IRTA

Research in monogastric nutrition in IRTA

Sponsor's day 2009

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3 December 2009

Monogastric nutrition

- Objective
- New facilities
- Lines of research
- Examples

Objective

To offer solutions to all problems where nutrition is involved.

New facilities
Poultry

Mas de Bover.

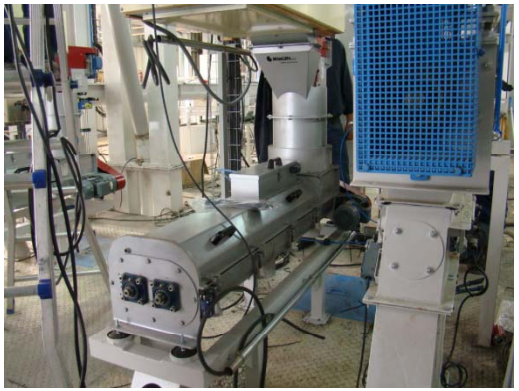
- Poultry.
  - Chickens: 48 replicates
  - Turkeys: 48 replicates

New facilities
Pigs

- Fattening pigs
  - 48 Pens
  - 72 Individual
- Adaptation of gestating unit to new legislation. Automatic feeding of gestating sows

Feed mill

- Two lines of production with or without ingredients of animal origin
- Extruder for fish feeds.
- Liquid aplications on pellets
- Automation and registers of all processes
- Greater storage of feed ingredients
- Increased capacity of production





European model of production

- Nutritional evaluation of new ingredients
- Food safety for the consumer
- Health and welfare of the animal
- Quality of meat and eggs: sensorial and health for the consumer
- The consequences of intensive production on the environment

Some examples

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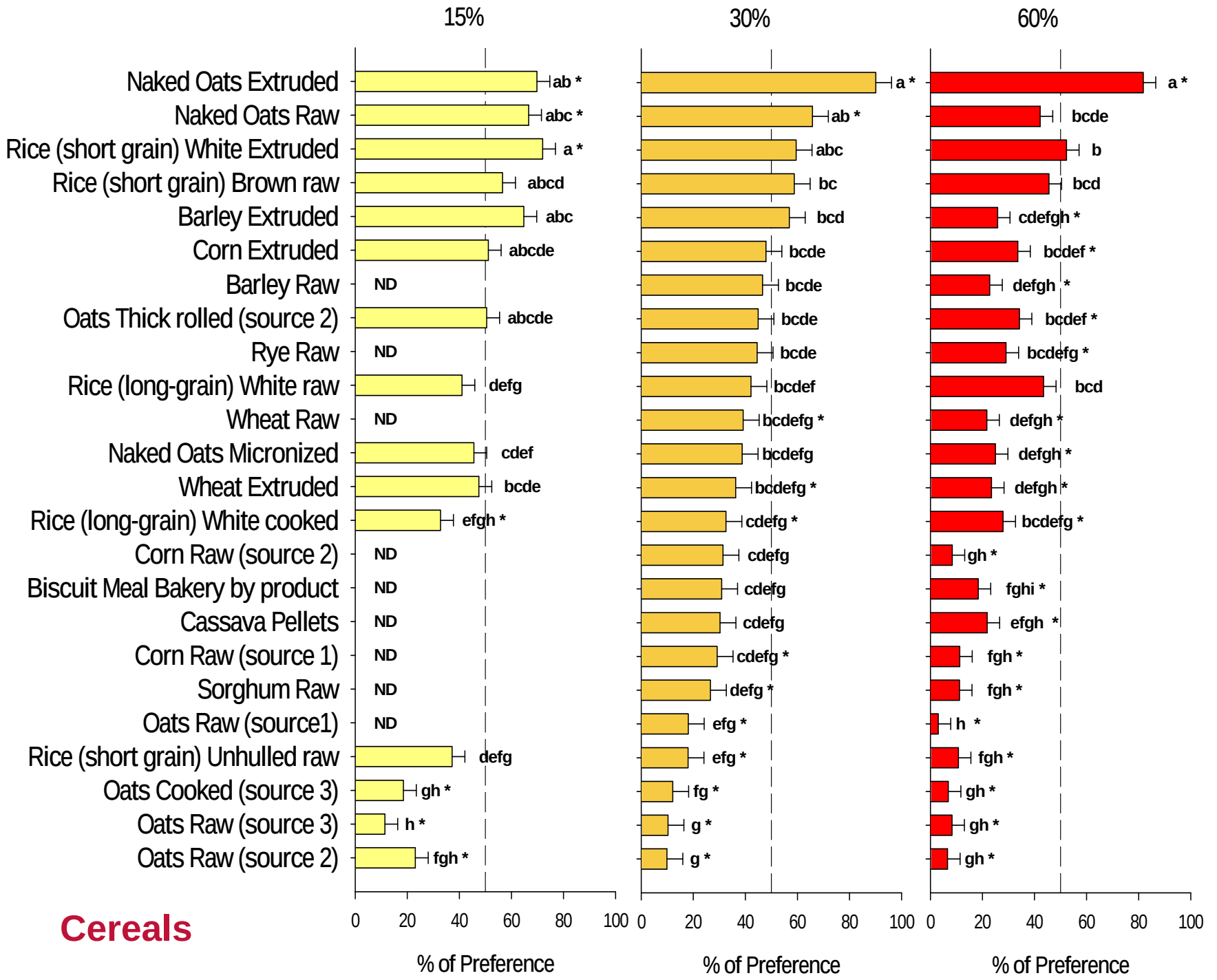
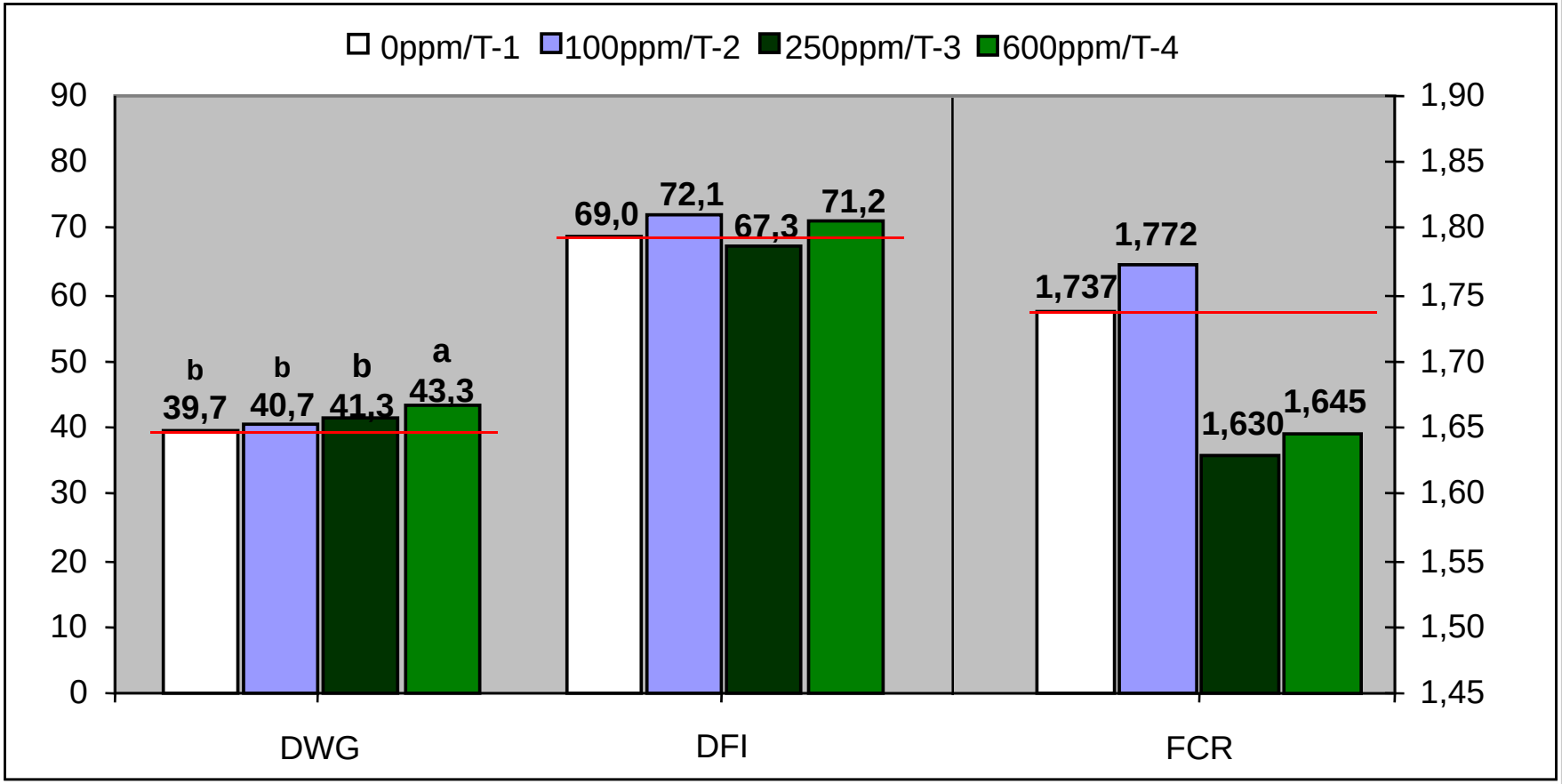
FOOD INTAKE AND INTESTINAL PHYSIOLOGY



Cereals

Solà-Oriol *et al*, (2009). J.Anim. Sci. 87:562

Antibodies Anti-CCK



Brufau *et al*. (1999)

