

CONSERVATION AND PERFORMANCE OF THE NATIVE HUNGARIAN GIANT RABBIT BREED

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ABSTRACT

There are few reliable data on the production of purebred Hungarian Giant (HG) rabbit breed. HG is endangered based on its population size. The aim of this study was to present the reproduction and growth of the small HG nucleus population formed in Gödöllő. Kindling rate was 68% in pens and 76% in large cages with natural mating and extensive reproductive rhythm. The number of live born kits was 8.0-8.6 and the number of weaned kits was 6.7-6.9. Kit live weights between 3 and 16 week of age and growth rates between 7 and 13 wk of age were significantly affected by season ($P < 0.01$). The effect of sex on kit weight was never significant. In straw bedded pens the 5, 10 and 16 wk live weights were 948, 2279 and 4141 g while the 5-10 and 10-16 wk growth rates 40.0 and 44.1 g/d, respectively. In large cages the 7, 10, 13 and 16 wk live weights were 1612, 2433, 3349 and 4089 g and the 7-10 and 7-13 wk growth rates 48.0 and 45.0 g/d, respectively. Doe live weight in cages varied between 6159 and 6404 g. There are no published data on the teat number in HG rabbits. The proportion of nucleus-founder rabbit does according to 6, 7, 8, 9, 10 and 11 teat number was 8, 8, 60, 8, 12 and 4%, respectively. Information on HG does' teat number can help at fostering and improve the success of rearing. Ear length was tested in some cases that were 15.4-15.6 cm in 10-26 wk old female rabbits.

Key words: Hungarian Giant rabbit, reproduction, growth, season, gender

INTRODUCTION

Hungarian Giant (HG) is the only native and historic rabbit breed in Hungary. It originates from a native colored population that was crossed with Flemish Giant and other giant breeds (Holdas and Szendrő, 2002). This was recently confirmed genetically (Alves *et al.*, 2015). However, some breeders use intensive breeds to improve HG reproduction (Szendrő *et al.* 2015). According to recent standard the body weight of adult HG rabbits can be 5.5 to 7.5 kg. HG can be used either as pet or paternal terminal breed (Dalle Zotte *et al.*, 2015).

HG belongs to endangered rabbit breeds based on population size, i.e. the number of registered breeding does (91, 159 and 179 in 2011, 2012 and 2013, respectively). Its conservation program was started in 2009 when the Hungarian Giant Rabbit-breeders' Association was founded. Some population genetic, productive, and characteristic data have been published (Bolet *et al.*, 2000; Fekete *et al.*, 2001; Fodor *et al.*, 2001, 2003; Virág *et al.*, 2002 and 2003) but the performance of pure bred HG is still less known.

Our conservation program was started in 2013 at Gödöllő by forming a small HG nucleus population that was housed in straw-bedded pens. From 2018 the rabbits are kept in big wire mesh cages with

plastic mat. Productive data were recorded under defined conditions with occasional DNS sampling. Frozen sperm, hair and ear tissue samples are stored for further genetic analyses.

The aim of this study was to provide some productive and morphometric data on our HG population.

MATERIALS AND METHODS

Animals, housing and feeding

Unrelated pedigree rabbits (12 males, 36 females) were purchased from five small scale or fancy breeders and they were allotted into four mating groups. The rabbits were placed in open-top straw bedded pens (1.5 x 2 m) equipped with plastic mat and nest-box in 2013. Because of high postnatal loss due to chilling outside the nest, the rabbits were moved to wire-mesh cages (95 x 116 x 70 cm) with plastic mat and external nest box (64 x 31 x 38 cm) in 2018. The daily lighting was 16 hr. The ambient temperature was between 20-28°C in summer and between 8-15°C in winter. Feed (9.91 MJ/kg DE, 16.5% CP, 2.3% EE, 15.8 CF), grass hay and drinking water were provided *ad libitum*.

Breeding

In the next generation, the females remained in their group and the males were used in the next group. The rabbit does were naturally mated after weaning. There was no mating in summer, 2019. The kits were weaned at 5 weeks of age in 2013 and according to local practice two-week later, at 7 weeks of age in 2018 and 2019.

