Feed efficiency components at fattening in rabbit lines selected for different objectives

Mariam Pascual
Piles M., Pascual J.J., Ródenas L., Velasco M., Herrera W., Rafel O., Savietto D., Sánchez J.P.
INTRODUCTION

How efficient are these lines?

INDIRECT SELECTION OF FEED EFFICIENCY

GROWTH RATE

CROSSBRED FEMALES

REPRODUCTIVE TRAITS

RABBIT MEAT

REPRODUCTIVE TRAITS

X

X
Feed efficiency important for sustainability in livestock:

- environmental impact
- economical reasons

feeding represents 40 – 60% of production costs in rabbits
Animals use energy for:

- growth
- maintenance

How we know how they use feed for maintenance and growth?
Ingestion above maintenance requirements
Feed is the energy source for maintenance and growth

Energy deposited per unit of energy ingested

Body Energy Gain

Body Energy Loss
Body Energy Balance

Energy feed intake

Ingestion below maintenance requirements
Feed and body reserves are used for maintenance

Energy loss per unit of energy not ingested
Body Energy Balance

Energy intake for no body change

Body Energy Gain

Body Energy Loss

Energy feed intake

Energy Balance

Energy intake for no body change
Body Energy Balance

Energy loss when fasting

Energy feed intake
OBJECTIVE

Analyse and compare the feed efficiency for maintenance and growth in two lines of rabbit selected for growth rate and litter size.
Line Caldes
Selected for growth rate from 30 to 62 days of age since 1983
14 males, 14 females

Line Prat
Selected for litter size at weaning since 1992
14 males, 13 females

METHODOLOGY
METHODOLOGY

Estimation of theoretical maintenance needs (430 KJ kg^{-0.75} day^{-1}) per line and sex

Animals divided in 3 groups restricted at 90, 80, 70% of these requirements

<table>
<thead>
<tr>
<th>60 to 64 days of age</th>
<th>64 to 67 days of age</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ad libitum</td>
<td>Restricted</td>
</tr>
</tbody>
</table>

Liveweight

Feed intake

Feed intake
Regression of body weight change against feed intake

For each line and sex:
Linear spline regression with a knot at (DFIm,0) with R
RESULTS

USING FEED FOR MAINTENANCE AND GROWTH

Growth ♂ 0.51  
Growth ♀ 0.63

Litter size ♂ 0.45  
Litter size ♀ 0.47

g deposited / g ingested

Daily weight gain (g/day)

Feed intake (g/day)
RESULTS

USING FEED AND BODY RESERVES FOR MAINTENANCE

Growth ♂ 1.40  Litter size ♂ 1.46
Growth ♀ 1.63  Litter size ♀ 2.09

g lost / g ingested
RESULTS

MAINTENANCE REQUIREMENTS

Growth ♂ 110.3  Litter size ♂ 82.8
Growth ♀ 109.9  Litter size ♀ 82.4

g feed for no body change
RESULTS

LOSS WEIGHT AT NON INGESTION

Growth ♂ 154.4
Litter size ♂ 120.9
Growth ♀ 179.1
Litter size ♀ 172.2

g lost when fasting
CONCLUSIONS

Line selected for growth rate, compared to line selected for litter size:
✓ Seems **more efficient** when ingestion is **above the maintenance levels**
✓ Has **lower mobilisation of reserves** when ingestion is **below the maintenance level**

**Females** have a **higher mobilisation** of reserves than males when ingestion is **below the maintenance level**
✓ Relating energy balance and energy intake estimated by measuring biometrical impedance and digestibility of the feed

✓ Applying this methodology to three lines of rabbits selected for feed efficiency with different criteria of selection in the context of the Feed A Gene European Project
Feed efficiency components at fattening in rabbit lines selected for different objectives

THANK YOU
Selected for growth rate:
✓ Higher live weight, growth rate, feed intake
✓ Similar conversion rate
Body Energy Balance

Ingestion above maintenance requirements
Feed is the energy source for maintenance and growth

Energy deposited per unit of energy ingested

Ingestion below maintenance requirements
Feed and body reserves are used for maintenance

Energy loss when fasting

Energy intake for no body change

Energy loss per unit of energy not ingested

Energy feed intake

Body Energy Gain

Body Energy Loss
RESULTS

MAINTENANCE REQUIREMENTS

CM = 110.3  PM = 82.8
CF = 109.9  PF = 82.4

FEED FOR MAINTENANCE AND GROWTH

CM = 1.40  PM = 1.46
CF = 1.63  PF = 2.09

FEED AND BODY RESERVES FOR MAINTENANCE

CM = 0.51  PM = 0.45
CF = 0.63  PF = 0.47

LOSS WEIGHT AT NON INGESTION

CM = 154.4  PM = 120.9
CF = 179.1  PF = 172.2