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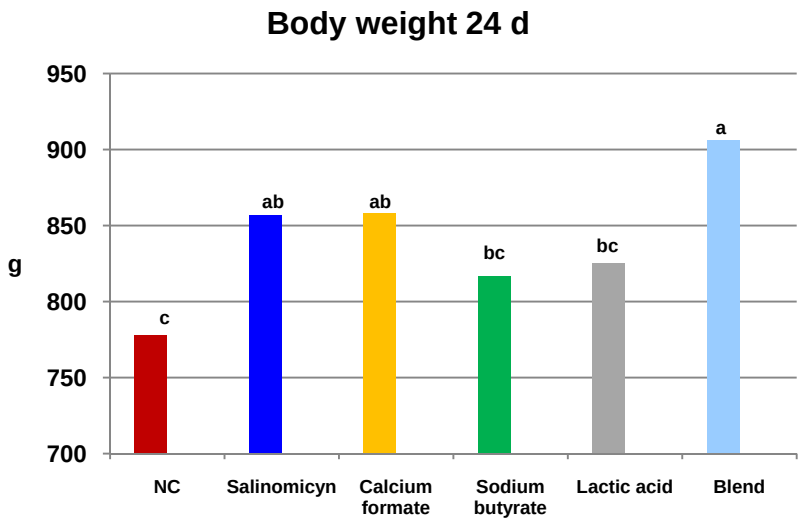
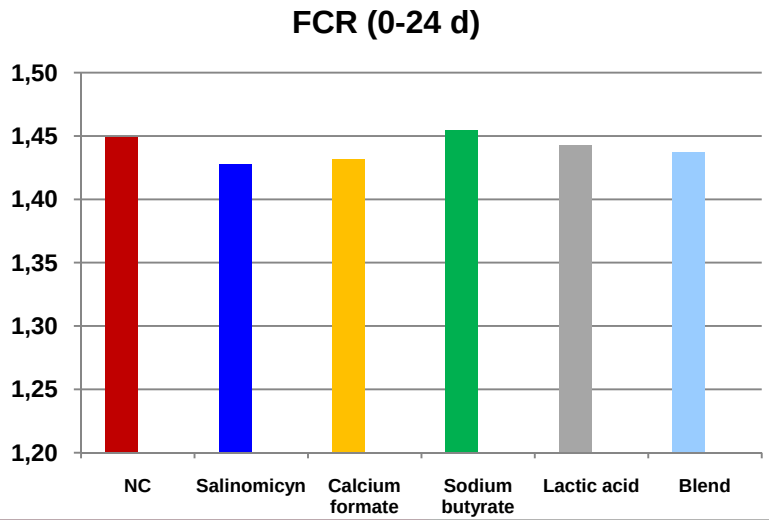
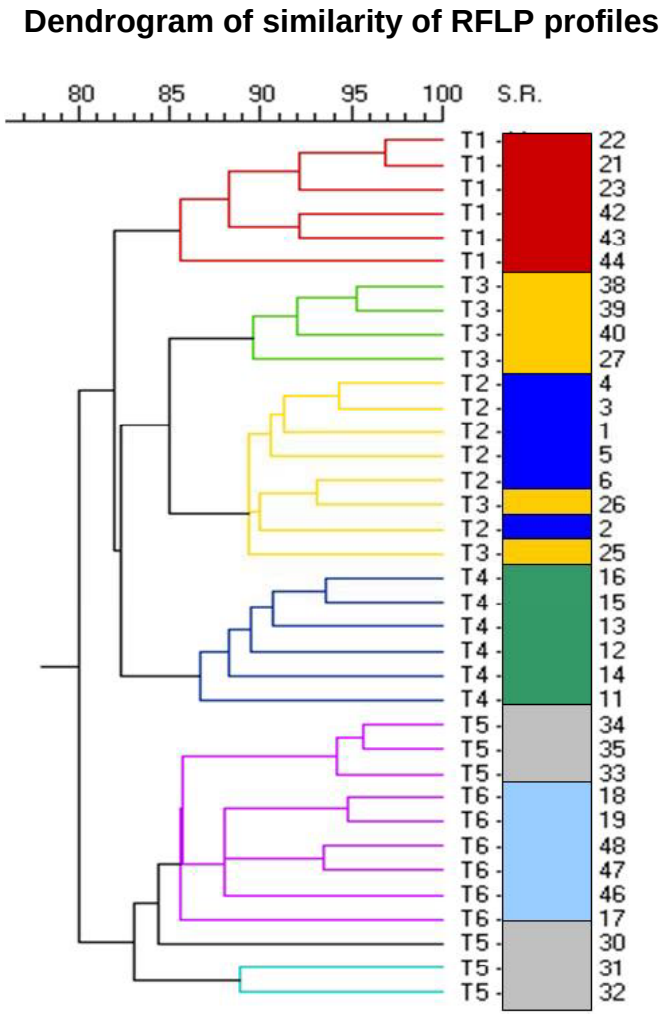
INTESTINAL HEALTH

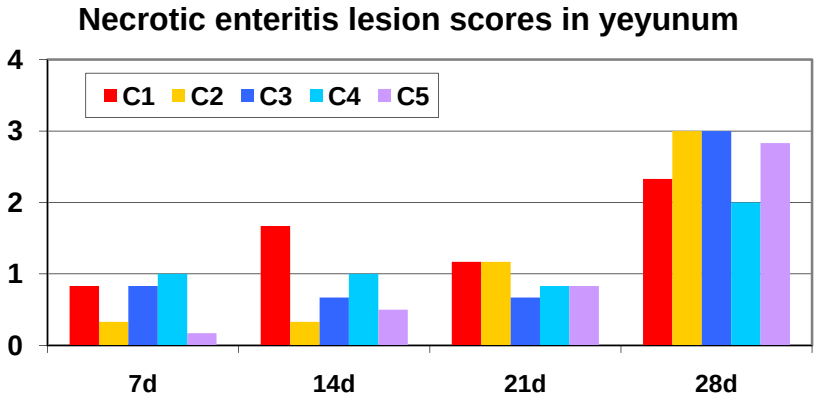
Effects of organic acids on performance and intestinal microbiota

