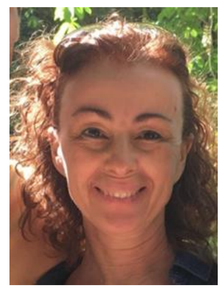
Small variation in diet energy content affects muscle gene expression in Iberian pigs



Y. Núñez[1], L. Calvo[2], R. Benítez[1], J. Ballesteros[1], J. Segura[3], J. Viguera[4] C. López-Bote[3], C. Óvilo[1]
[1]INIA, Madrid, Spain; [2]INCARLOPSA, Tarancón, Spain; [3]UCM, Madrid, Spain; [4]Imasde Agroalimentaria. Madrid, Spain

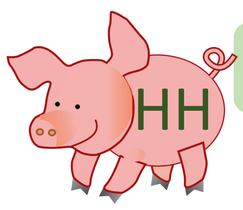
EAAP 2018 69th Annual Meeting of the European Federation of Animal Science
Dubrovnik, Croatia, 27th to 31st August 2018

Introduction and Objectives

Modulation of dietary energy content may be a tool to influence pork fat quantity and quality.
The metabolic response to different diets depends on individual factors as genetic background, age or sex and treatment factors as intensity or duration.
Aim: to analyse the effects of small variations in the energy content of growing and finishing diets on ham muscle transcriptome in Iberian crossbred pigs

Materials and Methods

30 animals



- HH: High energy diet in growing and finishing period
- LH: Low energy diet in growing and High energy diet in finishing period
- LL: Low energy diet in growing and finishing period

10 animals in each group (**5♀+ 5♂**)

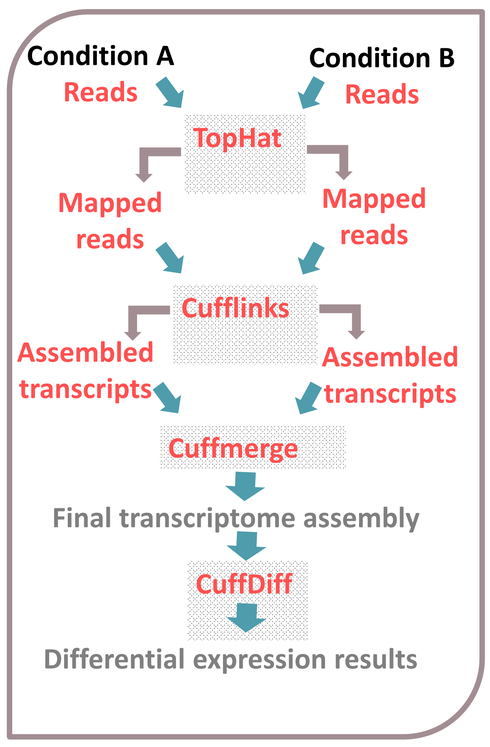
Sacrifice at the end of finishing period (158kgLW)

RNA isolation (Biceps femoris muscle)

RNA sequencing (HiSeq2000, Illumina)

