# CARCASS COMPOSITION AND MEAT CHARACTERISTICS OF TWO RABBIT GENOTYPES AT TWO DIFFERENT AGES

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## Introduction

To satisfy the needs for breeding rabbits in Slovenia, rabbit centre in Biotechnical Faculty was founded in the year 1989. In the year 1995 the selection of male SIKA line for meat production began. In male lines, the factors influencing growth rate, feed conversion ratio, slaughter, carcass and meat characteristics have to be controlled. The genetic origin of rabbits effects growth rate and carcass quality (Pla et al., 1996; Dalle Zotte and Ouhayoun, 1998; Piles et al., 2000). The aim of the present study was to find optimal animal age or live weight at slaughter of Slovenian rabbit male line SIKA. For this purpose it was compared with the commercial Italian hybrids at two different ages.

## Material and methods

Growth rate of 100 rabbits of two genotypes (SIKA male line – Slovenian commercial genotype and commercial hybrids imported from Italy, 50 rabbits per genotype and 50 rabbits of each sex) was recorded from 41 day to slaughter. Rabbits were fed standard feed mixture Kun/stand *ad libitum*, containing 170 g/kg crude protein and 140 g/kg crude fibre. The first half of rabbits was slaughtered at 77th day, the rest at 90th day of age. Animals were fasted 2 hours before slaughter. At slaughter warm carcass weight was recorded. 24 h after slaughter carcass weight without kidney and liver were recorded and pH and meat colour were measured at cross section of *longissimus lumborum* between last thoracic and first lumbar vertebra. Thirty-two rabbits were than dissected into muscle, fat (subcutaneous and kidney) and bone (16 animals per genotype, age and sex). Percentage rate of individual tissues was calculated from tissues weight and cold carcass weight. Thirty-two rabbits were dissected into different carcass cuts. After that kidney fat was removed, carcass was cut into fore and hind quarter between the 6th and 7th thoracic vertebra. Back was cut between last thorax and first lumbar vertebra. Loin was divided from hind leg between the 6th and 7th lumbar vertebra. Hind leg was further dissected into meat and bone. Percentage of cuts was calculated from cuts weight and cold carcass weight. For chemical analysis hind leg and loin muscles of rabbits that were dissected into different carcass tissues were used. For sensorical analysis loin of rabbits that were dissected into different carcass cuts were used.

Statistical analysis was performed by SAS statistical package (SAS, 1999) with GLM procedure. Effects of genotype, age and sex as fixed effects, and interaction between age and genotype were included in the model.

## Results

Live weight, cold carcass weight and pH 24 values increased with age, while the percentage of kidney fat and meat colour did not change. Genotype exhibited an effect only on the percentage of kidney fat, where rabbits of SIKA line had much lower values (2.2 vs 3.0 %). Live weight and cold carcass weight tended to increase faster with increased age in SIKA line (for 361 and 199 g) compared to the commercial hybrids (for 249 and 142 g); p values for AxG interaction were 0.216 and 0.117. With increased animal age pH 24 and redness (a value) of loin muscle increased. Dalle Zotte and Ouhayoun (1998) reported higher lightness (L value) in heavier rabbits. As slaughter factors can have a marked effect on post mortal glycolisis and thus on ultimate pH and meat colour (Hullot and Ouhayoun, 1999) they might have influenced pH and meat colour in also our study.

Table 1: Carcass traits of two rabbit genotypes at two different ages

| Age at slaughter (A), days | 77 | | 90 | | P values | | | |
|---|---|---|---|---|---|---|---|---|
| Genotype (G) | SIKA | COM. HYBRID | SIKA | COM. HYBRID | A | G | AxG | Sex |
| Live weight at slaughter, g | 2558 | 2566 | 2919 | 2765 | <0.001 | 0.216 | 0.170 | 0.978 |
| Carcass weight cold, g | 1219 | 1218 | 1468 | 1360 | <0.001 | 0.112 | 0.117 | 0.829 |
| Kidney fat, % | 2.12 | 3.03 | 2.36 | 2.96 | 0.676 | <0.001 | 0.443 | <0.001 |
| pH 24 | 5.61 | 5.60 | 5.76 | 5.77 | <0.001 | 0.861 | 0.689 | 0.242 |
| CIE L* | 58.28 | 59.08 | 58.65 | 56.54 | 0.142 | 0.371 | 0.050 | 0.162 |
| a* | 3.60 | 3.24 | 4.33 | 3.92 | 0.035 | 0.246 | 0.936 | 0.006 |
| b* | 3.57 | 3.68 | 4.12 | 3.60 | 0.441 | 0.493 | 0.308 | 0.343 |