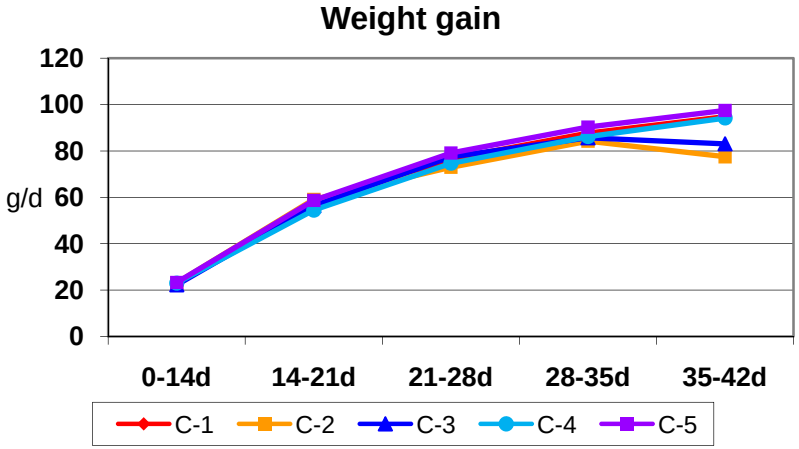


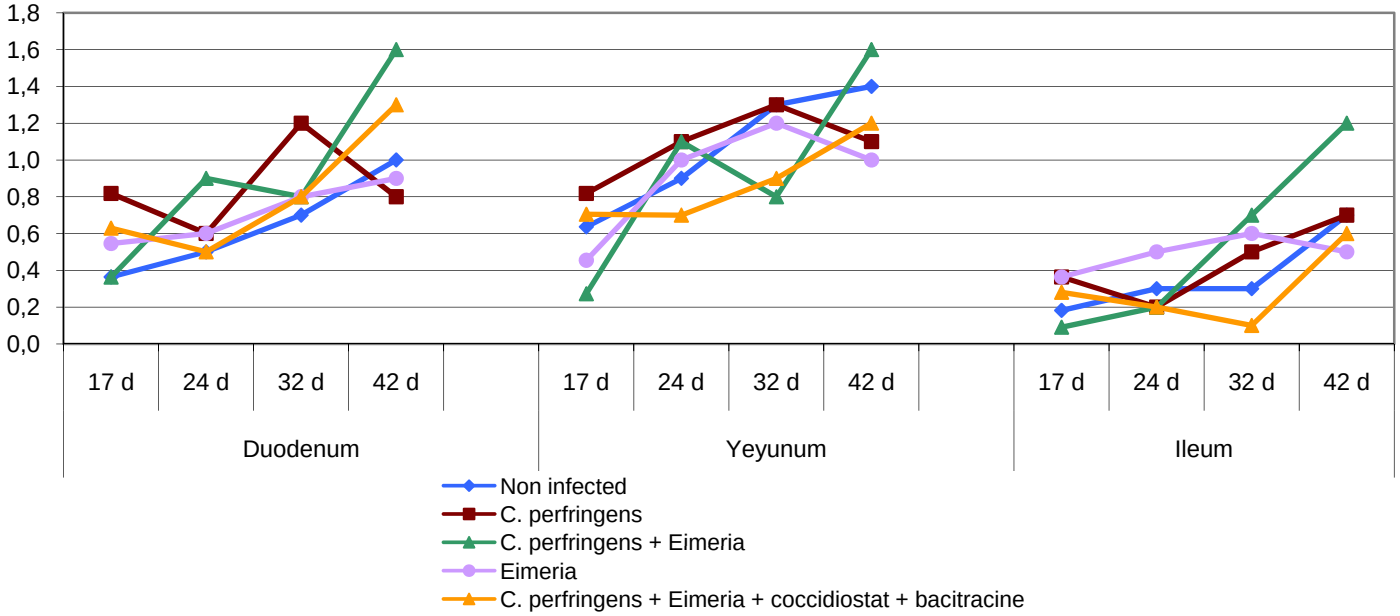




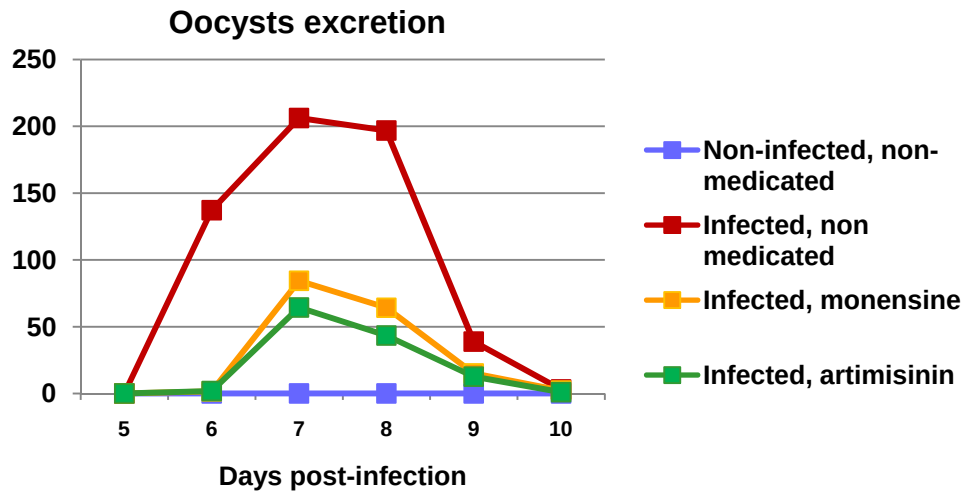
Necrotic enteritis infection model

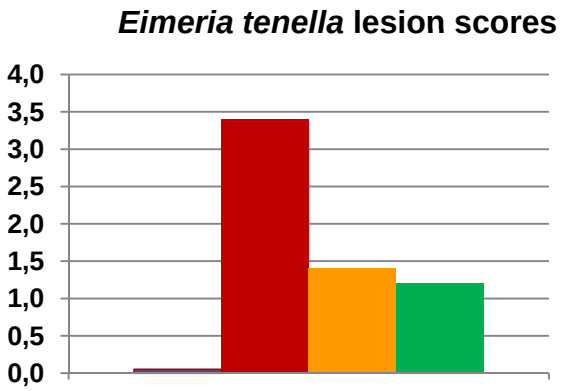


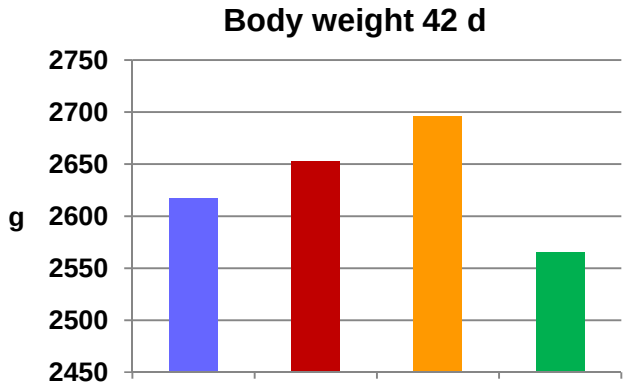


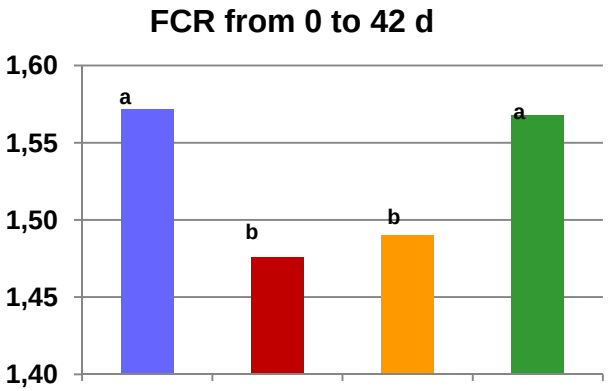


The use of Artemisinin as an anticoccidial on broiler chickens



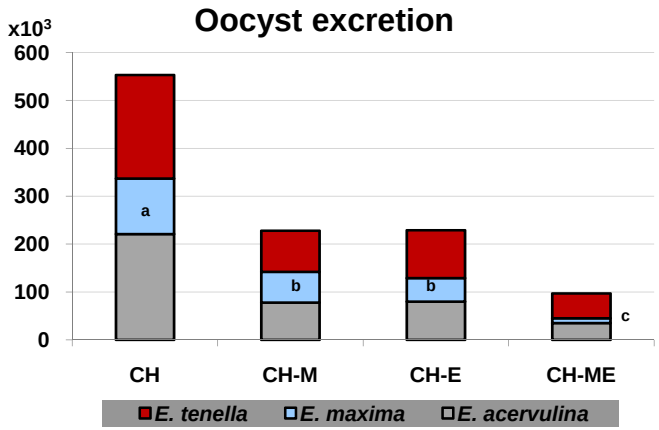


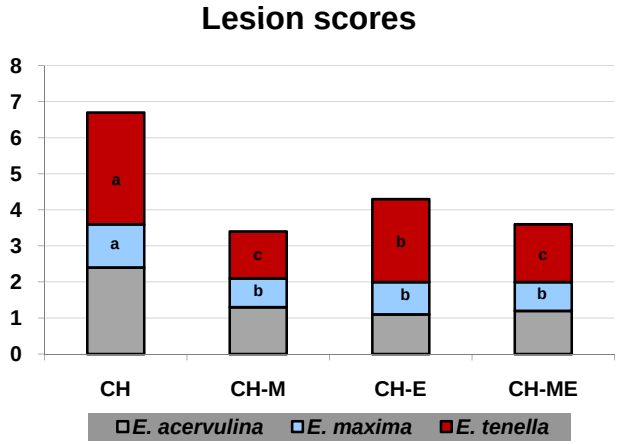


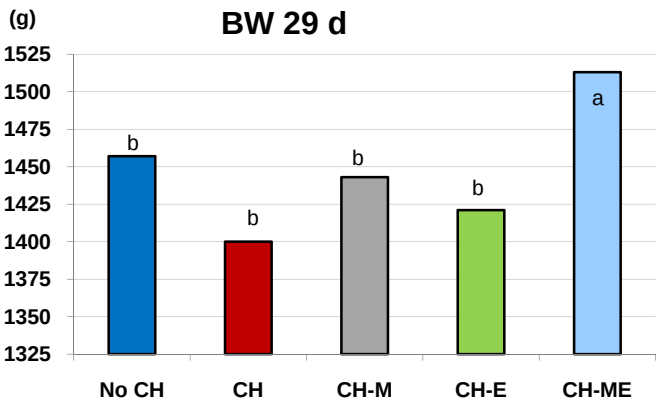


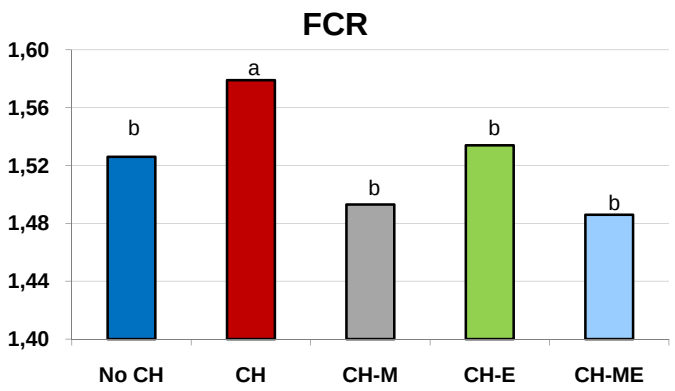
Effect of Xylanase on performance and coccidiosis infection of broiler chickens experimentally challenged with *Eimeria spp.*

CH=challenged, CH-M=challenged + monensin, CH-E=challenged + enzyme, CH-ME=challenged + monensin + enzyme