Statistical Analysis

The effects of season and gender on growth performance were assessed by two-way ANOVA with the use of Statgraphics 6.0 (1992) statistical software.

RESULTS AND DISCUSSION

Kindling rates and the number of live born kits (Tables 1 and 3) were 8-16% and 0.9-1.7–kit higher than values reported by Virág *et al.* (2002; 2003). However, they used 42-d reproductive rhythm and AI without summer rest. Rearing ability was also better based on 5-wk litter size and kit weight (Tables 1, 2, 4 and 5) than previous results (3.4 and 820 g) found by Virág *et al.* (2003).

Table 1: Reproductive performance of HG rabbits in 2013

| Kindling rate, % | Litter size | | | | | Litter weight, g | | Calculated | kit | Kit mortality, % | |
|------------------|---------------|---------------|---------------|---------------|---------------|------------------|---------------|------------|-------------|------------------|----------------|
| | total born | live born | reared | 3 wk | 5 wk | 3 wk | 5 wk | weight, g | 5 wk | 1-3 wk | 1-5 wk |
| 67.8 (19/28) | 9.65 ±3.24 | 8.65 ±3.53 | 8.59 ±2.72 | 6.83 ±2.86 | 6.75 ±2.93 | 2305 ±1059 | 6214 ±3586 | 328 ±59 | 866 ±220 | 27 (30/112) | 28 (30/112) |

The 5-10 wk growth rate in straw-littered pens (Table 2) was 5% lower than in the study of Virág *et al.* (2003) but they used wooden cages. There are few reliable data on production of HG rabbits depending on season and sex that was considered in 2018 and 2019. Calculated 7-wk kit weight, individual kit weights and growth rates were significantly ($P < 0.01$) affected by season (Tables 4 and 5). Doe live weight at 5 wk of lactation seemed ($P < 0.088$) to be 24% higher in autumn (6930 g) and 14% higher in winter (6338 g) than in summer (5573 g). Kits mean 14 wk live weight was higher (3883 g) than earlier reported (3189 g by Virág *et al.*, 2003) and it was significantly ($P < 0.001$) affected by season (4099, 3219, 3659 and 4555 g in spring, summer, autumn and winter, resp.) and slightly ($P < 0.076$) by sex (male: 3789 g, female 3977 g). The 7 wk live weight of female rabbits (1612 g) in this study agrees with the report (1.7 kg) of Fekete *et al.* (2001). Fodor *et al.* (2001) observed

similar 14 wk live weight (3.83 kg) to ours but a higher 16 wk body weight (4.28 kg), presumably due to optimal climatic and dietary conditions.

Table 2: Growth performance of HG rabbits in 2013

| Individual kit weight, g | | | Growth rate, g/d | |
|--------------------------|-------|-------|------------------|----------|
| 5 wk | 10 wk | 16 wk | 5-10 wk | 10-16 wk |
| n=76 | n=53 | n=53 | n=53 | n=53 |
| 948 | 2279 | 4141 | 40.0 | 44.1 |
| ±222 | ±302 | ±517 | ±6.76 | ±8.44 |

Table 3: Kindling rate and litter traits of HG rabbits in 2018 to 2019

| Kindlin g rate, % | Litter size | | | | | | Litter weight, g | | | | Kit mortality, % | |
|-------------------------|-------------------|-------------------|--------------------|-------------------|-------------------|-------------------|------------------|--------------|--------------|-------------------|----------------------|----------------------|
| | total born | live born | reare d | 3 wk | 5 wk | 7 wk | 1-3 d | 3 wk | 5 wk | 7 wk | 1-3 wk | 1-7 wk |
| 76.5 (49/64) | 9.13 ±0.4 0 | 8.03 ±0.4 2 | 7.43 ±0.29 1 | 6.94 ±0.3 1 | 6.93 ±0.3 1 | 6.86 ±0.3 1 | 678 ±24. 7 | 2438 ±114 | 5934 ±367 | 1057 7 ±522 | 6.15 (20/315) | 7.38 (24/315) |
| Season n | Prob. 2 | 0.63 0 | 0.411 0 | 0.29 9 | 0.26 3 | 0.40 1 | 0.10 1 | 0.16 0 | 0.83 1 | 0.818 | - | - |

