INDEX

I. GENERAL INTRODUCTION 1

1.1. RABBIT MEAT PRODUCTION 1

1.1.1. Situation of the rabbit meat production 1
1.1.2. Rabbit commercial lines 1
1.1.3. Selection of parental lines for growth rate 1
1.1.4. Effect of selection for growth rate on growth curves in rabbits 2

1.2. RELATIVE GROWTH 3

1.2.1. General considerations 3
1.2.2. Models for relative growth 3

1.2.2.1. Huxley’s allometric equation 3

1.2.2.1.1. History of Huxley’s allometric equation 3
1.2.2.1.2. Fitting Huxley’s allometric equation 4

1.2.2.2. Butterfield’s allometric equation 6

1.2.2.2.1. Butterfield’s allometric equation 6
1.2.2.2.2. Fitting Butterfield’s allometric equation 7

1.2.3. Some considerations when studying relative growth in rabbit 7
1.2.3.1. Range of age and intervals considered
1.2.3.2. Cross-sectional studies
1.2.3.3. Choosing the weight of reference
1.2.4. Effect of selection for growth rate on relative growth in rabbit

1.3. EFFECT OF SELECTION FOR GROWTH RATE ON CARCASS COMPOSITION AND MEAT QUALITY

1.3.1. Effect of selection for growth rate at the slaughter age
   1.3.1.1. Effect of selection for growth rate on carcass composition
   1.3.1.2. Effect of selection for growth rate on meat quality
1.3.2. Effect of the degree of maturity
   1.3.2.1. Effects of the degree of maturity on carcass composition
   1.3.2.2. Effects of the degree of maturity on meat quality

1.4. REFERENCES

II. OBJECTIVES

2.1. OBJECTIVES

III. EXPERIMENTS

3.1. EFFECT OF SELECTION FOR GROWTH RATE ON RELATIVE GROWTH IN RABBIT
3.1.1. Abstract 20
3.1.2. Introduction 20
3.1.3. Material and methods 21
  3.1.3.1. Animals 21
  3.1.3.2. Carcass Dissection 22
  3.1.3.3. Statistical Analysis 22
    3.1.3.3.1. Huxley’s allometric equation 23
    3.1.3.3.2. Obtaining mature weights 23
    3.1.3.3.3. Butterfield’s allometric equation 24
3.1.4. Results and discussion 25
  3.1.4.1. Offal and organs 26
  3.1.4.2. Retail cuts 28
  3.1.4.3. Carcass tissues 28
  3.1.4.4. Carcass linear measurements 30
3.1.5. Conclusions 30
3.1.6. References 30

3.2. CHANGES IN CARCASS COMPOSITION AND MEAT QUALITY WHEN SELECTING RABBITS FOR GROWTH RATE 43

3.2.1. Abstract 43
3.2.2. Introduction 43
3.2.3. Materials and methods 44
  3.2.3.1. Animals 44
  3.2.3.2. Carcass composition 45
  3.2.3.3. Meat quality 45
3.2.3.3.1. Colour measurements 45
3.2.3.3.2. pH measurement 46
3.2.3.3.3. Cooking losses 46
3.2.3.3.4. Water holding capacity 46
3.2.3.3.5. Enzymatic activity 46
3.2.3.3.6. Chemical composition 47
3.2.3.4. Statistical analysis 47

3.2.4. Results and discussion 48
3.2.4.1. Carcass composition 48
3.2.4.2. Meat quality 50
3.2.5. Conclusions 53
3.2.6. References 54

3.3. CHANGES IN COLLAGEN, TEXTURE AND SENSORY PROPERTIES OF MEAT WHEN SELECTING RABBITS FOR GROWTH RATE 61

3.3.1. Abstract 61
3.3.2. Introduction 61
3.3.3. Material and methods 63
  3.3.3.1. Animals 63
  3.3.3.2. Collagen content and collagen Solubility 64
  3.3.3.3. Texture analysis 64
  3.3.3.4. Sensory analysis 64
  3.3.3.5. Statistical analysis 65
3.3.4. Results and discussion 65
  3.3.4.1. Collagen content and solubility 66
  3.3.4.2. Texture analysis 67
  3.3.4.3. Sensory analysis 67
3.3.5. Conclusions 69
3.3.6. References

IV. GENERAL DISCUSSION

4.1. GENERAL DISCUSSION

4.2. REFERENCES
INDEX OF TABLES

Table 3.1.1. Mature weights of liveweight and mature weights of the different traits studied estimated from the Gompertz’s model for both groups and sexes 34

