Federal University of Pelotas
Center for Research, Teaching and Extension in Animal Science
University of Illinois
Mammalian Nutriphysiogenomics Laboratory

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Urbana, 04-26-2012

INTRODUCTION

- **Center for Research, Teaching and Extension in Animal Science**
- **Veterinarian Medicine University - UFPel**

INTRODUCTION

What we do?

The begining...

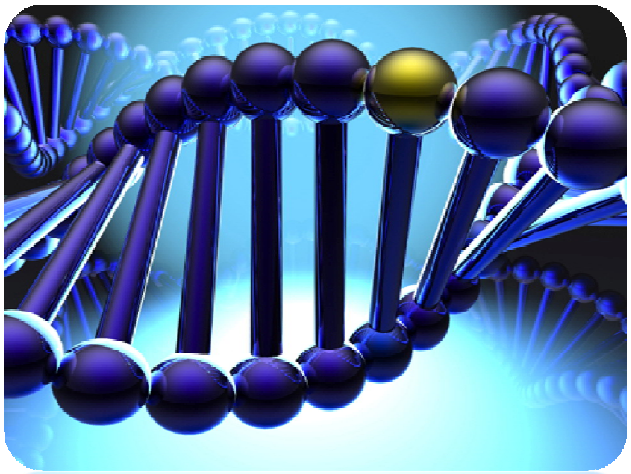
✓ **Knowlegde from Eduardo Schmitt;**

✓ **An idea: study gene expression related with our focus: metabolism**

✓ **Think and development a project**

✓ **Project: fatty acids thought generations in rats**

✓ **Epigenetics group**



The begining...

Recent Advances in Nutritional Sciences

THE JOURNAL OF BIOLOGICAL CHEMISTRY
Vol. 277, No. 3, Issue of January 18, pp. 1703–1711, 2002

Printed in U.S.A.

Polyunsaturated Fatty Acids Suppress Sterol Regulatory Element-binding Protein 1c Promoter Activity by Inhibition of Liver X Receptor (LXR) Binding to LXR Response Elements*

Burdge and Lillycrop *Genome Medicine* 2010, 2:80

Cross-Talk between Peroxisome Proliferator-Activated Receptor (PPAR) α and Liver X Receptor (LXR) in Nutritional Regulation of Fatty Acid Metabolism. I. PPARs Suppress Sterol Regulatory Element Binding Protein-1c Promoter through Inhibition of LXR Signaling

ScienceDirect

NEUROTOXICOLOGY AND

Identification of Liver X Receptor-Retinoid X Receptor as an Activator of the Sterol Regulatory Element-Binding Protein 1c Gene Promoter

lactation cause impaired neural transmission in rat pups

The project...

Linoleic and α-Linolenic fatty acids consumption throughout generations can regulate the expression of nuclear receptors related to lipid metabolism

Carolina B. Jacometo, Eduardo Schmitt, Luiz F. M. Pfeifer , Augusto Schneider, Marcio N. Corrêa, Francisco A. B. Del Pino, Francielle Bado, Fernanda T. da Rosa, Simone Halfen, Nelson J. L. Dionello

jbc THE JOURNAL OF BIOLOGICAL CHEMISTRY

Aim of project…

- **Was to investigate the effects of diets, rich in omega-3 and omega-6, consumed throughout three generations, on biochemical parameters and the expression level of some genes related to lipid metabolism**

Materials and methods...

8 weeks old

21-23°C
60-70% RU
12:12h light

Materials and methods...

G0

G OM (n=18)