With increased animal age the percentage of fore quarter did not change, while the percentage of back and hind leg decreased and the percentage of loin increased. The interaction between genotype and age was statistically significant for the percentage of fore quarter ($p<0.05$). In SIKA rabbits the percentage of fore quarter increased 0.7 % from 77 to 90 days of age while in commercial hybrid rabbits it decreased 0.8 %. With increased animal age, meat percentage in hind leg increased and bone percentage decreased ($p<0.05$). Percentage of kidney fat did not change with age. SIKA rabbits had lower percentage of kidney fat than commercial hybrids. Otherwise, Gomez et al. (1998) reported not only differences in kidney fat, but also in fore and hind leg percentage between different rabbit lines. Pla et al. (1996) also found differences in the percentage of carcass cuts and kidney fat between two breeds differing in adult weight. Breeds with higher adult body weight had less fat at the same weight. Therefore, Dalle Zotte and Ouhayoun (1998) reported the highest kidney fat percentage in line that reached the highest maturity at slaughter. In most experiments the adult weight is not known and so it is difficult to distinguish between the effect of genotype and adult weight.

Fat percentage did not changed with increased age, while meat percentage even increased (+1.8%), and bone percentage decreased (–1.8%). Small differences were found in meat and fat percentage in the carcass. SIKA rabbits exhibited slightly higher meat (+1%) and lower fat (–1.3%) percentage.

Table 2: Percentage of different rabbit carcass cuts, and lean meat and bone percentage in hind leg

| Age at slaughter (A), days | 77 | | 90 | | P values | | | |
|---|---|---|---|---|---|---|---|---|
| Genotype (G) | SIKA | COM. HYBRID | SIKA | COM. HYBRID | A | G | AxG | Sex |
| Fore quarter, % | 26.23 | 27.04 | 26.80 | 26.18 | 0.649 | 0.774 | 0.032 | 0.528 |
| Back, % | 12.70 | 13.07 | 12.14 | 12.58 | 0.107 | 0.206 | 0.920 | 0.532 |
| Loin, % | 20.79 | 19.11 | 22.09 | 21.84 | <0.001 | 0.076 | 0.179 | 0.815 |
| Hind leg, % | 36.76 | 36.20 | 35.74 | 35.12 | 0.004 | 0.094 | 0.936 | 0.107 |
| Muscle in hind leg, % | 83.76 | 84.20 | 85.74 | 84.94 | 0.026 | 0.763 | 0.289 | 0.798 |
| Bone in hind leg, % | 16.24 | 15.80 | 14.26 | 15.06 | 0.026 | 0.763 | 0.289 | 0.798 |
| Kidney fat, % | 2.27 | 2.98 | 2.37 | 2.89 | 0.978 | 0.033 | 0.728 | 0.003 |

Table 3: Carcass tissue composition of rabbit carcass

| Age at slaughter (A), days | 77 | | 90 | | P values | | | |
|---|---|---|---|---|---|---|---|---|
| Genotype (G) | SIKA | COM. HYBRID | SIKA | COM. HYBRID | A | G | AxG | Sex |
| Muscle, % | 73.34 | 72.31 | 75.14 | 74.13 | 0.002 | 0.064 | 0.988 | 0.345 |
| Fat, % | 2.65 | 4.14 | 2.70 | 3.82 | 0.737 | 0.003 | 0.645 | 0.047 |
| Bone, % | 22.88 | 22.65 | 21.01 | 20.92 | 0.007 | 0.793 | 0.906 | 0.889 |