Table 3.1.2. Mean values and SE of Huxley’s $\log b$ and allometric coefficients $k$ for offal, organs and chilled carcass with respect to liveweight, coefficient of determination and difference, SED and $P$ between $k$ values of selected and control group (S-C) and males and females (M-F) 35

Table 3.1.3. Mean values and SE of Butterfield’s allometric coefficients $q$ for offal, organs and chilled carcass with respect to liveweight, coefficient of determination and difference, SED and $P$ between $q$ values of selected and control group (S-C) and males and females (M-F) 36

Table 3.1.4. Mean values and SE of Huxley’s $\log b$ and allometric coefficients $k$ for the different retail cuts of the carcass with respect to liveweight, coefficient of determination and difference, SED and $P$ between $k$ values of selected and control group (S-C) and males and females (M-F) 37

Table 3.1.5. Mean values and SE of Butterfield’s allometric coefficients $q$ for the different retail cuts of the carcass with respect to liveweight, coefficient of determination and difference, SED and $P$ between $q$ values of selected and control group (S-C) and males and females (M-F) 38

Table 3.1.6. Mean values and SE of Huxley’s $\log b$ and allometric coefficients $k$ for dissectible fat of the carcass and meat and bone of the hind leg with respect to liveweight, coefficient of determination and difference,
SED and $P$ between $k$ values of selected and control group (S-C) and 
males and females (M-F)

Table 3.1.7. Mean values and SE of Butterfield’s allometric coefficients $q$ for 
dissectible fat of the carcass and meat and bone of the hind leg with 
respect to liveweight, coefficient of determination and difference, SED 
and $P$ between $q$ values of selected and control group (S-C) and males 
and females (M-F)

Table 3.1.8. Mean values and SE of Huxley’s $\log b$ and allometric coefficients 
$k$ for the carcass linear measurements of the carcass with respect to 
liveweight, coefficient of determination and difference, SED and $P$ 
between $k$ values of selected and control group (S-C) and males and 
females (M-F)

Table 3.1.9. Mean values and SE of Butterfield’s allometric coefficients $q$ for 
the carcass linear measurements of the carcass with respect to 
liveweight, coefficient of determination and difference, SED and $P$ 
between $q$ values of selected and control group (S-C) and males and 
females (M-F)

Table 3.2.1. Features of the marginal posterior distributions of the means, 
standard deviations (sd) and ratio of the group effects, 
Selected/Control, for the main traits of the carcass composition in 
rabbits

Table 3.2.2. Features of the marginal posterior distributions of the means, 
standard deviations (sd) and ratio of the group effects, 
Selected/Control, for the carcass and meat colour, pH, water holding 
capacity and enzymatic activity of m. Longissimus in rabbits

Table 3.2.3. Features of the marginal posterior distributions of the means, 
standard deviations (sd) and ratio of the group effects,
Selected/Control, for the chemical and fatty acid composition in the hind leg in rabbits

Table 3.3.1. Means and standard deviations (sd) and features of the marginal posterior distribution of the ratio of the group effects, Selected/Control, for the collagen content (mg/g fresh meat) and collagen solubility (%) in m. *Longissimus* in rabbits

Table 3.3.2. Means and standard deviations (sd) and features of the marginal posterior distribution of the ratio of the group effects, Selected/Control, for the shear force (N/cm²), shear firmness (N/s cm²) and area (N s/cm²) of the texture analysis by Warner-Bratzler in m. *Longissimus* in rabbits

Table 3.3.3. Means and standard deviations (sd) and features of the marginal posterior distribution of the ratio of the group effects, Selected/Control, for the sensory panel test in m. *Longissimus* in rabbits
Figure 1.1. Growth curves of rabbits from Line R, a line selected for growth rate between the 4th and 9th week of age, where sm are males from the 10th generation of selection and cm males from the 3-4th generation; a.: representing the weight of the animal with respect to the age, where group sm has a higher weight than group cm along the whole curve; b.: representing the maturity degree (weight /adult weight) with respect to the metabolic age (age/adult weight^{0.27}), where differences between both groups disappear. From Blasco et al. (2003)

Figure 1.2. Interpretation of Huxley’s (k) and Butterfield’s (q) allometric coefficients: a) Representation of the weight of the component (y) with respect to the weight of the animal (x) or the degree of maturity of the component with respect to the degree of maturity of the animal; b) Representation after transformation of the data to the linear form