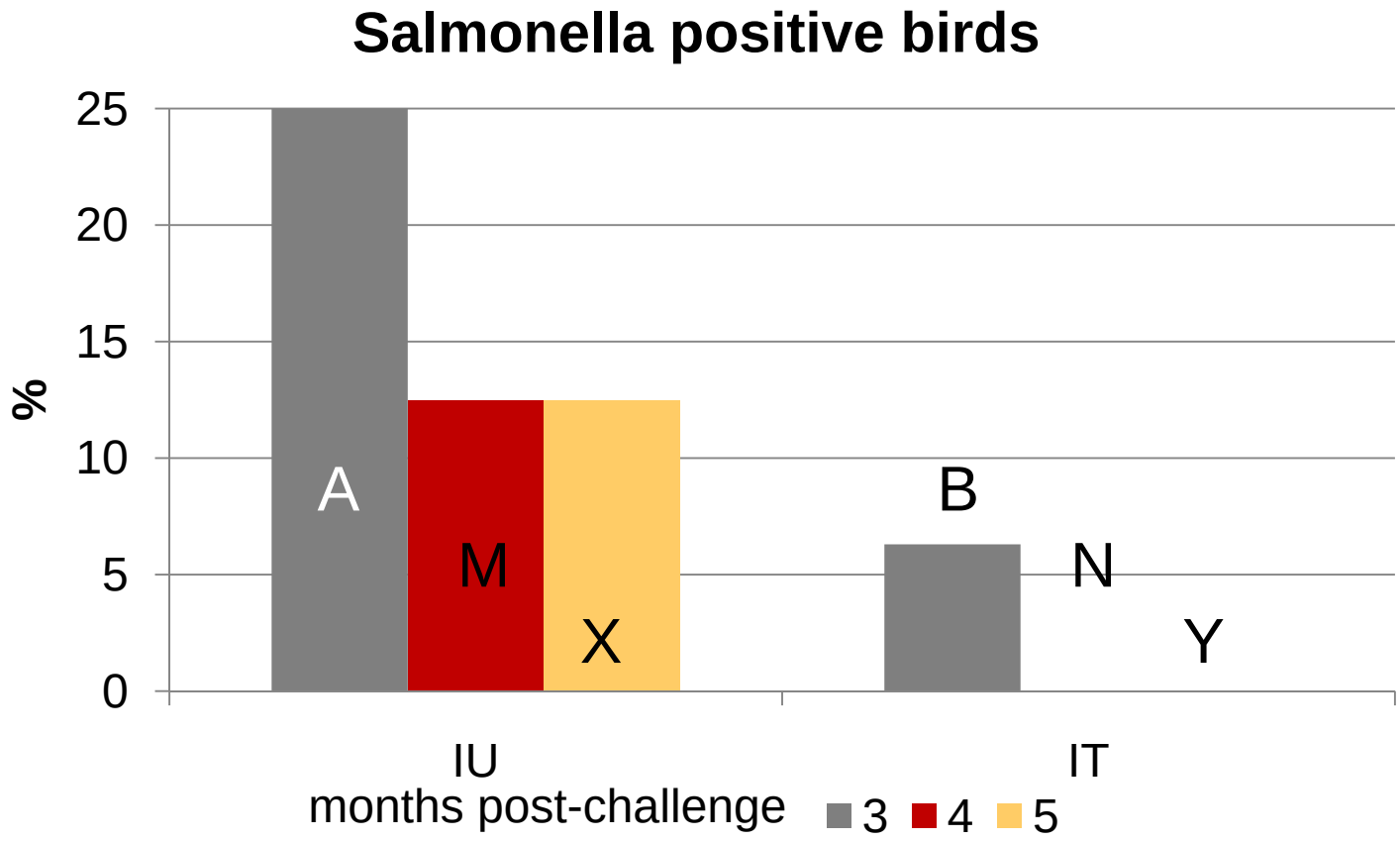




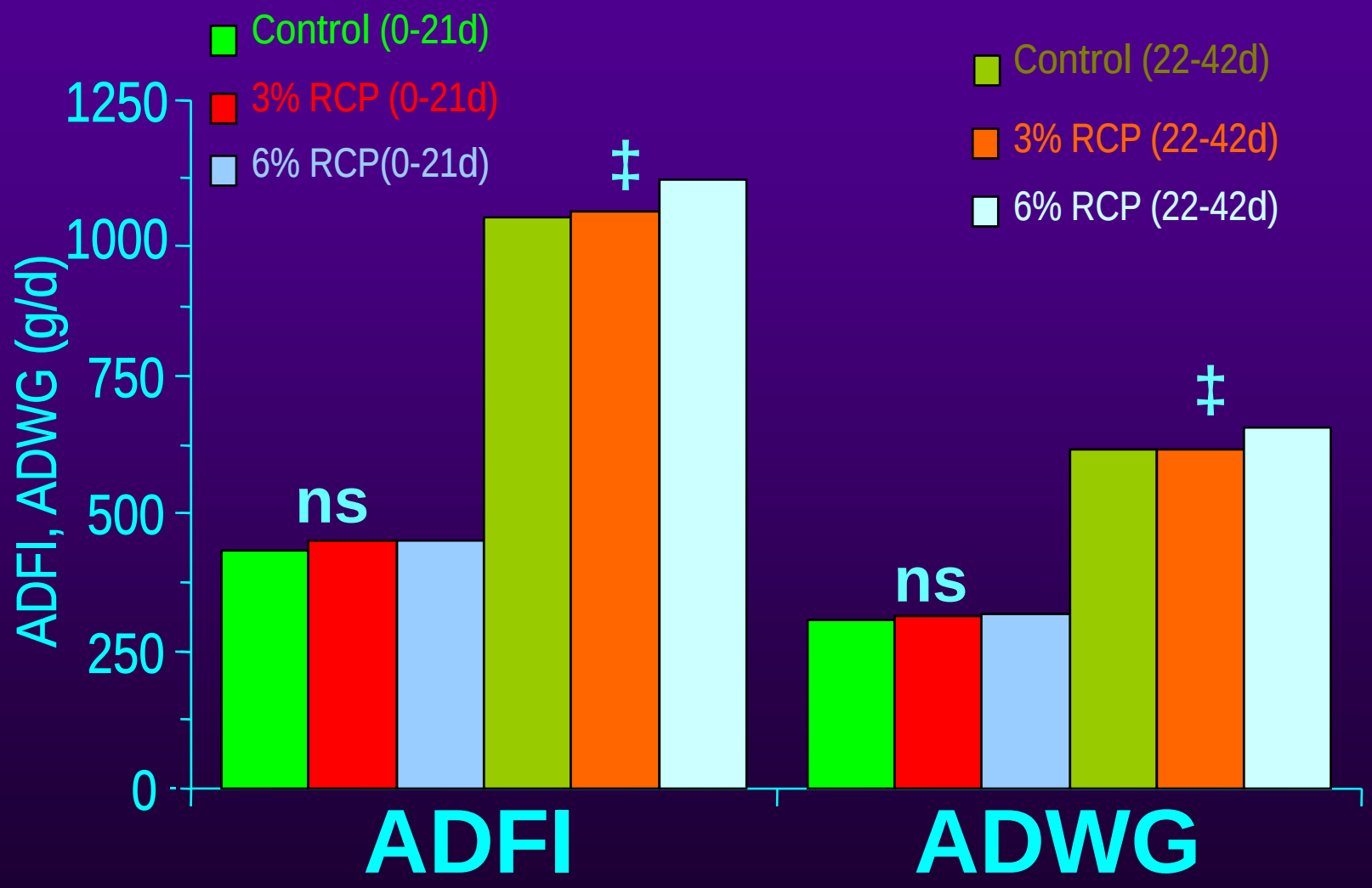


MEC AGL2005/02856-GAN

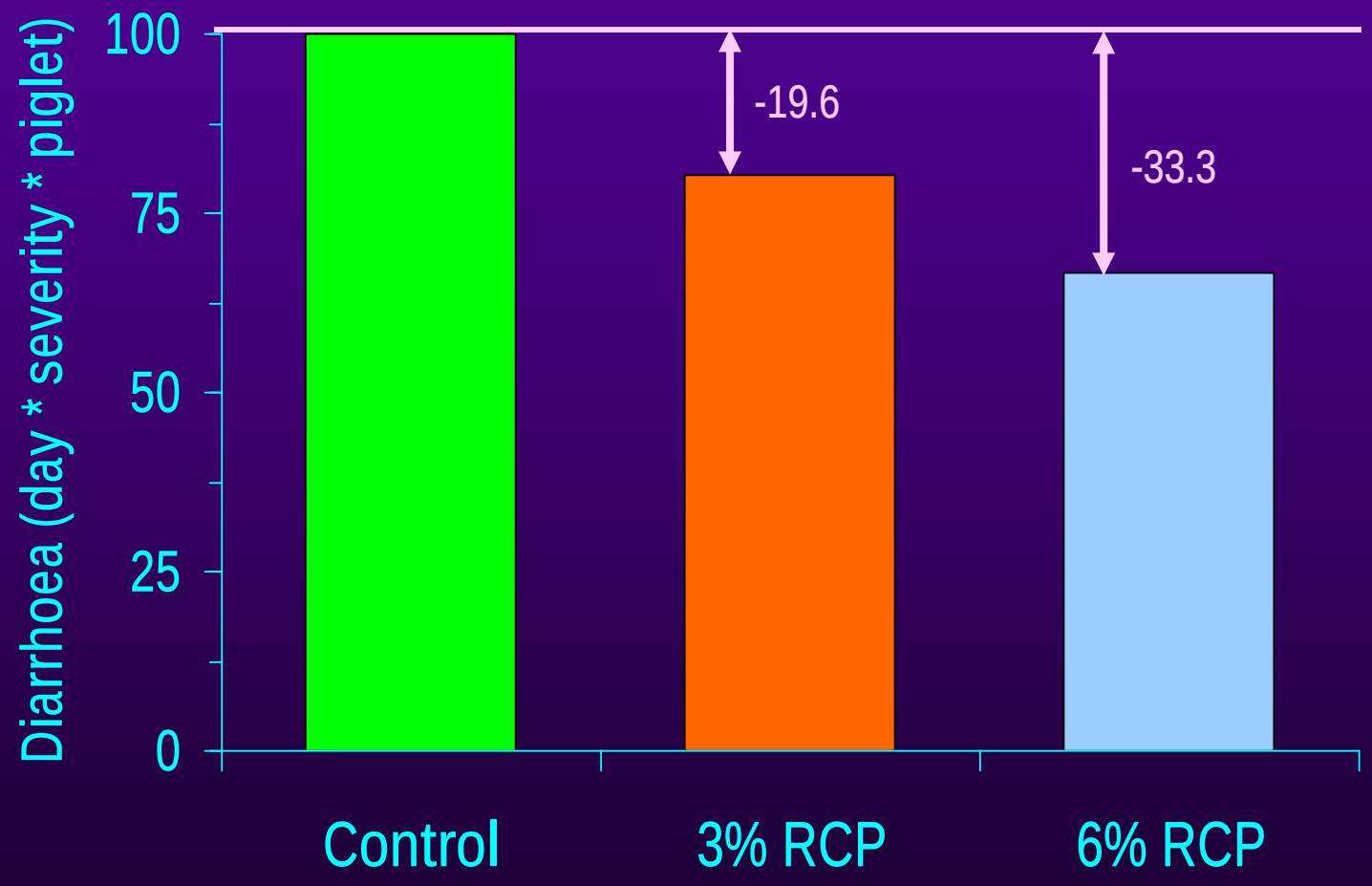
Tesina Anna Fontgibell (2009) Reduction of *Salmonella enterica* serovar Enteritidis colonization and invasion contamination /prevalence) by mannose-derived products inclusion in laying hens diet.



Feed intake, growth rate (Exp. 2)

