PROTEIN DIGESTIBILITY AND BIOAVAILABILITY OF THE F2 HOMOZYGOUS CROSSING LINE OF THE CONGENIC MICE FOR THE LEAN LOCUS Fob3b2, FED BY HIGH FAT DIET

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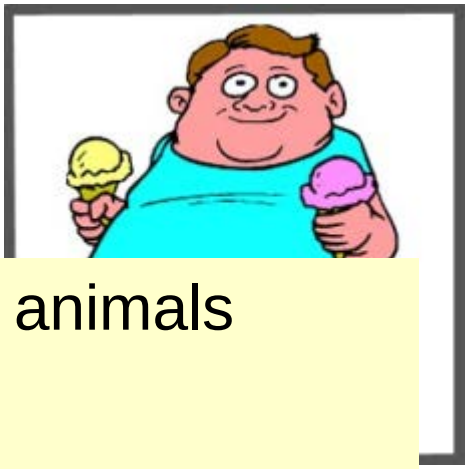
INTRODUCTION

Obesity

- Diabetes
- Cardiovascular disease
- Increased blood pressure
- Cancer

INTRODUCTION

Obesity



- Diab
- Card
- Incre
- Canc

Fat deposition in domestic animals

Undesirable component of growth

Consumers
Production economy
Slow growth
Poor feed conversion

OBESITY

Complex trait

- Genetic
- Interacting environmental factors
- Heratibility estimates 50 – 75 %

↓

Strong genetic basis

Aim of the study

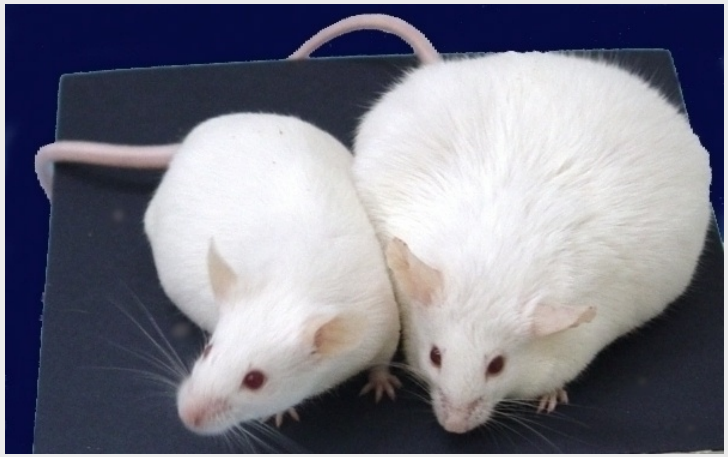
The aim of the study was to determine whether there are differences in protein digestibility and/or bioavailability among F2 homozygotes from a cross of congenic lines with different genetic variation for the lean locus *Fob3b2*

Materiali and methods

10% fat

53 generations

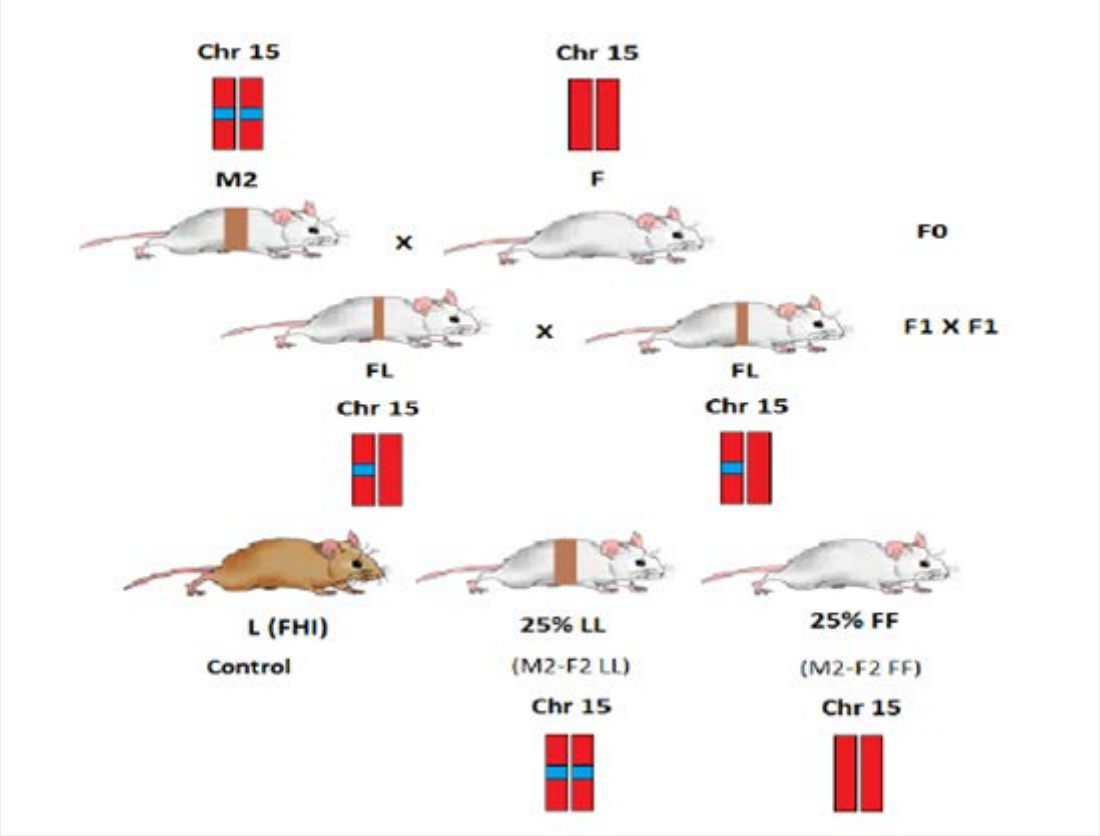
4% fat



23% fat

Materiali and methods

M2 congenic line – fat genotype, chromosome 15, lean segment (2 Mbp)



Materiali and methods

Mouse lines:

Experimental groups:

11 male and female animals in each group (2 different genotypes):

- 25% FF (M2-F2 FF)
- 25% LL (M2-F2 LL).