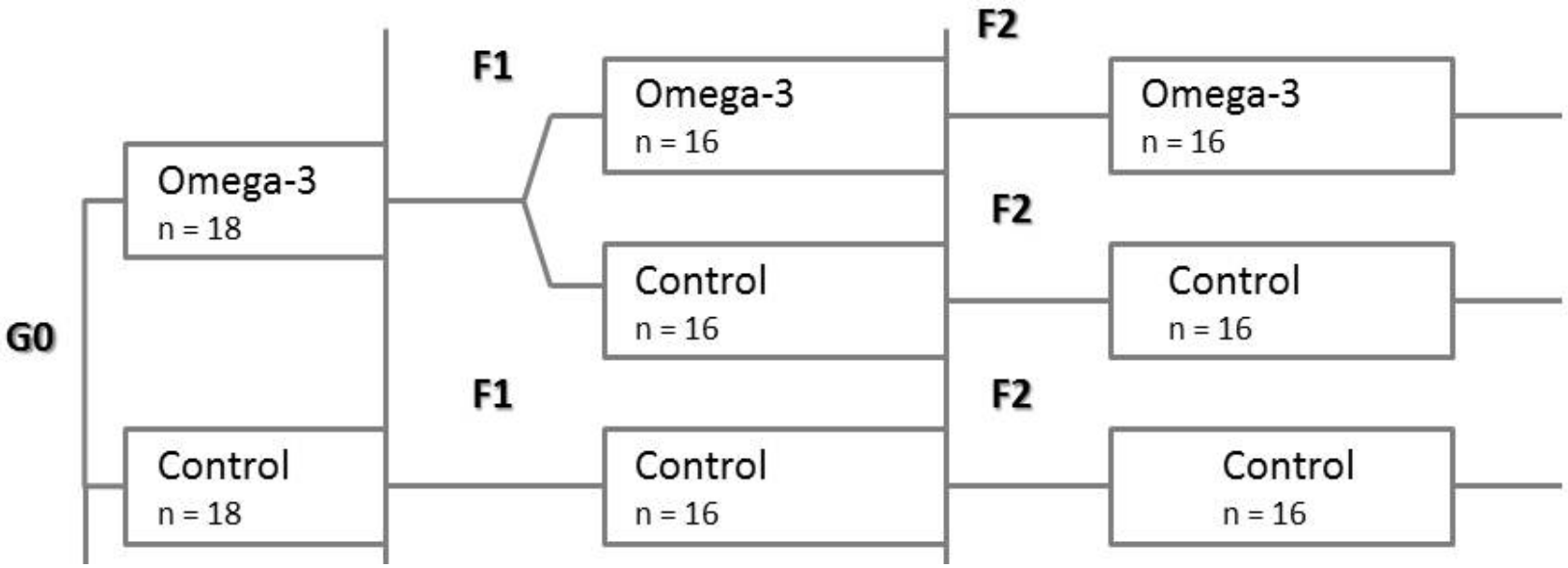
G CTL (Females - n=18; Males – n=12)

AIN-93 G

G OM

G CTL

Materials and methods...



Materials and methods...