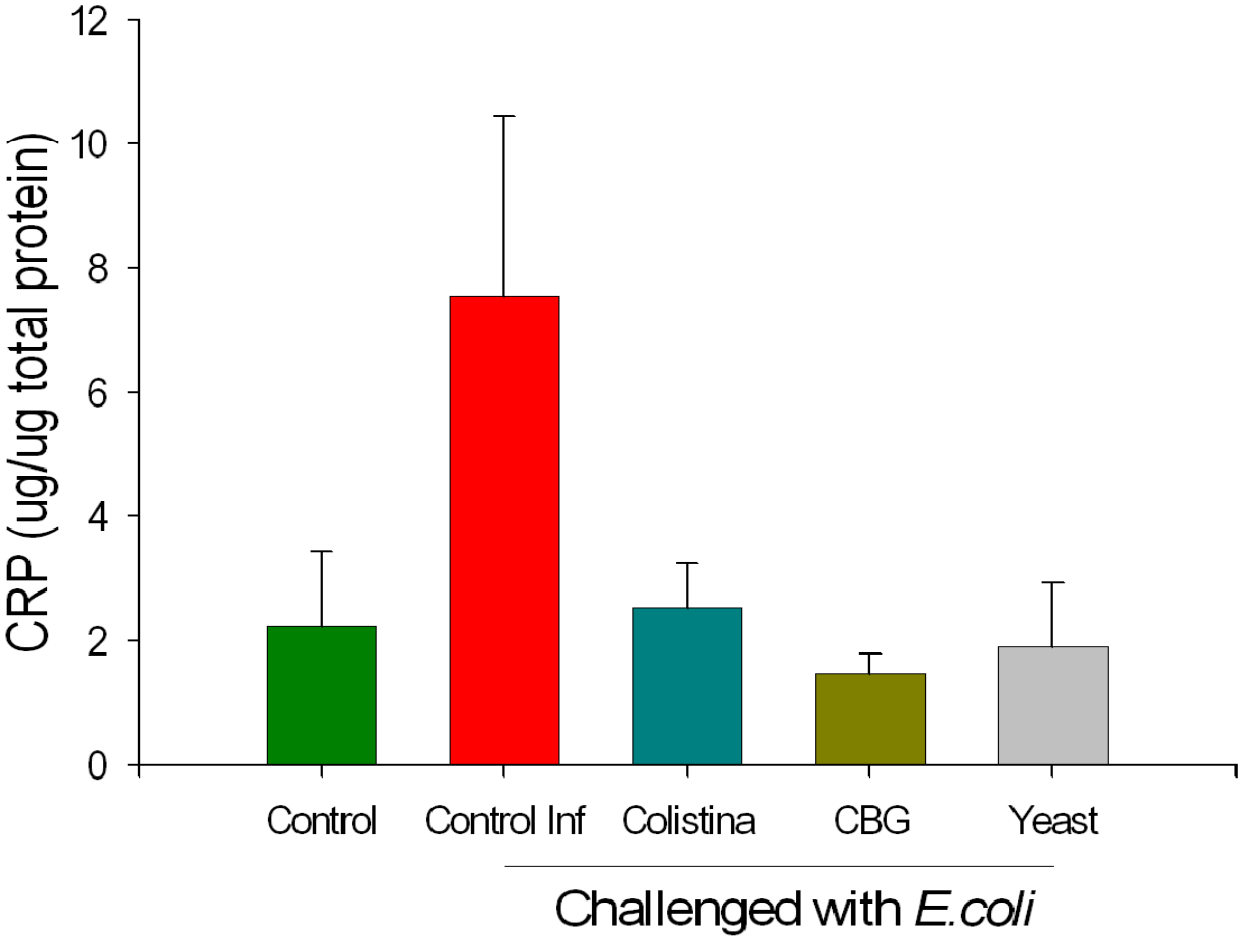


Prevalence of diarrhoea



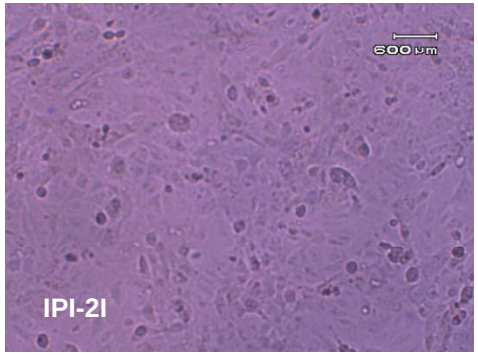
NUTRITION AND INMUNE FUNCTION

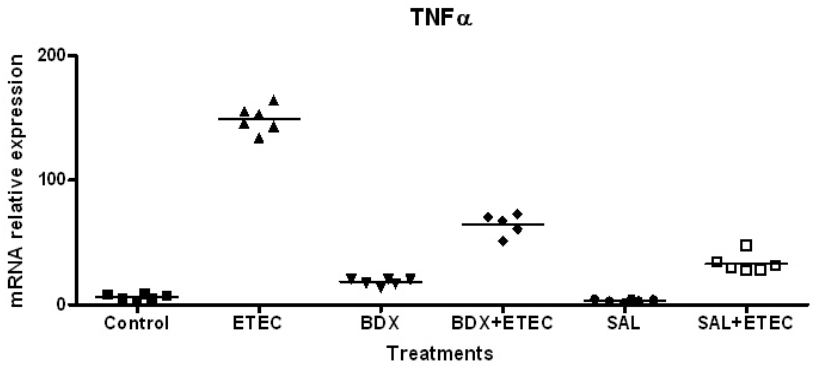
Nutrition and inmunity

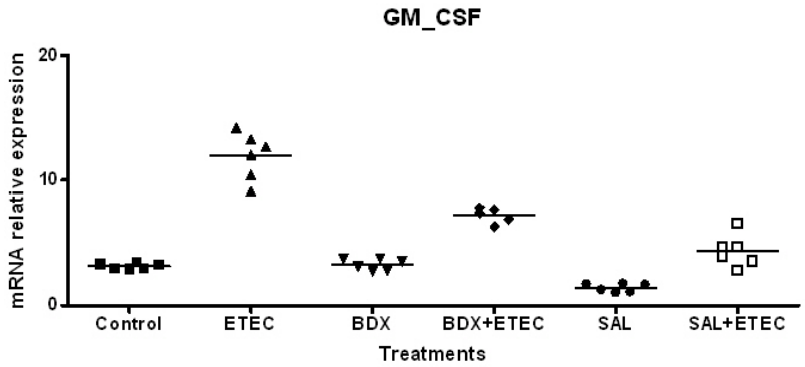


Properties of *Salmosan* i *Saccharomyces boulardii* as alternative to AGP (I)

Model *in vitro* infection (*E.coli* K88) in an porcine intestinal cell line (IPI-2I)



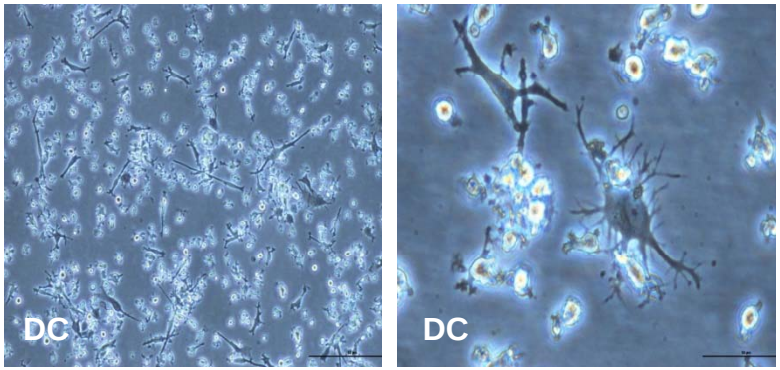


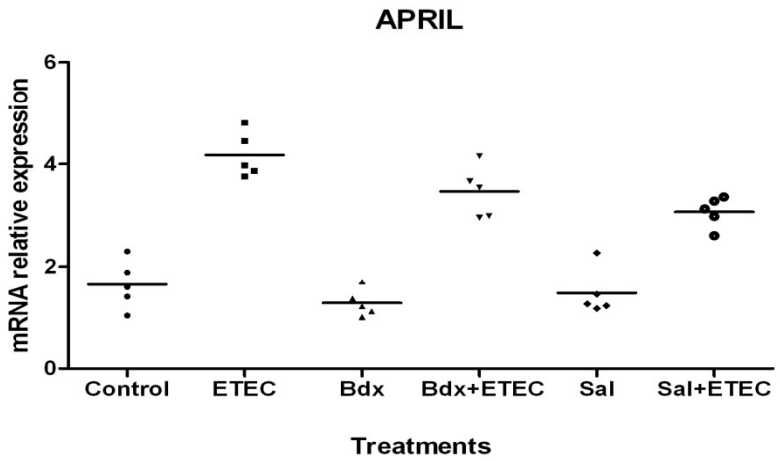


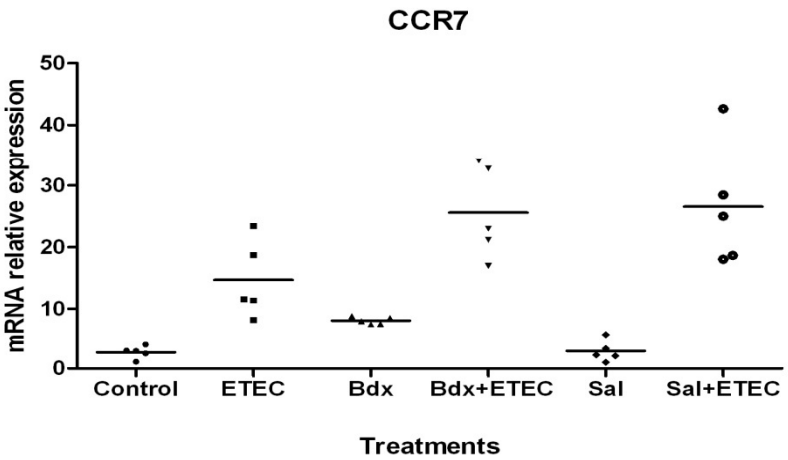
*Reduction of levels of proinflamatory cytokines in cells infected with *E.coli* and treated with *S.boulardii* i Salmosan

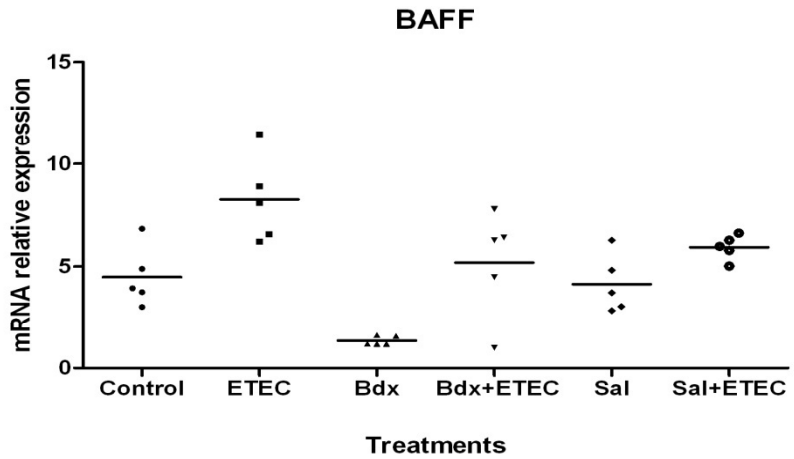
Properties of *Salmosan* i *Saccharomyces boulardii* as alternative to AGP (I) (II)

