

## An evaluation of growth ability in domestic geese

Cyril Hrnčár\*, Jozef Bujko, Stanislav Bandík, Ján Weis

*Slovak University of Agriculture in Nitra, Faculty of Agrobiolgy and Food Resources, Nitra, Slovak Republic*

**Article Details:** Received: 2016-07-26 | Accepted: 2016-07-28 | Available online: 2016-09-01

<http://dx.doi.org/10.15414/afz.2016.19.si.128-132>

The growth potential of Landes, Pomeranian and Steinbacher geese breeds was evaluated in free-range management conditions. Goslings were individually weighted by electronic weight tool at the age of 1, 14, 28, 42, 56, 70, 84 and 98 days. During rearing, goslings were fed by standard feed mixture and grazed at the pasture; water was offered *ad libitum*. The results showed that egg weight was significantly correlated with hatching weight (0.79625). During rearing period, the highest body weights of goslings were recorded in Pomeranian geese. There are significant differences among breeds, while most significant differences were observed in comparison Pomeranian and Steinbacher geese.

**Keywords:** breeds, egg weight, geese, growth, hatching weight

### 1 Introduction

Growth is a complicated progress and enlargement in size is the most straightforward form of it as manipulated by genetic and environmental factors. These factors are expressed with the sex, age, genetics, feeding and weight of hatching eggs (Tilki et al., 2005; Saatci and Tilki, 2007).

Geese are mainly kept for their meat, down and feathers, and fatty liver in various regions of the world and therefore they are the most common poultry species for certain world regions (Kirmizibayrak et al., 2010).

Waterfowl have a remarkably rapid growth during the first weeks of live. At slaughter age of 7–8 weeks in domestic ducks, 9 weeks in domestic geese, and 10–11 weeks in Muscovy ducks, they reach 70–80 % of adult weight, while chicken broilers have a slaughter weight less than 40 % of adult weight (Pingel, 1990; Shalev, 1995). Geese have a rapid growth rate during the first weeks of life; they reach 70–80 % of adult weight at 9 weeks of age. Males exceed females in growth rate by more than 10 % up to age of 8 weeks (Tilki et al., 2005; Uhlířová and Tůmová, 2014).

The aim of this study was determined correlation between egg weight and hatching weight of goslings and compared body weight in Landes, Pomeranian and Steinbacher geeses.

### 2 Material and methods

The experiment was conducted with goslings of three goose breeds (Landes, Pomeranian, Steinbacher) at natural conditions. After hatching goslings were identified with wing number without sexing and were individually weighted by electronic weight tool at the age of 1, 14, 28, 42, 56, 70, 84 and 98 days.

One-day-old goslings were placed into brooder batteries, at the age of 2 weeks they were transferred into shelter run, both sexes together. Pens were fitted and 0.4–0.8 m<sup>2</sup> floor place allowed for each animal from 2 to 16 weeks. They were raised in free-range conditions and grazed in the pasture.

During rearing, goslings were fed by *ad libitum* feed mixture in 1 kg with crude protein 17 %, crude fat 3.3 %, crude fibre 3.4 %, crude ash matter 4.9 %, lysine 0.76 %, methionine 0.38 %, calcium 0.8 %, phosphorus 0.56 %, sodium 0.15 %, vitamin A 12020 IU vitamin D<sub>3</sub> 3005 IU, vitamin E ( $\alpha$ -tocopherol)

\* **Corresponding Author:** Cyril Hrnčár, Department of Poultry Science and Small Animal Husbandry, Slovak University of Agriculture, Tr. A. Hlinku 2, 949 76 Nitra, Slovakia. E-mail: [cyril.hrnacar@uniag.sk](mailto:cyril.hrnacar@uniag.sk)

55 mg, copper 18 mg, zinc 84 mg, manganese 72 mg, iron 48 mg, selenium 0.4 mg, iodine 1 mg, 6-phytase 402 FTU. Water was offered *ad libitum*.

The evaluated variables were submitted to analysis of variance using Statistical Analysis System software package (SAS, 2003). The significance of differences among the geese breeds was tested by t-test at the levels of significance ( $P < 0.05$ ). Correlation between egg weight and hatching goslings' weight were determined using the independent sample test by Pearson (1956).

### 3 Results and discussion

As shown table 1, a significant positive correlation (79.63 %, with restricted number,  $n = 28$ ), was found between egg weight and hatching weight ( $P < 0.0001$ ).