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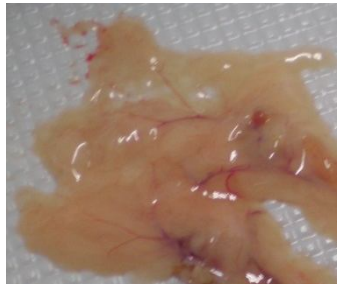
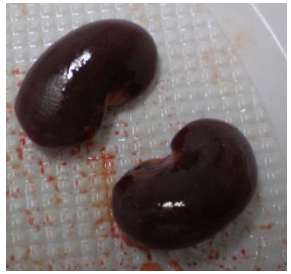
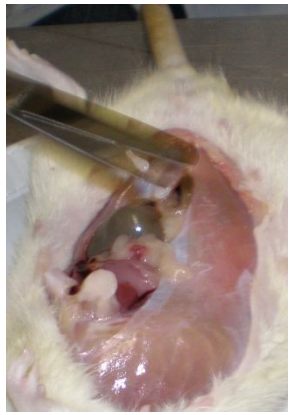
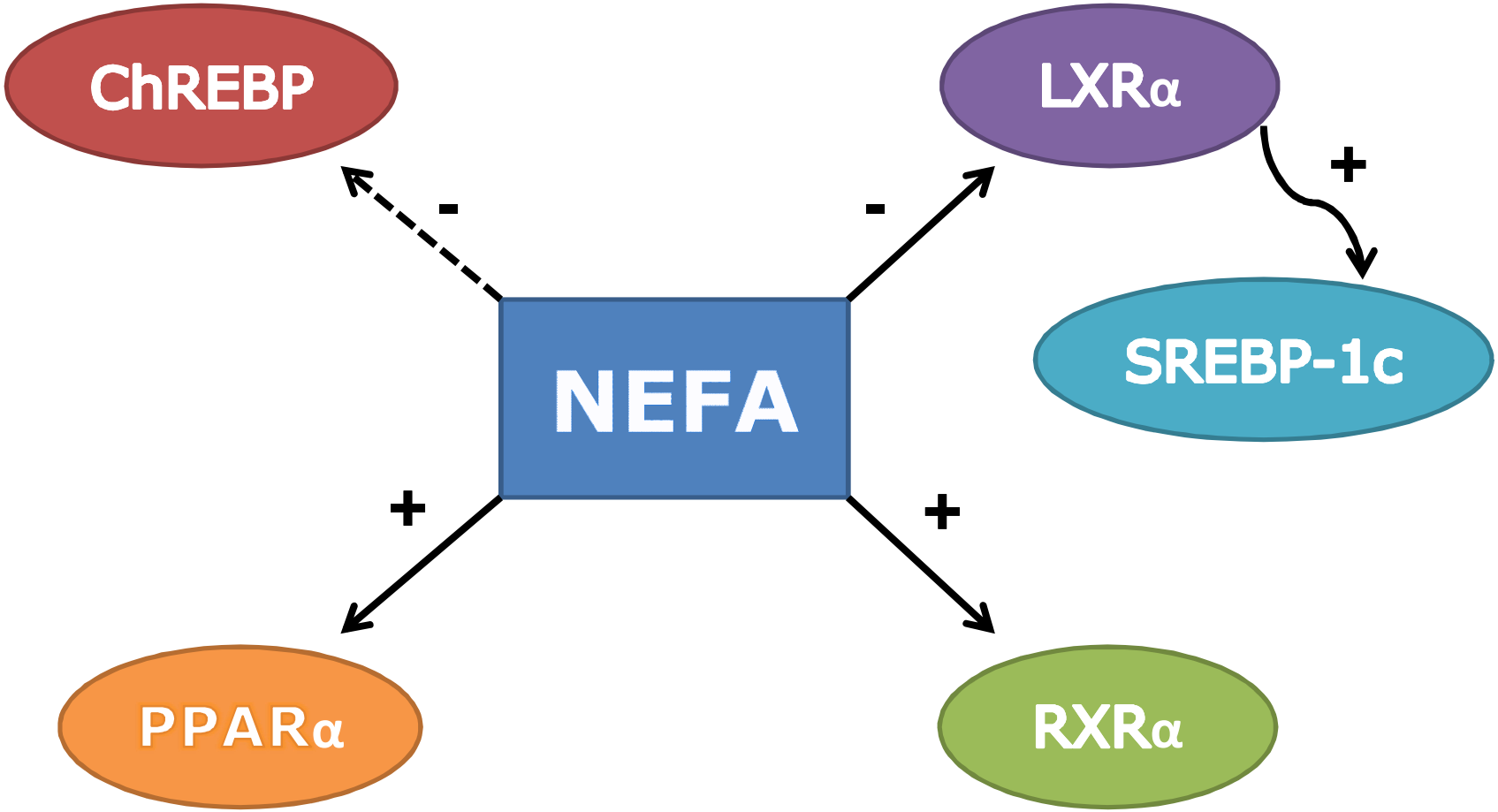




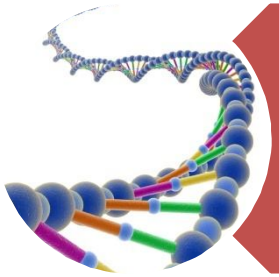


Materials and methods...



GAPDH | ATCB | 18S

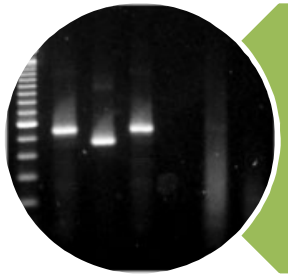
Materials and methods.....