Model of *in vitro* infection (*E.coli* K88) on dendritic porcine cells





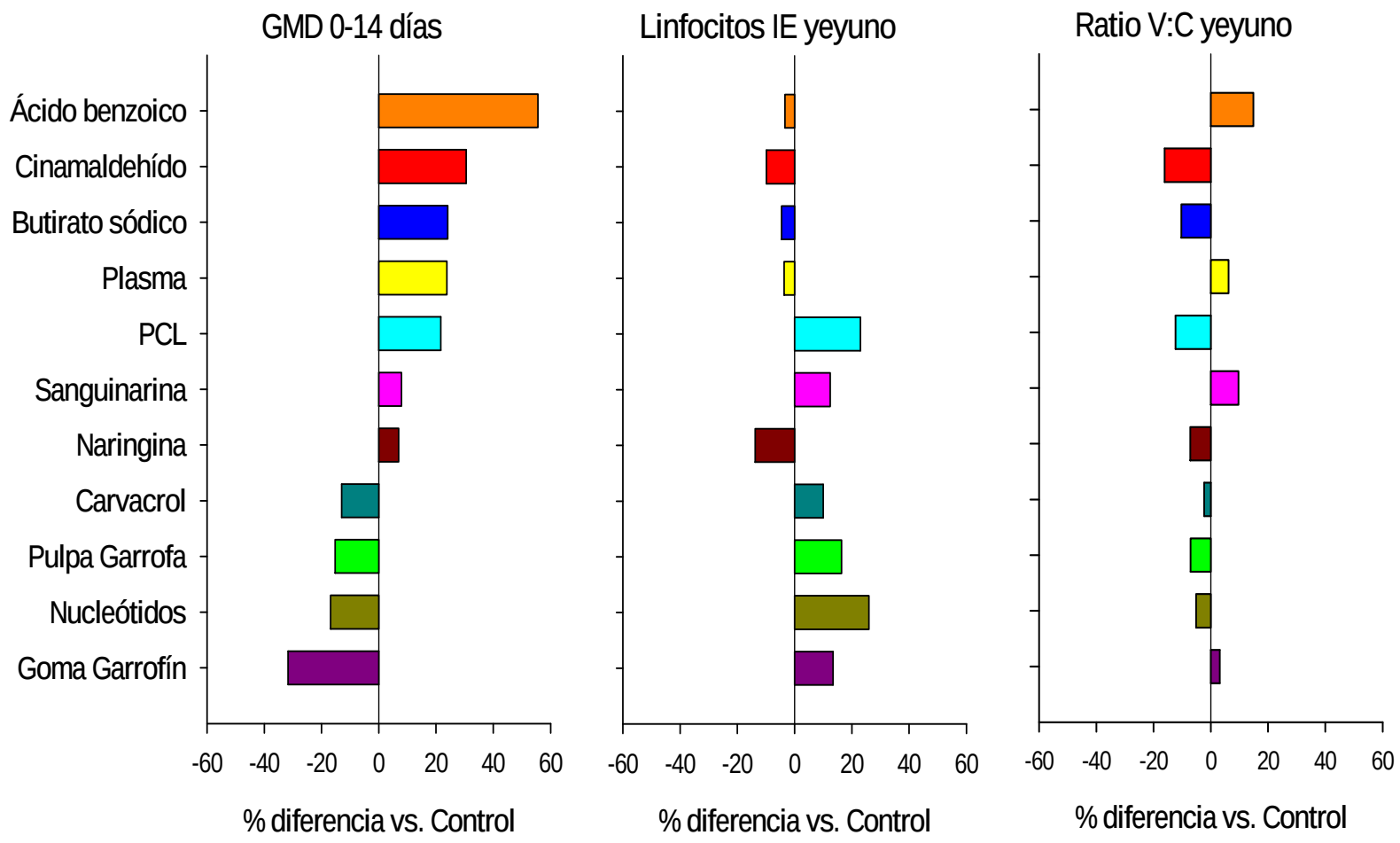




Yeast cell walls and inmune challenge

Trials* (2007-2008)	Type of bird	Days	Challenge	Treatment	Body weight, g	Feed conversion
Irta-1 (Spain)	Broiler	0-21d	no	control	749	1.34
Irta-1 (Spain)	Broiler	0-21d	**no**	**YCW**	**744**	**1.33**
Irta-1 (Spain)	Broiler	0-21d	LPS-*E. coli*[1]	control	685	1.40
Irta-1 (Spain)	Broiler	0-21d	**LPS-*E. coli*[1]**	**YCW**	**693**	**1.34**
Irta-2 (Spain)	Leghorn	0-15 d	*Salmonella*[2]	control	135	3.54
Irta-2 (Spain)	Leghorn	0-15 d	***Salmonella*[2]**	**YCW**	**148**	**3.23**
Irta-3 (Spain)	Broiler	0-21 d	*Salmonella*[2]	control	766	1.41
Irta-3 (Spain)	Broiler	0-21 d	***Salmonella*[2]**	**YCW**	**800**	**1.32**
Irta-4 (Spain)	Broiler	0-28 d	*Salmonella*[2]	control	1307	1.52
Irta-4 (Spain)	Broiler	0-28 d	Salmonella2	YCW	1378	1,51

Feed for pig health



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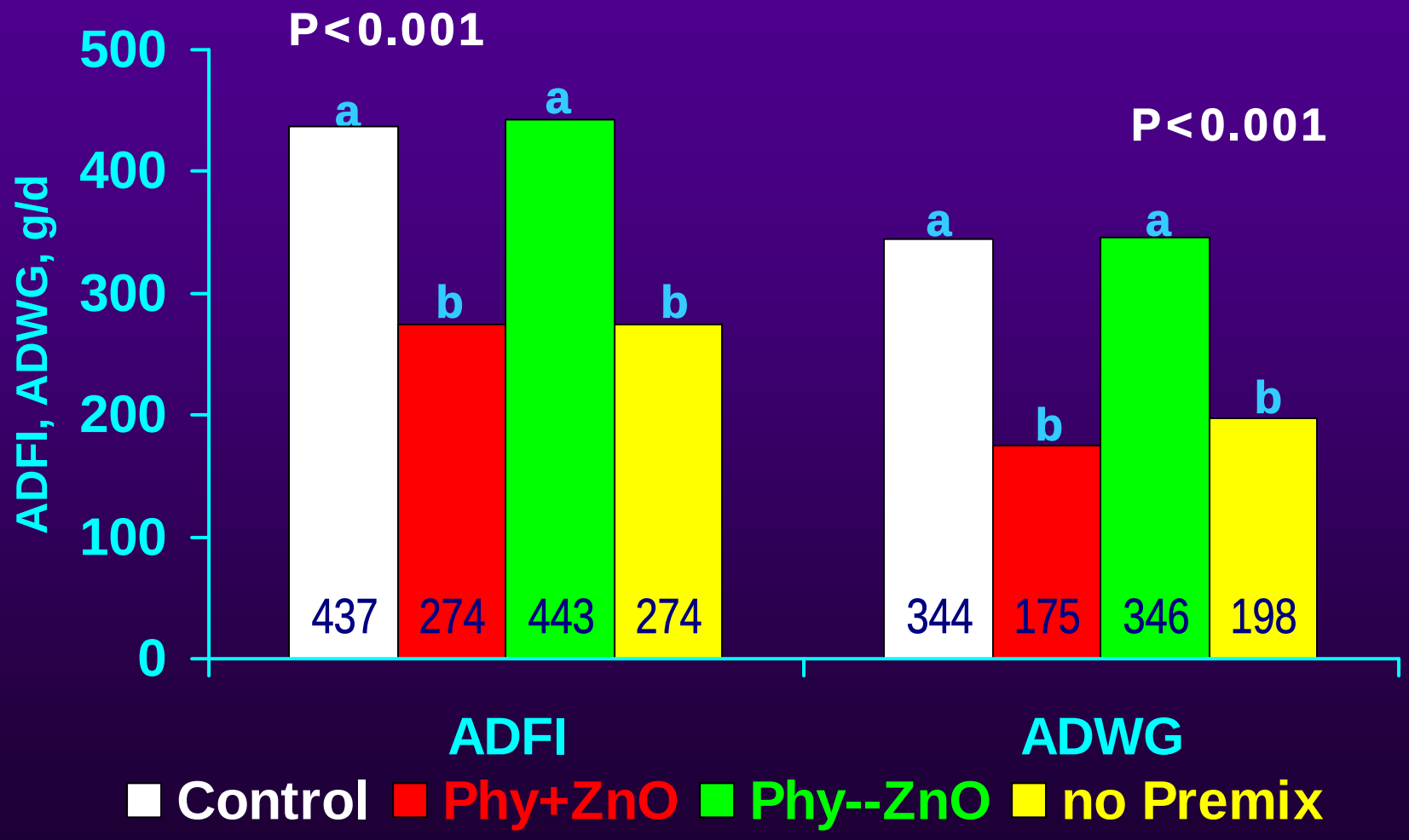
ENZYMES

Feed intake, growth performance after weaning (0-33 days)



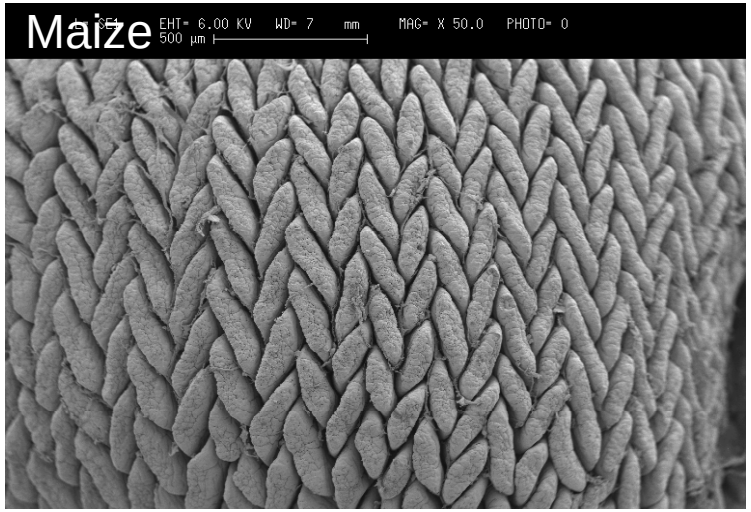
T1: normal-P, no phytase + ZnO

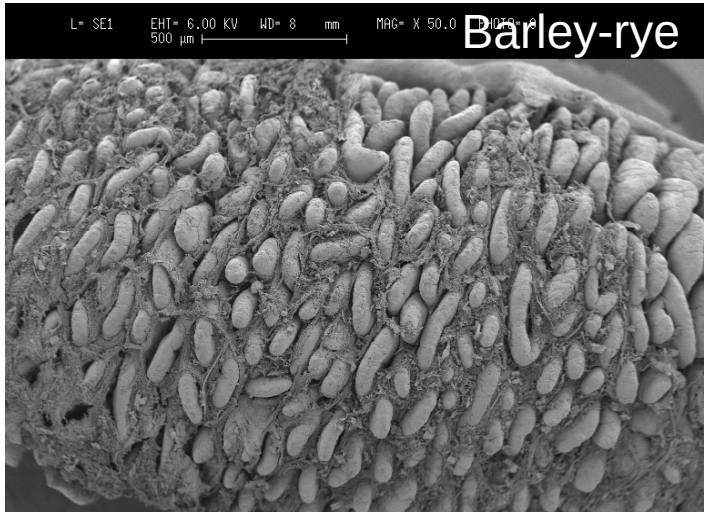
T2: Low-P+Phytase + ZnO

T3: Low-P+Phytase, no ZnO

T4: Low-P +Phytase +ZnO, --Vit Min

Scanning electron micrographs of the small intestinal mucosa of broilers fed maize or barley-rye diets