Table 1 Correlation between egg weight and hatching goslings' weight

| Parameter                        | n                 | $\bar{x}$ | s.d.  | s.e.              | c.v. (%) | min    | max    |
|----------------------------------|-------------------|-----------|-------|-------------------|----------|--------|--------|
| Egg weight                       | 28                | 176.61    | 16.64 | 3.14              | 9.42     | 150.00 | 218.00 |
| Hatching weight                  | 28                | 109.61    | 10.94 | 2.07              | 9.98     | 90.00  | 124.00 |
| Pearson Correlation Coefficients |                   |           |       |                   |          |        |        |
|                                  | Egg weight        |           |       | Hatching weight   |          |        |        |
| Egg weight                       | 1.00000           |           |       | 0.79625<br><.0001 |          |        |        |
| Hatching weight                  | 0.79625<br><.0001 |           |       | 1.00000           |          |        |        |

According to Tilki and Ünal (2004), origin and variety of geese have significant effects on egg properties, hatching and growth traits. The close relationship between the egg properties and hatching weight of chick has been well documented for domestic fowls (Tserveni-Gousi, 1987). It was reported by several researchers (Whiting and Pesti, 1983; Shanawany, 1984; Yannakopoulos and Tserveni-Gousi, 1987; Altan et al., 1995; Başpınar et al., 1997) that egg weight has an important influence on one-day-old chick weight in various poultry species. A great impact of egg weight on hatching weight of goslings was reported by Willin (1995). Puchajda et al. (1988) stated a significant relationship between egg weight and hatching weight of Bilgoraj goslings. The positive correlation between egg weight and the weight of chick hatched from it was reported by Skewes et al. (1988) for Bobwhite quail, by Altan et al. (1995) for Japanese quail, by Raju et al. (1997) for chicken, by Ksiazkiewicz et al. (1998) for ducks and by Shanawany (1987) for geese.

Table 2 shows the means of the body weights of goslings up to the age of 98 days of life. The highest body weights we repeatedly noted in Pomeranian, lowest body weights were in Steinbacher geese.

The reared goslings weighed averaged from 105.20 g (Landes) to 118.63 g (Pomeranian), while Biesiada-Drzazga (2014) reported for White Kołuda geese body weight from 104 g to 111 g.

In comparison, body weight Italian White, Bilgoraj and Lubno goslings with 2106, 2046 and 1953 g at 4 weeks and 4108, 4116 and 3740 g at 8 weeks, respectively found Faruga and Wolos (1983). Grom et al. (1980) found in Rhenish and Italian White goslings body weight 3531 and 3473 g, Kočí (1983) in 4 lines of Ivageese body weight with 3.6 to 4.0 kg at 56 days.

The average body weights of both sexes of five local goose genotypes (Kara, Beyaz, Şam, Ala, Tülü) at the age of 9 weeks were from 1984.2 to 2572.0 g and at the age of 12 weeks from 2264.0 to 3004.3 g (Isguzar and Pingel, 2003).

Live weight increased rapidly until of 10–12 weeks of age. After those weeks, it did not show a noteworthy increase. Body weights found in this study, were similar to the reported values by Arslan and Saatci (2003) for native Turkish geese and Tilki and Inal (2004) for different origins of geese, but values were lower than for most European originated geese reported by several authors (Hrouz, 1988; Szabone Willin and Bögre, 1992; Guy et al. 1995; Kirchgessner et al. 1997; Szabone Willin 1998).

Table 2 Body weights in Landes, Pomeranian and Steinbacher geese from 1 to 98 days