RNA extraction

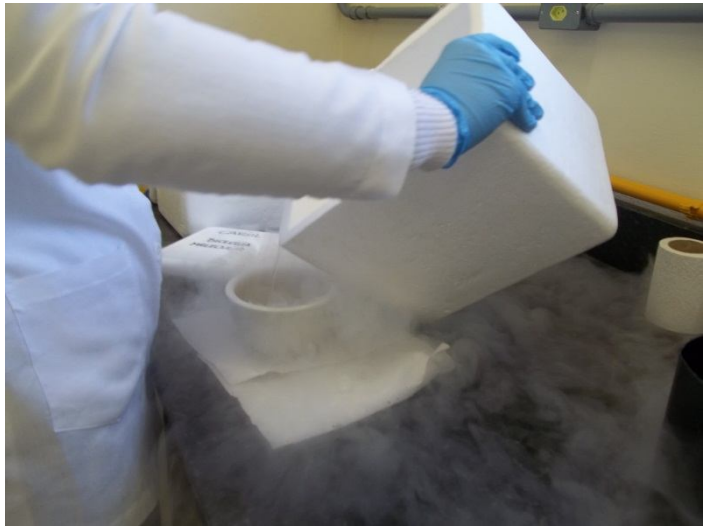
Selection the Primers

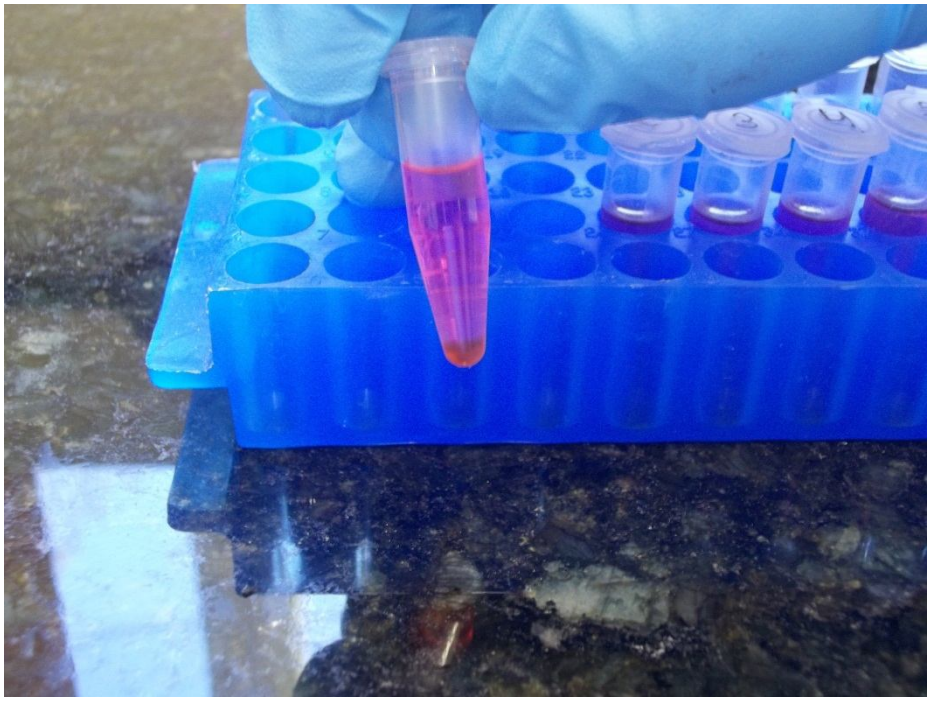
RT-qPCR



Analysis of results

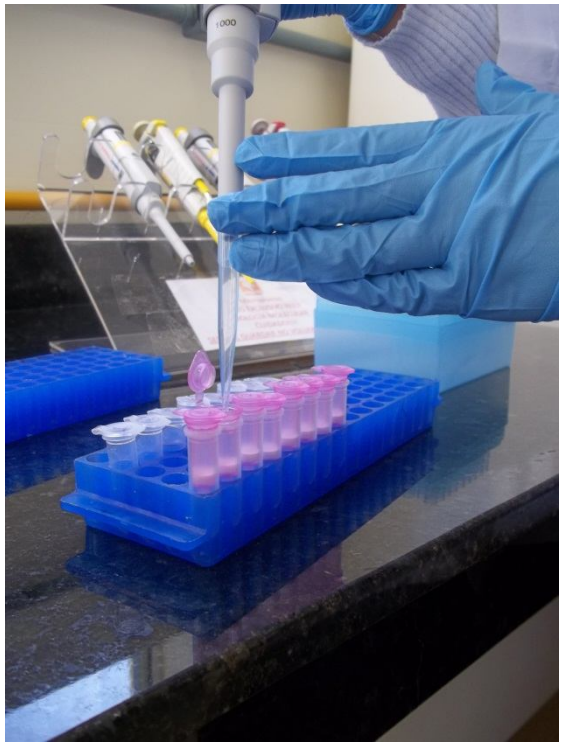