Table 4: Calculated kit weight and live weight of lactating HG rabbits in 2018 to 2019

| Season Prob. | Calculated kit weight, g | | | | Lactating doe live weight, g | | | |
|-----------------|--------------------------|--------------|--------------|---------------|------------------------------|--------------|--------------|--------------|
| | 1-3 d | 3 wk | 5 wk | 7 wk | 1 wk | 3 wk | 5 wk | 7 wk |
| | 83.9 ±3.23 | 372 ±17.8 | 944 ±54.8 | 1663 ±53.0 | 6159 ±181 | 6212 ±169 | 6201 ±181 | 6404 ±211 |
| | 0.880 | 0.098 | 0.270 | 0.028 | 0.855 | 0.583 | 0.088 | 0.204 |

Table 5: Individual kit weight and growth rate of HG rabbits in 2018 to 2019

| Effect s (Prob.) | Individual kit weight, g | | | | | | | | | | Growth rate, g/d | | |
|------------------------|--------------------------|------------------|---------------|---------------|---------------|-------------------|---------------|-------------------|-------------------|-------------------|------------------|---------------|-------------------|
| | weeks | | | | | | | | | | weeks | | |
| | 3 | 5 | 7 | 9 | 10 | 11 | 12 | 13 | 14 | 16 | 7-10 | 10-12 | 7-13 |
| | n=82 | n=70 | n=19 | n=22 | n=22 | n=80 | n=16 | n=84 | n=52 | n=53 | n=15 | n=16 | n=80 |
| | 313 ±10. 9 | 851 ±17. 5 | 1612 ±20.9 | 2152 ±23.8 | 2433 ±26.1 | 2652 ±66. 3 | 3128 ±28.9 | 3349 ±39. 9 | 3883 ±61. 2 | 4089 ±64. 9 | 48.0 ±0.86 | 44.8 ±1.03 | 45.0 ±0.9 2 |
| Season n | 0.01 3 | 0.00 1 | 0.001 | 0.003 | 0.001 | 0.00 | 0.001 | 0.00 | 0.00 | 0.00 | 0.001 | 0.003 | 0.00 9 |
| Sex | 0.21 5 | 0.90 1 | 0.985 | 0.919 | 0.170 | 0.65 2 | 0.383 | 0.50 9 | 0.07 6 | 0.24 9 | 0.838 | 0.395 | 0.38 8 |

The HG rabbit breed exists in different color varieties. According to Gödöllő scientific reports from 1960s light-bellied agouti rabbits were superior in viability, dark-bellied steel rabbits in growth and white rabbits in carcass traits. Here the 13 wk live weights of agouti (3360 g) or dark steel rabbits (3432 g) were similar and higher ($P < 0.05$) than the black rabbits (3095 g). However, more data are needed to confirm these findings.

There are no data about the teat number in HG rabbit breed. The founder does were checked during the lactation period and in some litters the newborn. The proportions of does and kits according to teat number are shown in Table 6. There are few does in the same lactation stage when natural mating is used in small size populations but birth litter size varies. Info on doe teat number can aid correct fostering and improve rearing success.

Table 6: Teat number of HG rabbits in 2018-2019

| | Proportion of rabbits according to teat number, % | | | | | |
|--------------|---|-----|------|------|------|-----|
| | 6 | 7 | 8 | 9 | 10 | 11 |
| Does (n=25) | 8.0 | 8.0 | 60.0 | 8.0 | 12.0 | 4.0 |
| Kits (n=141) | - | 0.7 | 52.5 | 28.4 | 18.4 | - |

Ear length is a morphometric trait used in rabbit standards. Preliminary data on this are shown in table 7.

Table 7: Ear length of female HG rabbits at different ages in 2018-2019

| Ear length (cm) | | |
|-----------------|----------------|-----------------|
| 10 wk (n=14) | 11 wk (n=7) | 26 wk (n=18) |
| 15.4 | 15.5 | 15.6 |
| ±0.81 | ±0.65 | ±0.85 |

CONCLUSIONS

The results of this study contributes to better knowing of the Hungarian Giant rabbit breed. The production data confirm the possible use of this breed in extensive management. There are few data on the meat production and carcass traits of purebred HG rabbits which has to be tested.

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