| Breed       | Live day | n  | $\bar{x}$ | s. d.  | s. e.  | c.v. (%) | min     | max     |
|-------------|----------|----|-----------|--------|--------|----------|---------|---------|
| Landes      | 1        | 10 | 105.20    | 8.93   | 2.82   | 8.49     | 95.00   | 120.00  |
|             | 14       | 10 | 774.40    | 114.62 | 36.25  | 14.80    | 603.00  | 941.00  |
|             | 28       | 10 | 2456.40   | 214.49 | 67.83  | 8.73     | 2316.00 | 2860.00 |
|             | 42       | 10 | 3489.20   | 225.35 | 71.26  | 6.46     | 3230.00 | 3730.00 |
|             | 56       | 10 | 4220.00   | 492.84 | 155.85 | 11.68    | 3550.00 | 4900.00 |
|             | 70       | 10 | 4740.00   | 609.55 | 192.76 | 12.86    | 4100.00 | 5800.00 |
|             | 84       | 10 | 4940.00   | 597.59 | 188.97 | 12.10    | 4400.00 | 6000.00 |
|             | 98       | 10 | 5433.33   | 524.09 | 213.96 | 9.65     | 5000.00 | 6100.00 |
| Pomeranian  | 1        | 8  | 118.63    | 4.93   | 1.74   | 4.15     | 110.00  | 124.00  |
|             | 14       | 8  | 797.38    | 186.38 | 65.90  | 23.37    | 595.00  | 1185.00 |
|             | 28       | 8  | 2428.75   | 311.73 | 110.21 | 12.84    | 2070.00 | 2975.00 |
|             | 42       | 8  | 3812.13   | 271.82 | 96.10  | 7.13     | 3400.00 | 4214.00 |
|             | 56       | 8  | 4643.75   | 375.54 | 132.78 | 8.09     | 4300.00 | 5400.00 |
|             | 70       | 8  | 5287.50   | 664.27 | 234.85 | 12.56    | 4200.00 | 6600.00 |
|             | 84       | 8  | 5700.00   | 787.40 | 352.14 | 13.81    | 4600.00 | 6800.00 |
|             | 98       | 8  | 6140.00   | 606.63 | 271.29 | 9.88     | 5300.00 | 7000.00 |
| Steinbacher | 1        | 10 | 106.80    | 12.55  | 3.97   | 11.75    | 90.00   | 120.00  |
|             | 14       | 10 | 561.00    | 53.93  | 17.05  | 9.61     | 500.00  | 628.00  |
|             | 28       | 10 | 1942.00   | 318.64 | 100.76 | 16.41    | 1520.00 | 2270.00 |
|             | 42       | 10 | 3202.20   | 384.03 | 121.44 | 11.99    | 2700.00 | 3514.00 |
|             | 56       | 10 | 3840.00   | 245.86 | 77.75  | 6.40     | 3500.00 | 4100.00 |
|             | 70       | 10 | 4325.00   | 190.86 | 67.48  | 4.41     | 4100.00 | 4500.00 |
|             | 84       | 10 | 4825.00   | 265.92 | 94.02  | 5.51     | 4500.00 | 5200.00 |
|             | 98       | 10 | 5225.00   | 409.70 | 144.85 | 7.84     | 4800.00 | 5700.00 |

There are significant differences among breeds during rearing period. The most significant differences were observed when comparing Pomeranian and Steinbacher geese (Table 3).

Table 3 Statistical significance between Pomeranian, Landes and Steinbacher geese

| Live day | Landes v. Pomeranian | Landes v. Steinbacher | Pomeranian v. Steinbacher |
|----------|----------------------|-----------------------|---------------------------|
| 1        | ++                   | -                     | +                         |
| 14       | -                    | +++                   | ++                        |
| 28       | -                    | +++                   | ++                        |
| 42       | +                    | -                     | ++                        |
| 56       | -                    | +                     | +++                       |
| 70       | -                    | -                     | ++                        |
| 84       | -                    | -                     | +                         |
| 98       | -                    | -                     | ++                        |

-  $P > 0.05$ , +  $P < 0.05$ , ++  $P < 0.01$ , +++  $P < 0.001$

#### 4 Conclusions

In conclusions, we recorded that egg weight was significantly correlated with hatching weight in our study. From selected geese breeds, highest increase of body weight was in Pomeranian geese, lowest body weight re recorded in goslings of Steinbacher geese.

#### References

- ALTAN, O. et al. (1995) Effect of egg weight and specific gravity on hatchability and chick weight in Japanese quail. *Turkish Journal of Agriculture and Forestry*, vol. 19, pp. 219–222.
- ARSLAN, C. and SAATCI, M. (2003) Bulky feeds in the intensive fattening of goslings. I. Effects of grass, alfalfa and sugar beet pulp on growth, slaughter performance and some blood parameters in geese. *Revue de Medicine Veterinaire*, vol. 154, pp. 633–638.
- BAŞPINAR, E. et al. (1997) The effect of egg weight and shape index on hatchability in Japanese quail eggs. *Turkish Journal of Veterinary and Animal Sciences*, vol. 21, pp. 53–56.