RNA extraction

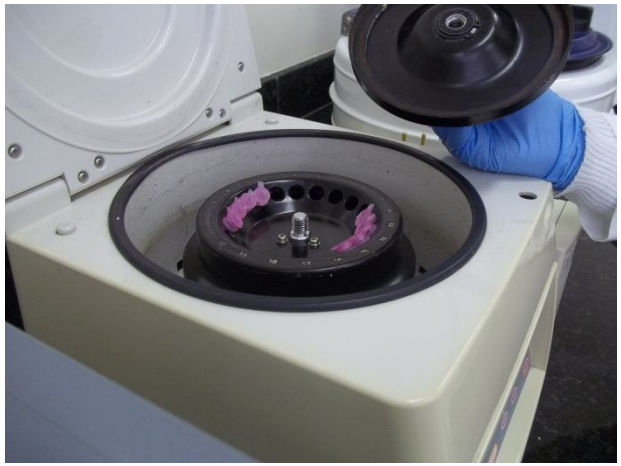


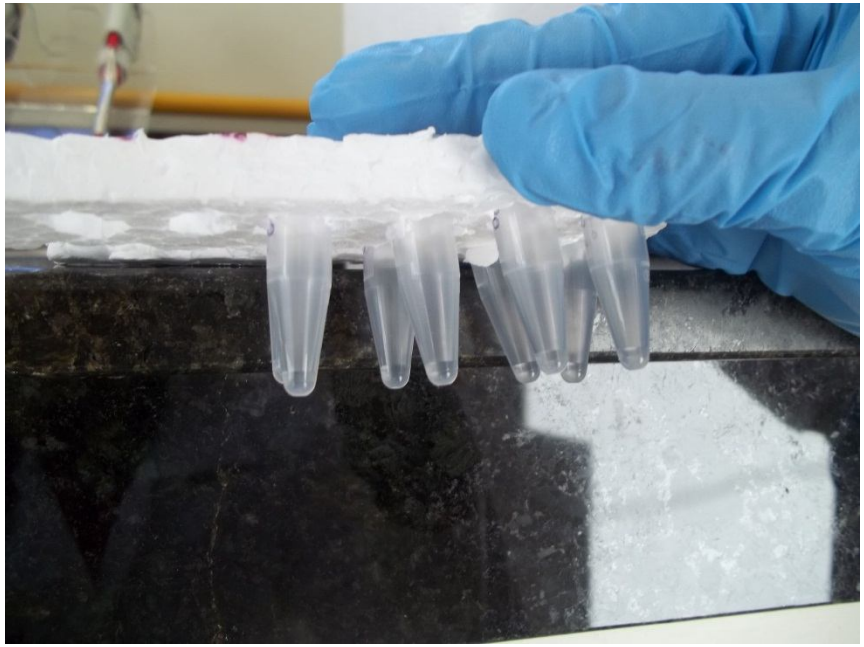


TRIZOL

Purification…





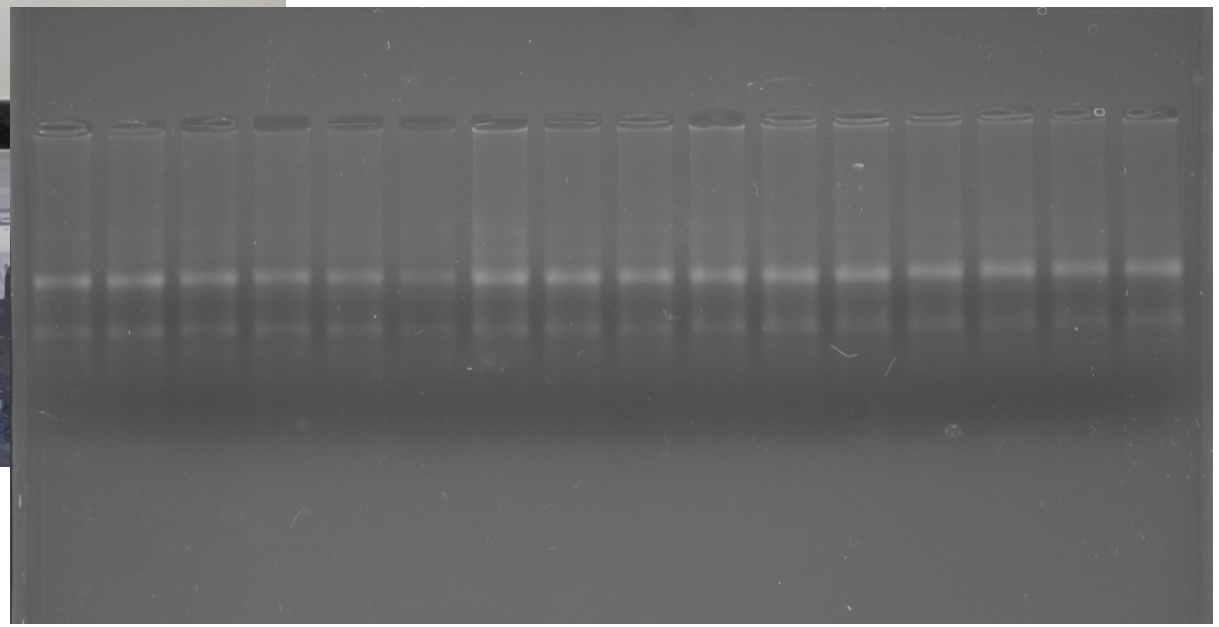