Like in carcass composition, age had no significant effect on chemical composition of rabbit meat (except ash percentage). The fat content is comparable with the fat content in hind leg of Pannon White rabbits reported by Szendro et al. (1998), who also reported increased fat content when live weight increased from 2.2 to 3.5 kg. Gondret et al. (1997) reported increased intramuscular fat and meat tenderness with increased age from 11 to 18 weeks. But age and weight differences were also much greater in their experiment. They concluded that at least in part sensory quality of rabbit meat was related to intramuscular fat content. SIKA rabbits had lower percentage of intramuscular fat and protein and higher percentage of water and ash. Age and genotype exhibited also no significant effect on sensorical meat traits.

Table 4: Chemical composition (loin and hind leg muscles) and sensorical characteristics (*Longissimus lumborum* muscle) of rabbit meat

| Age at slaughter (A), days | 77 | | 90 | | P values | | | |
|---|---|---|---|---|---|---|---|---|
| Genotype (G) | SIKA | COM. HYBRID | SIKA | COM. HYBRID | A | G | AxG | Sex |
| Fat, % | 3.56 | 4.30 | 3.96 | 4.37 | 0.403 | 0.039 | 0.547 | 0.038 |
| Protein, % | 22.04 | 22.35 | 21.89 | 22.18 | 0.238 | 0.029 | 0.928 | 0.521 |
| Water, % | 73.04 | 72.31 | 73.06 | 72.35 | 0.912 | 0.007 | 0.975 | 0.061 |
| Ash, % | 1.37 | 1.31 | 1.31 | 1.29 | 0.002 | 0.009 | 0.249 | 0.012 |
| Aroma * | 5.35 | 5.46 | 5.25 | 5.35 | 0.135 | 0.135 | 1.000 | 0.547 |
| Juiciness * | 5.29 | 5.35 | 5.17 | 5.27 | 0.116 | 0.208 | 0.752 | 0.344 |
| Tenderness * | 5.46 | 5.64 | 5.38 | 5.38 | 0.064 | 0.323 | 0.323 | 0.912 |
| Shear force value | 32.76 | 33.08 | 32.41 | 35.52 | 0.306 | 0.096 | 0.242 | 0.173 |

* 1 is the worse and 7 is the best note.

## Conclusion

From the presented results it may be concluded that with increased age from 77 to 90 days carcass quality improved. Muscle percentage increased, bone decreased and fat percentage stayed constant, whereas age had no profound effect on meat quality. SIKA rabbits as male line selected for higher live weight at slaughter compared to the imported commercial hybrid breed exhibited higher growth rate between day 77 and 90 and better carcass quality, specially at higher age or live weight.

## References

Dalle Zotte, A., Ouhayoun, J. (1998). Effect of genetic origin, diet and weaning weight on carcass composition, muscle physiochemical and histochemical traits in the rabbit. Meat Science, 50, 4. 471-478.

Gomez, E.A., Baselga, M., Rafael, O., Ramon, J. (1998). Comparison of carcass characteristics in five strains of meat rabbit selected on different traits. Livestock production Science 55. 53-64.

Gondret, F., Juin, H., Mourot, J., Bonneau, M. (1998). Effect of age at slaughter on chemical traits and sensory quality of longissimus lumborum muscle in rabbit. Meat science, 48,1-2,181-187.

Piles, M., Blasco, A., Pla, M. (2000). The effect of selection for growth rate on carcass composition and meat characteristics of rabbits. Meat Science, 54. 347-355.

Pla, M., Hernandez, P., Blasco, A. (1996). Carcass composition and meat characteristics of two rabbit breeds of different degrees of maturity. Meat Science, 44, 1-2. 85-92.

SAS (1999). SAS/ STAT User's, Version 6. Cary, NC, USA, SAS Institute Inc.

Szendro, Zs., Radnai, I., Biro,-Nemeth, E, Romvari, R., Milisits, G., Kenessey, A., (1998). The effect of live weight on the carcass traits and the chemical composition of meat of Pannon White rabbits between 2.2 and 3.5 kg. World Rabbit Science, 6, 2. 243-249.