- BIESIADA-DRZAZGA, B. (2014) Growth and slaughter value of W11, W33 and W31 White Koluda geese. *European Poultry Science*, vol. 78. doi: <http://dx.doi.org/10.1399/eps.2014.44>
- FARUGA, A. and WOLOS, A. (1983) Possibilities in defining the breeds and strains of geese based on some biochemical indices. *Vedecke Prace Hydinarstvo*, no. 20, pp. 113–123.
- GROM, A. et al. (1980) Genotype nutrition interaction during finishing of broiler geese. *Vedecke Prace Hydinarstvo*, no. 17, pp. 5–13.
- GUY, G. et al. (1995) Comparison of meat growth performance fed with concentrate or green grass from 8 weeks up to 22 weeks of age. In *10th European Symposium on Waterfowl, Halle, Germany*, pp. 97–102.
- HROUZ, J. (1988) Growth and development of Bohemian geese (*Anser anser*). *British Poultry Science*, vol. 29, pp. 53–61. doi: <http://dx.doi.org/10.1080/00071668808417026>
- ISGUZAR, E. and PINGEL, H. (2003) Growth, carcass composition and nutrient content of meat of different local geese in Isparta region of Turkey. *Archiv Fur Tierzucht*, vol. 46, no. 1, pp. 71–76.
- KIRCHGESSNER, M. et al. (1997) Carcass quality and fatty acid composition in growing geese fed various rations. *Archiv Fur Geflugelkunde*, vol. 61, pp. 191–197.
- KIRMIZIBAYRAK, T. et al. (2011) Effects of age and sex on meat quality of Turkish native geese raised under a free-range system. *Kafkas Universitesi Veteriner Fakültesi Dergisi*, vol. 17, pp. 817–823. doi: <http://dx.doi.org/10.9775/kvfd.2011.4587>
- KOCI, E. (1983) Production of broiler geese and foie gras in Czechoslovakia. *Avicultura*, vol. 52, no. 12, pp. 31–37.
- KSIAZKIEWICZ, J. (1998) The effect of origin on relationship between internal traits of incubation eggs and some traits of hatched ducks. *Roczniki Naukowe Zootechniki*, vol. 25, pp. 37–49.
- PEARSON, K. (1956) Coefficient of correlation. *Journal of the Royal Statistical Society*, vol. 14, pp. 199–206.
- PINGEL, H. (1990) Genetics of growth and meat production in waterfowl. In: CRAWFORD, R.D. (ed.) *Poultry Breeding and Genetics*. Amsterdam: Elsevier, pp. 691–703.
- PUCHAJDA, H. et al. (1988) The effect of the weight and shape of goose eggs on their hatchability sex and weight of goslings. *Acta Zootech. Univ. Agri. Nitra*, vol. 44, pp. 149–158.
- RAJU, M.V.L.N. et al. (1997) Interrelationship among egg weight, hatchability, chick weight, post-hatch performance and rearing method in broiler breeders. *Indian Journal of Animal Sciences*, vol. 67, pp. 48–50.
- SAATCI, M. and TILKI, M. (2007) Zoometrical body measurements and their relation with live weight in native Turkish geese. *Turkish Journal of Veterinary and Animal Sciences*, vol. 31, pp. 47–53.
- SAS INSTITUTE (2003) *SAS User's Guide 2002-2003 : Version 9.1(TS1M3)*. Cary, NC, USA: SAS Institute.
- SHALEV, A. (1995) Comparative growth and efficiency of various avian species. In: HUNTON, P. (Ed.) *Poultry Production*. Amsterdam: Elsevier, pp. 53–69.
- SHANAWANY, M.M. (1984) Inter-relationship between egg weight, parental age and embryonic development. *British Poultry Science*, vol. 25, pp. 449–455.
- SKEWES, P.A. et al. (1988) Correlation among egg weight, chick weight and yolk sac weight in Bobwhite quail. *Florida Scientist*, vol. 51, pp. 159–162.
- SZABONE WILLIN, E. and BÖGRE, J. (1992) Changes in breast weight and skin, meat, and bone proportions of breast between ages 0 to 16 weeks in geese. In *9th International Symposium on Waterfowl, Pisa, Italy*, pp. 250–252.
- SZABONE WILLIN, E. (1998) Growing characteristics in dual-purpose hybrid geese. In *The First Vietnamese-Hungarian Workshop on Small Animal Production for the Development of Sustainable Integrated Farming Systems*, Chi Miny City, Vietnam, pp. 84–88.
- TILKI, M. (2005) Effect of age on growth and carcass composition of native Turkish geese. *Archiv Fur Geflugelkunde*, vol. 69, no. 2, pp. 77–83.
- TILKI, M. and INAL, Ş. (2004) Yield traits of different originated geese rearing in Turkey II. Growth traits. *Turkish Journal of Veterinary and Animal Sciences*, vol. 28, pp. 157–163.
- TSERVENI-GOUSHI, A.S. (1987) Relationship between parental age, egg weight and hatching weight of Japanese quail. *British Poultry Science*, vol. 28, pp. 749–752.
- UHLIŘOVA, L. and TŮMOVA, E. (2014) The effect of genotype and sex on performance and meat composition of geese. *Acta fytotechnica et zootechnica*, vol. 17, no. 2, pp. 52–54. doi: <http://dx.doi.org/10.15414/afz.2014.17.02.52-54>

YANNAKOPOULOS, A.L. and TSERVENI-GOUSHI, A.S. (1987) Effect of breeder quail age and egg weight on chick weight. *Poultry Science*, vol. 66, pp. 1558–1560.

WHITING, T.S. and PESTI, G.M. (1983) Effect of the dwarfing gene on egg weight, chick weight, and egg weight ratio in commercial broiler strain. *Poultry Science*, vol. 62, pp. 2297–2302.

WILLIN, S.E. (1995) Relation between egg weight and intensity of growth in geese. In *10<sup>th</sup> European Symposium on Waterfowl, Halle, Germany, 1995*, pp. 443–446.