Rneasy columns;
Rnase free Dnase treatment
(Quiagen)

Quantification...

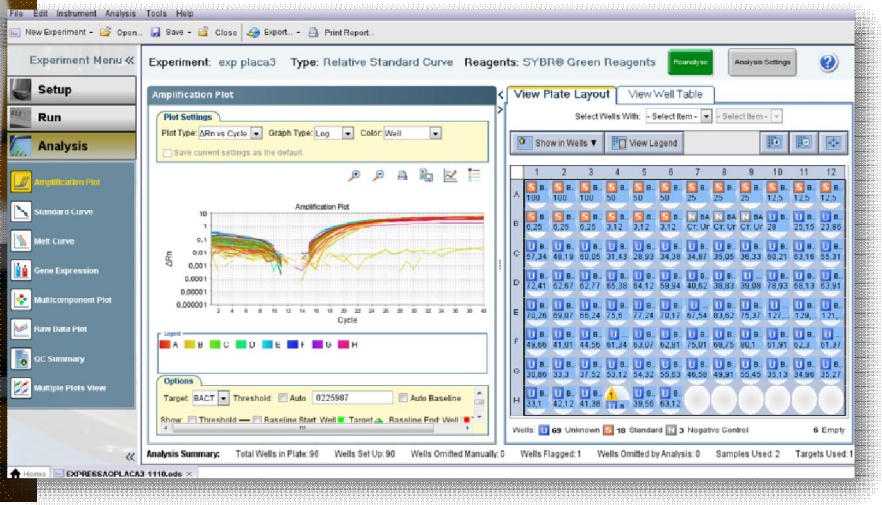
Ratio: 260nm/280nm

For good RNA quality.



RT-qPCR...