Scarce effect of diet on phenotype.
Trend for higher fattening in HH males

TUXEDO PROTOCOL

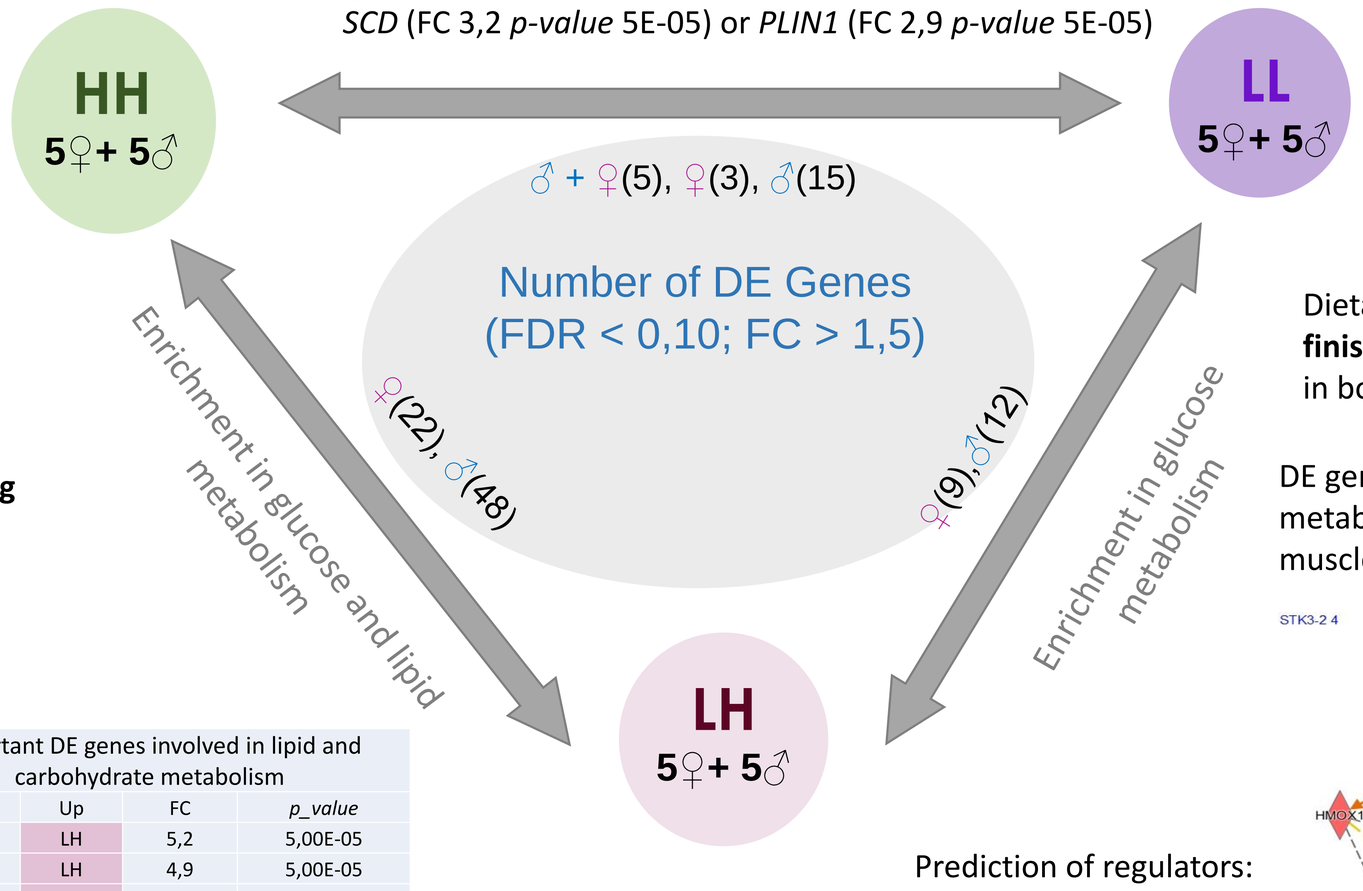


Transcriptome analysis

Enrichment in lipid metabolism

Dietary treatment applied **during growing and finishing** : Scarce transcriptome response, higher in ♂

In ♂, higher expression in **LL** diet of relevant lipid metabolism genes like *SCD* (FC 3,2 *p-value* 5E-05) or *PLIN1* (FC 2,9 *p-value* 5E-05)



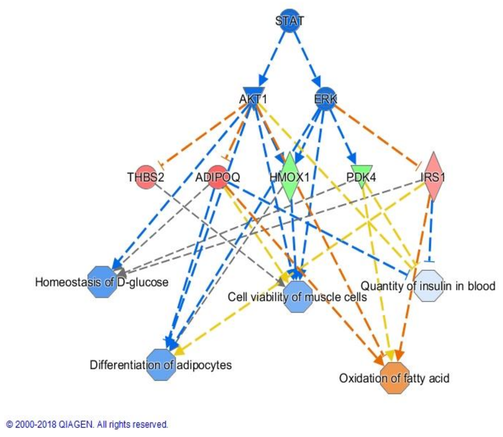
Molecular and celular functions related to DE genes

Name	*p-value*	#Molecules
Carbohydrate Metabolism	2,03E-02 - 3,76E-10	13
Small Molecule Biochemistry	2,06E-02 - 3,76E-10	19
Lipid Metabolism	2,03E-02 - 3,91E-08	12
Molecular Transport	1,83E-02 - 3,91E-08	17
Cellular Function and Maintenance	1,83E-02 - 6,31E-08	17

Dietary treatment applied **only in growing phase**: major response, specially in ♂.

Dietary treatment applied **only in finishing phase**: small response, similar in both sexes.

DE genes are involved in glucose metabolism, as *PDK4* or *PPP1R3C*; and muscle growth, as *SPP1* or *HMOX1*

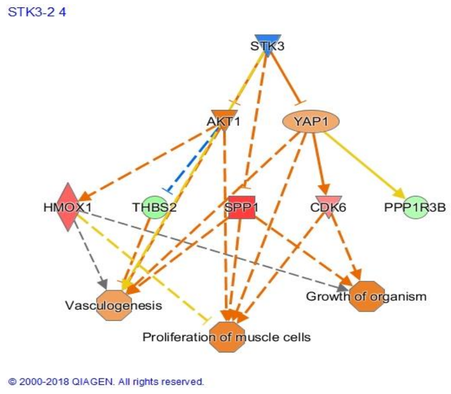


Important DE genes involved in lipid and carbohydrate metabolism

gene	Up	FC	*p_value*
SCD	LH	5,2	5,00E-05
PPP1R3C	LH	4,9	5,00E-05
PLIN1	LH	4,2	5,00E-05
ADIPOQ	LH	3,5	0,0003
IRS1	LH	2,3	0,0003
PPP1R3B	LH	2,3	0,00025
LIPE	HH	2,6	0,00045
PDK4	HH	3,8	5,00E-05

Prediction of regulators: LEP, PPARG, SREBF, STAT3, AKT1 or IRS

Prediction of regulators:
AKT1, TRIB2 or CEBPA



Remarks

Diet effects on transcriptome are more evident when treatment is applied **only in growing phase**
Main diet effects on genes involved in lipid and glucose metabolism and muscle growth
Different response between genders: major response in ♂.

The research was supported by CDTI-FEDER-Interconnecta 2015, Spanish Ministry of Economy and Competitivity