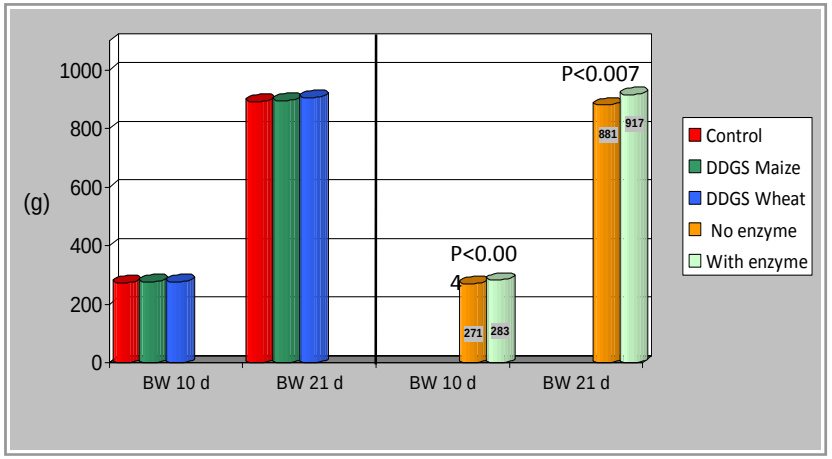




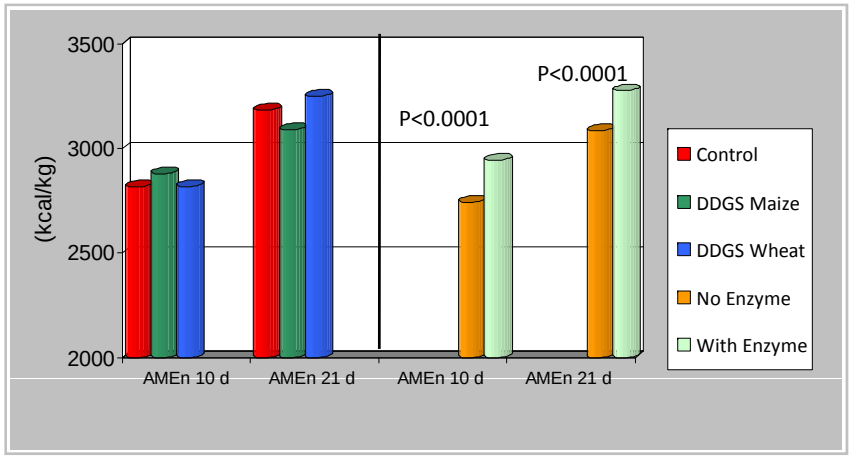
USE OF DDGS IN POULTRY

Treatment	Diet	Enzyme (g/kg)
T-1	0% DDGS	0
T-2	10% Maize DDGS	0
T-3	10% Wheat DDGS	0
T-4	0% DDGS	2
T-5	10% Maize DDGS	2
T-6	10% Wheat DDGS	2

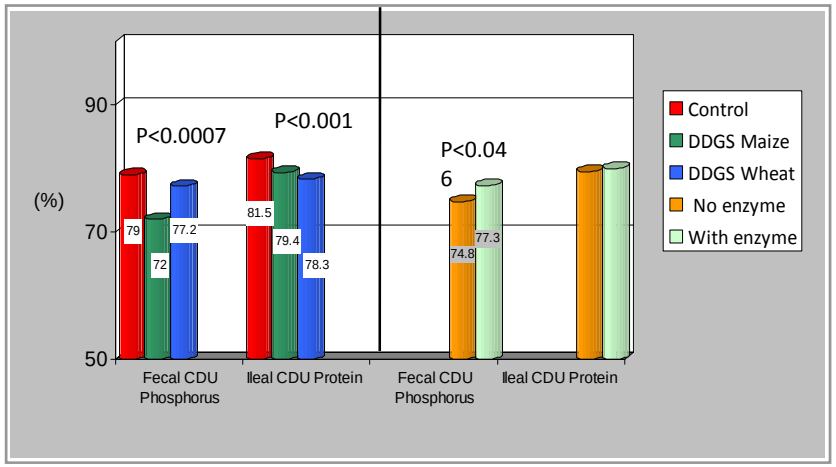
Effects of type of diet and enzyme addition on body weight of 20 d broilers



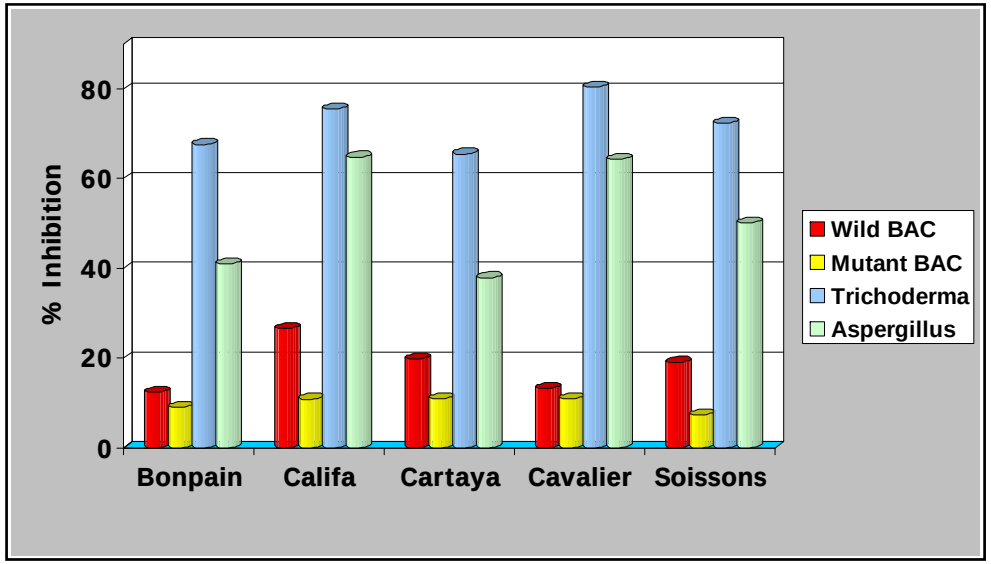
Effects of type of diet and enzyme addition on metabolizable energy



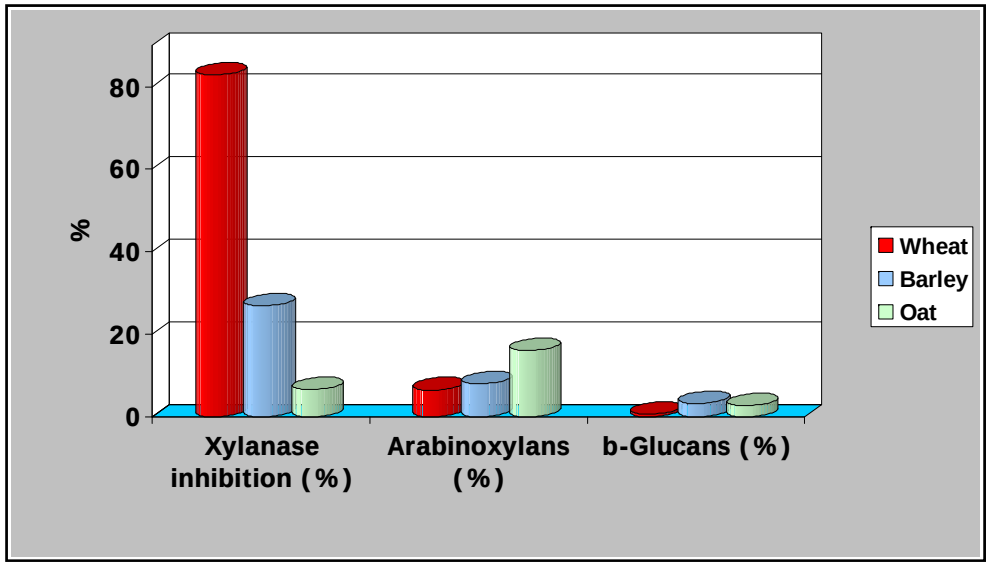
Effects of type of diet and enzyme addition on coefficents of digestive utilization of phosphorus and protein



XYLANASE INHIBITORS



Variability of xylanase inhibitor activity in different Spanish wheat cultivars. Exogenous xylanases produced by micro-organisms are inhibited in different extension

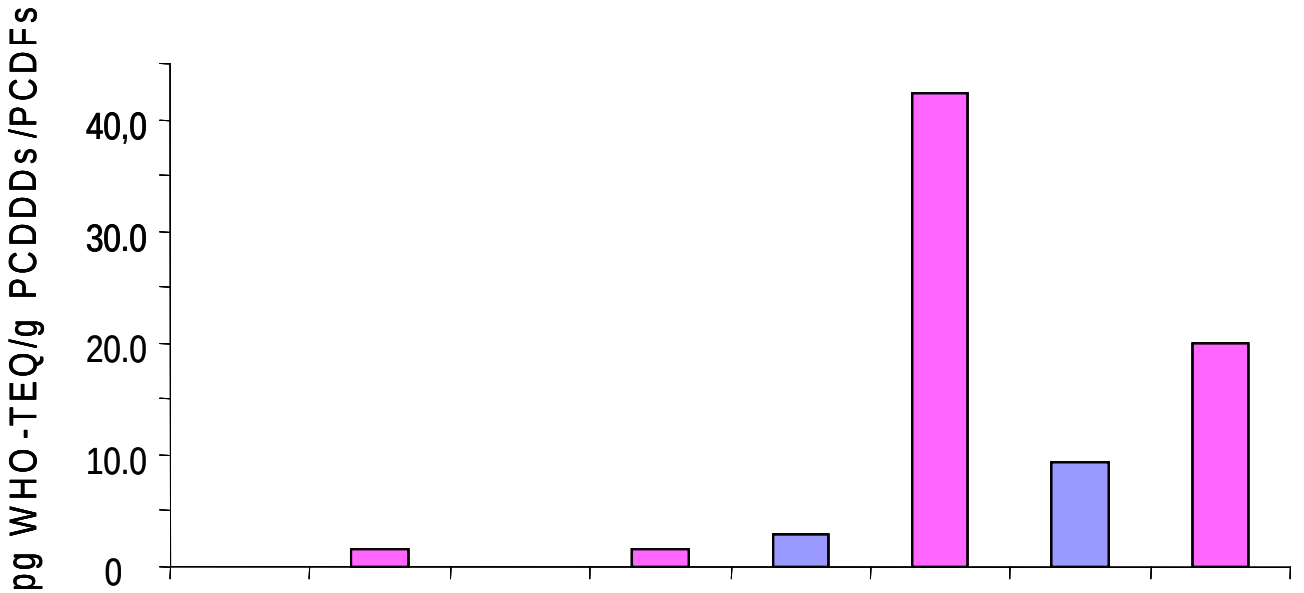


Great variability of xylanase inhibitor activity in different cereals, and no related to contents of total arabinoxylans

