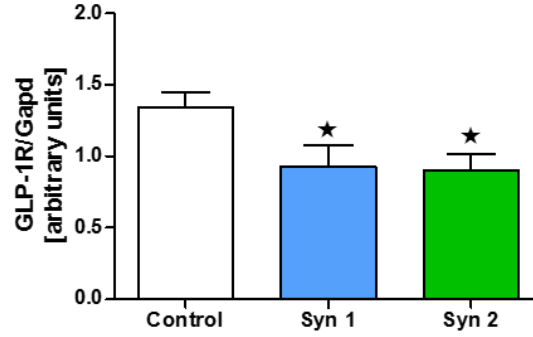
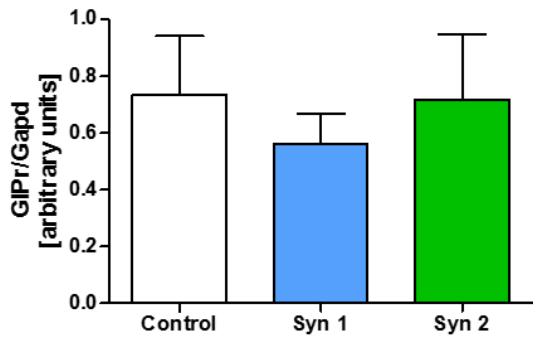
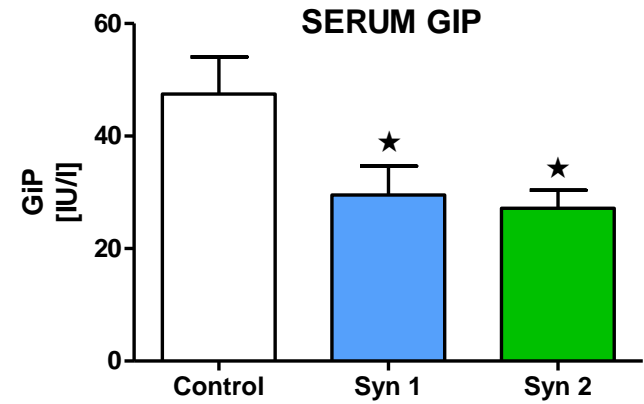
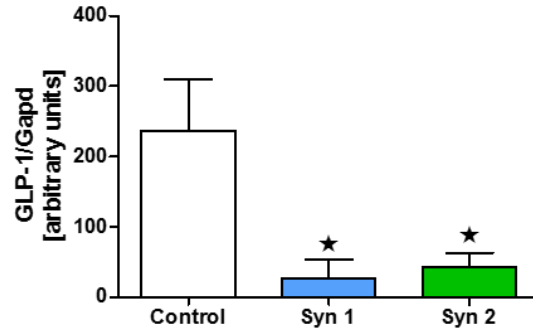
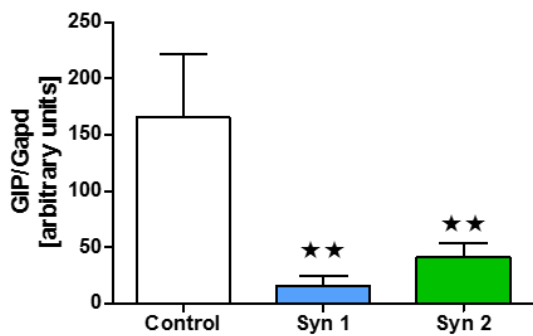
Total and Free triiodothyronine



SYN1 and SYN2 increased metabolic rate in the middle of rearing



Effect of synbiotics on incretins serum level and mRNA expression in chicken duodenum



SYN1 and **SYN2** down regulates mRNA expression and protein level of GIP (gastric inhibitory peptide) and GLP-1 (glucagon-like peptide-1)

SUMMARY



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MAJOR CONCLUSIONS

- *In ovo* synbiotics administration influences
 - At the **gene expression level**:
 - S1 mostly activates immune related pathways,
 - whereas S2 metabolic pathways
 - At the **physiological level**:
 - lipase, amylase, and trypsin activities in pancreas and duodenum content,
 - alter hormonal blood concentration and carbohydrate-lipid profile
- *In ovo* injected synbiotics **strongly modulate incretins expression**

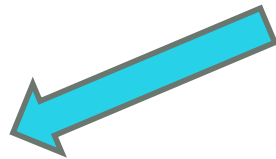


TAKE HOME MESSAGE

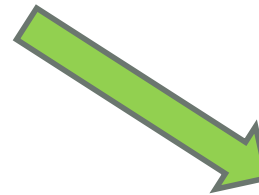
SYNBIOTICS *in ovo* reduce mortality and maintain body weight without deterioration in FCE

DIFFERENT SYNBIOTICS MAY BE USED FOR DIFFERENT PURPOSES

through immunological pathways in case of SYN1



pro-metabolic pathways in case of SYN2- gut efficiency



photography.nationalgeographic.com

Premium product due to meat quality

- (healthy, low fat, fatty acids)
- body weight , EBI



selected depending on the expected immunological situation on farm :

- pathological factors eg. bacterial infections
- other challenging conditions

Even much more can be modulated with synbiotics *in ovo* depending on the stakeholder's needs, physiological condition of birds, genotype and environmental challenges.



THANK YOU



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