Control group: 10 FHI (L) male and female mice

Experimental procedure:

- Individually housed in metabolic cages
- 7 days of pre-experimental period, 5 days of experimental period
- Diets and drinking water provided *ad libitum*
- Diet intake and body mass were regularly recorded
- Excreted faeces and urine collected 5 successive days
- To determine the amount of N in diets, faeces and urine, the Kjeldahl method was used

UVHVVR No.: U34401-11/2013/2

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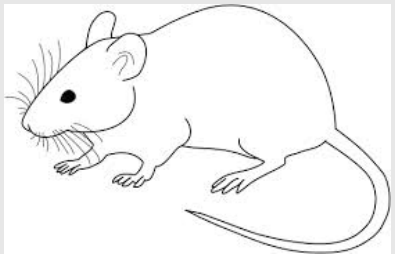
Chemical composition of the diets (g/kg DM)

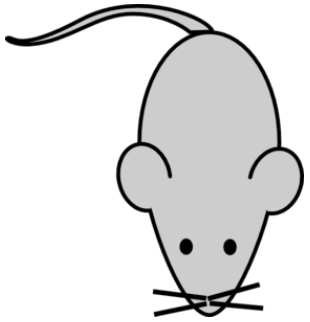
	HIGH FAT	CONTROL
CRUDE PROTEIN	363.3	220.4
CRUDE FAT	**222.2**	**29.4**
CRUDE FIBRE	46.3	63.1
CRUDE ASH	37.2	81.9
Gross energy *	20063 kJ/kg DM	14981 kJ/kg DM

Calculated: GE = 4 * protein + 9 * fat + 4 * CH



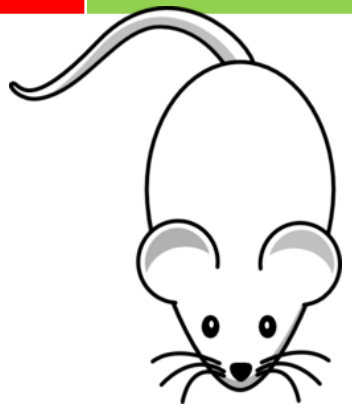
RESULTS

	M2-F2 FF	M2-F2 LL	CONTROL
INITIAL BODY MASS (g)	31.6 ± 2.6	31.9 ± 4.1	24.4 ± 2.7
FINAL BODY MASS (g)	31.5 ± 2.4	32.0 ± 3.3	25.1 ± 2.6
DIET INTAKE (g/day)	3.0 ± 0.6	3.0 ± 0.6	4.2 ± 0.7



N intake and excreted N

	M2-F2 FF	M2-F2 LL	CONTROL
N intake (mg/day)	162 ± 33	161 ± 43	133 ± 21
Excreted N in faeces (mg/day)	9.7 ± 2.2	9.4 ± 3.2	35.9 ± 6.3
Excreted N in urine (mg/day)	44.1 ± 9.2	46.2 ± 12.8	53.2 ± 12.0

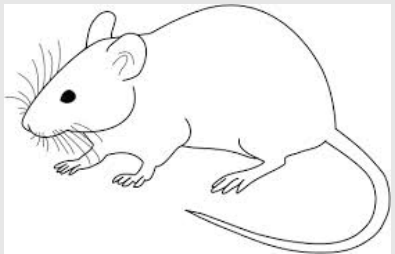


Nitrogen calculations

$$AD\ (\%) = \frac{N\ intake\ - Excreted\ N_{faeces}}{N\ intake} \times 100$$

$$ABV\ (\%) = \frac{N\ intake\ - (Excreted\ N_{faeces}\ + Excreted\ N_{urine})}{N\ intake\ - Excreted\ N_{faeces}} \times 100$$

$$ANPU\ (\%) = \frac{N\ intake\ - (Excreted\ N_{faeces}\ + Excreted\ N_{urine})}{N\ intake} \times 100$$



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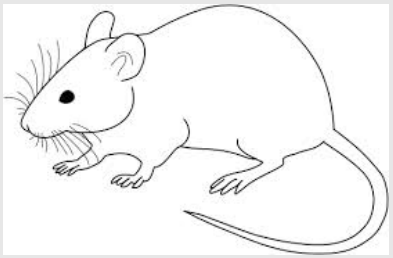
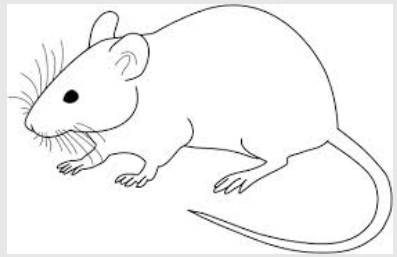


100,0
90,0
80,0
70,0
60,0
50,0
40,0
30,0
20,0
10,0
0,0
[%]
AD (%)
ABV (%)
ANPU (%)
M2-F2 FF
M2-F2 LL
CONTROL

CONCLUSIONS

- Phenotypic differences between the genotype in the M2-F2 population are not due to differences in digestibility or net protein utilization



- Phenotypic differences are not caused by the differences in nutrient absorbtion between the genotypes

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Differential effect of the Fob3b2 locus on metabolism or energy expenditure

- Phenotypic differences are not caused by the differences in nutrient absorbtion between the genotypes

THANK YOU FOR YOUR ATTENTION