RT - PCR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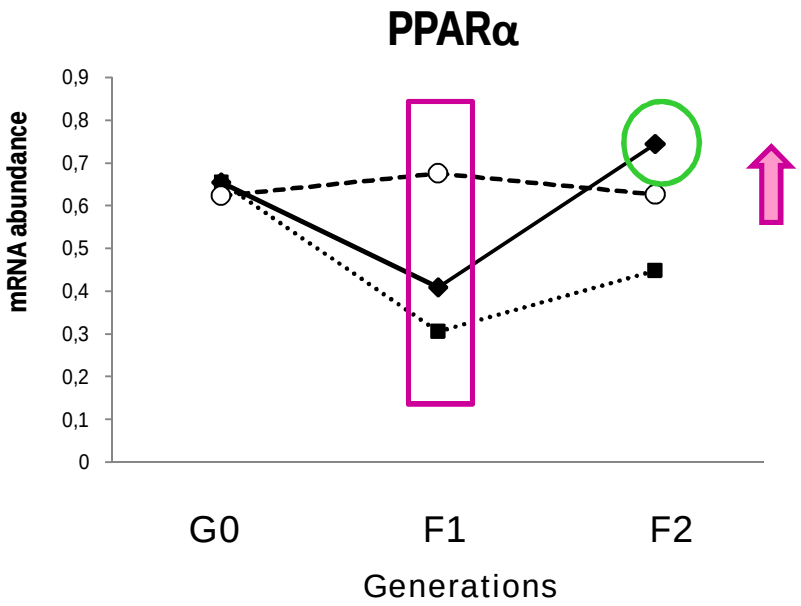
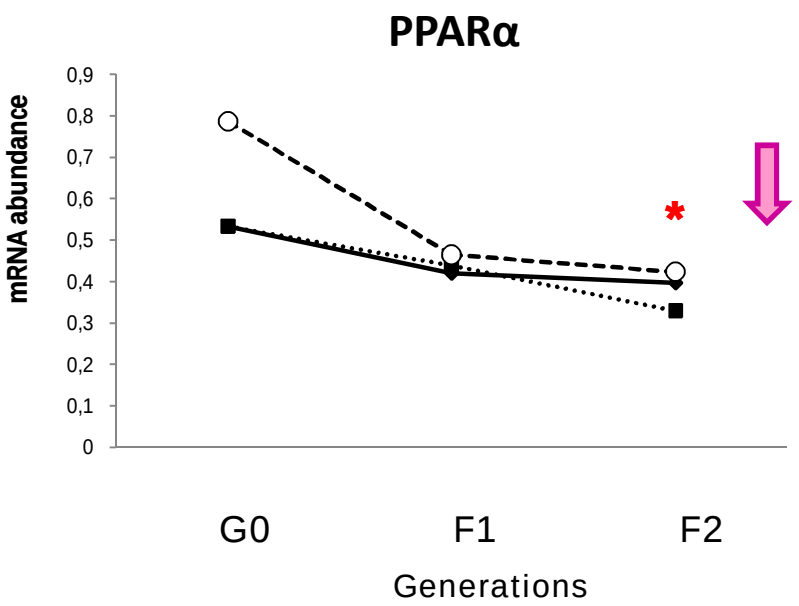
Setup
Run
Analysis
Amplification Plot
Standard Curve
Melt Curve
Gene Expression
Multicomponent Plot
Raw Data Plot
QC Summary
Multiple Plots View
Experiment: exp placa3
Type: Relative Standard Curve
Reagents: SYBR® Green Reagents
Amplification Plot
View Plate Layout
View Well Table

Some results...



PRE



POS

♦ OM
■ OMCTL
○ CTL

Results and discussion...

RXRα Had a crescent expression in all groups along generations;

SREBP-1c Difference in mRNA level only in the F1 generation postpartum;

LXRα Seems to be upregulated by PUFAs;

ChREBP Didn't show an effect of dietary PUFAs on its expression regulation.

** CTL group regulation PPAR and SREBP-1c
** methylation
** Post transcriptional regulatory mechanisms

**Nutrients from dietary: cause methylation of PPAR-alpha

Prospects...

DNA methylation is the major epigenetic modification that controls gene expression in physiologic and pathologic states (Barres, R., and Zierath, J. R. 2011).

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- **It must be the next step of this study, and might answer the control throughout generations that could not be explained by the gene expression profile.**

- **Another future possibility will be to evaluate some target genes, regulated by these nuclear receptors, specially the enzymes that participate in fatty acid metabolism.**

In conclusion…

- **Feeding animals with PUFAs make possible to control the relationship between lipogenesis and lipolysis. There are clearly evidences of cumulative effects throughout generations, especially of a diet rich in ω-3 fatty acids, up and down regulating the genes related to lipid metabolism.**

Thank you!