UNDESIRABLE SUBSTANCES

Dioxin in feed

T-1 Control Feed	T-2 3% Sepiolite	T-3 Contaminated feed	T-4 Kaolinitic clay



	Control Diet T-1	Dioxin Liver T-1	Control Diet T-2	Dioxin Liver T-2	Control Diet T-3	Dioxin Liver T-3	Control Diet T-4	Dioxin Liver T-4
Total WHO-TEQ (pg/g)	0.049	1.66	0.096	1.57	2.86	42.42	9.21	20.05

Parera et al. 2008, Chemosphere

MEAT QUALITY

Efect of protein and lysine on peformance and IMF deposition in fattening pigs

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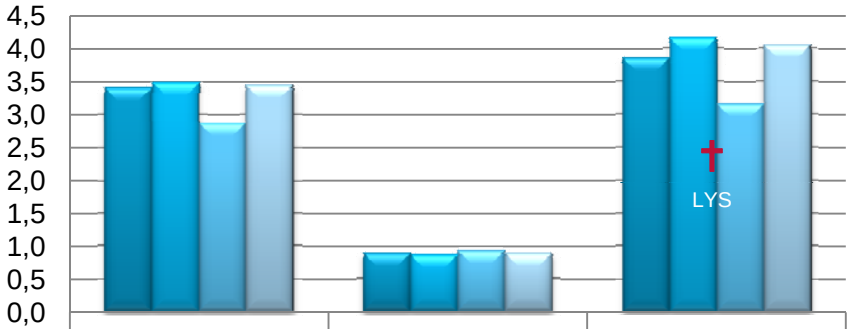
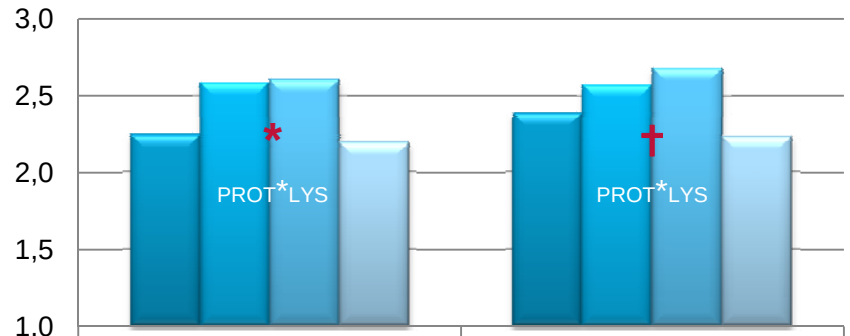
Growing parameters



	ADFI (Kg/day)	ADG (Kg/day)	FGR
C	3,39	0,88	3,85
LL	3,47	0,85	4,15
LP	2,86	0,92	3,15
LLP	3,44	0,88	4,05

IMF content



	Folch (%)	NIT (%)
C	2,24	2,38
LL	2,58	2,57
LP	2,6	2,68
LLP	2,19	2,23

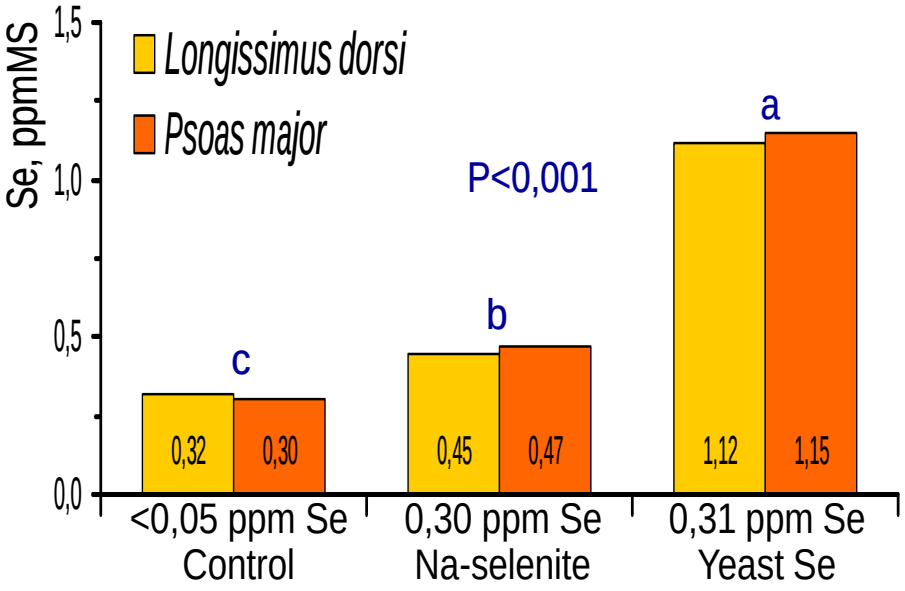
Influence of the dietary source and level of Se on performance and Se content of pig meat

R.Lizardo, A.Pérez, N. Ballet, E. Auclair, J.Brufau

IRTA - Nutrición Animal, Espagne ; LFA – Lesaffre Feed Additives, France

Objective : Evaluate the efficacy, tolerance adn enrichment of Se in the meat, by supplementation of yeast-Se (Selsaf®) in pig diets

	Control 0,05 ppm	Selenite 0,30 ppm	yeast-Se 0,31 ppm	yeast-Se 5,40 ppm	P
ADG	593	597	560	570	NS
IT	1,62	1,62	1,67	1,61	NS
Hématies	7,4	7,0	7,1	7,2	NS
Leucocytes	18,6	19,5	16,7	17,8	NS
Hémoglobin	12,2	11,4	12,4	11,8	NS

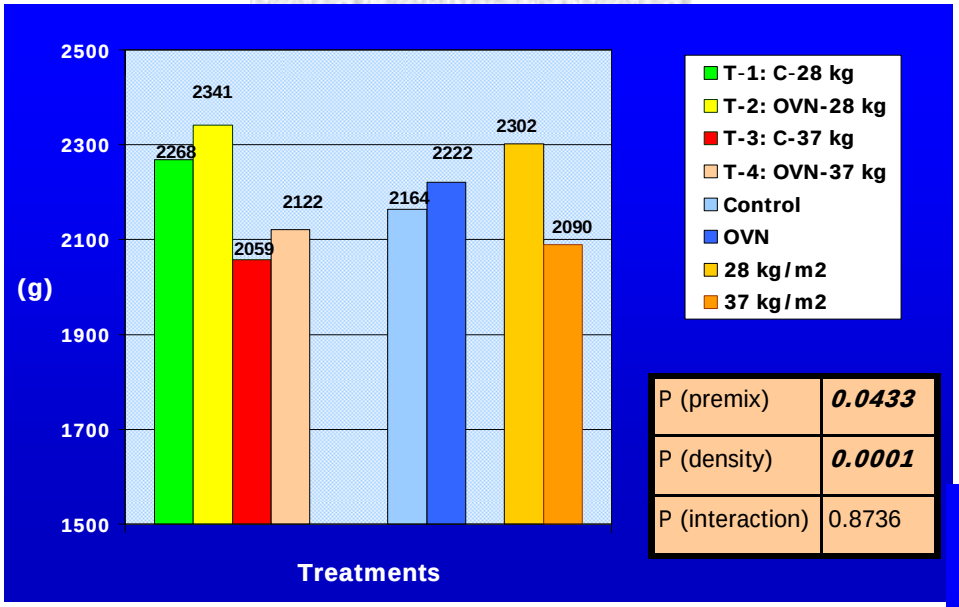


Conclusions: Yeast-Se is well tolerated by pigs. Organic Se results in higher incorporation in meat. Enrichment of pig meat is more efficient with yeast-Se.

rosil.lizardo@irta.es

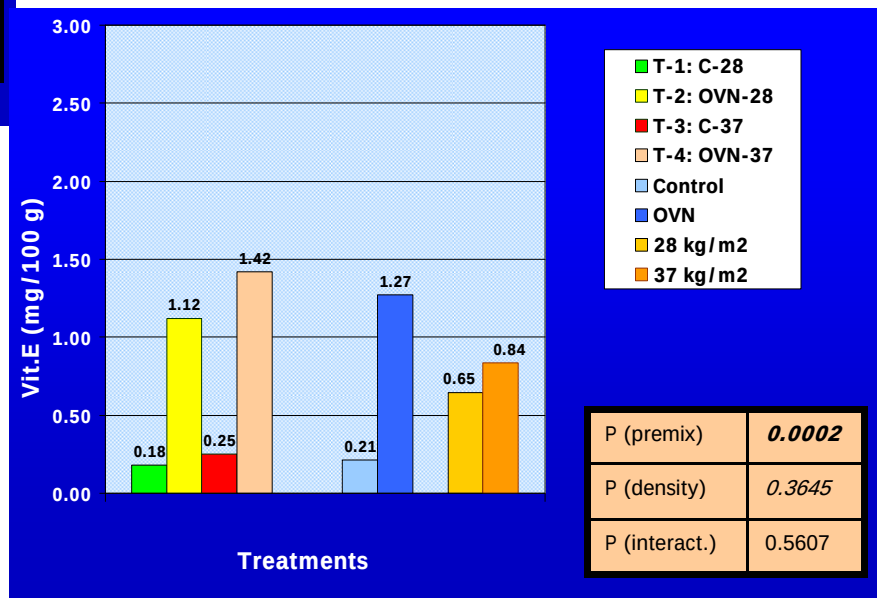
VITAMIN LEVELS IN POULTRY

Body weight at 40 d



P (premix)	***0.0433***
P (density)	***0.0001***
P (interaction)	0.8736

Vitamin E level in breast meat



P (premix)	***0.0002***
P (density)	*0.3645*
P (interact.)	0.5607

Thank you