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ANALYSIS OF SLOVAK AND CZECH NATIONAL BREEDS OF GEESE WITH RESPECT TO EFFECTIVE POPULATION SIZE

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ABSTRACT

For this study certified flocks of Slovak Goose and Suchovska Goose controlled by the Czech Goose and the Czech Crested Goose Breeders Club, were used. Parameters analyzed were: total number of birds, number of breeding males and number of breeding females, effective population size following the categorization by Simon and Buchenauer (1993) and Wright (1931). Populations of analyzed breeds of geese were categorized by Scherf (2000). We found the lowest number of Slovak Goose in the year 2001 (34 birds), while the highest number of poultry was detected in the year 2005 (83 birds). The effective population size of Slovak Goose varied widely from 28.24 to 76.86 pcs, with average of 56.26 pcs. We categorized the Slovak Goose as a critical breed. In case of the Suchovska Goose we detected the lowest total number in the year 2003 (67 birds) and highest number in the year 2005 (143 birds). Minimal effective population size of Suchovska Goose ranged from 57.78 to 125.33 pcs, with average of 96.72 pcs. Suchovska Goose was also categorized as a critical breed. The total number of Czech Goose was the highest in the year 2000, where 226 birds were bred, the lowest number being in the year 2008 (111 birds). The effective population size was in the range from 101.20 to 168.50 pcs, with average effective population size of 116.03 pcs. The Czech Goose was categorized as endangered from the year 2000 to 2003 and was maintained with an active conservation programme. From the year 2004 to 2008 it was a critically-maintained breed with an active conservation programme in place. The highest total number of Czech Crested Goose was noted in the year 2004 (39 birds), the lowest number in the year 2005 (25 birds). The effective population size was in the range from 23.04 to 34.67 pcs, with an average size of 29.49 pcs. The Czech Crested Goose was also categorized as critically-maintained breed with an active conservation programme in place.

Key words: geese; effective population size; male; female

INTRODUCTION

Romanov *et al.* (1996) recorded that native goose breeds have better adaptability to extensive management, better disease resistance, higher reproduction rates and better meat quality, which are based on the natural gene pool and good original material of crossbreed predominance and high performance. Such excellent native breeds may contain the gene and alleles permanent to the adaptation to particular environments and local breeding goals and needed to maintain genetic resources permitting adaptation to unforeseen breeding requirements in the future and a source of research materials.

Slovak Goose was established in 1940s on the basis of the regional breeds from South-Eastern part of Slovakia. During the breeding process the regional Hungarian and German breeds were also used. There was a large decrease in the overall numbers in 1948 as a result of the creation of large scale breeding farms and change of production conditions. The interest to breed this type was renewed upon the initiative of the Slovak Union of Breeders in the 1960s (Weis and Hrnčár, 2007). The aim of breeding was to have medium-heavy triple purpose geese suitable for the corn growing areas, as a vital goose, adaptable with a good ability to pasture and preservation of clucking instinct. The risk factor is

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a low number of birds and this creates bigger pressure on the breeders and judges at the specialized exhibitions and the recognition of breeding flocks. A high risk for the reproduction is a tendency of male geese to be monogamous and the mutual refusal which exists in both sexes (Kadlečík *et al*., 2004).

Suchovska Goose was established at the end of the 1980s in the village Suchá nad Parnou from the population of local yellow coloured domestic goose by cross-breeding with French (Toulouse, Landes) and German (Pomeranian, Steinbach) breeds of geese. A Suchovska goose was recognised as a breed in 1995 (Hrnčár *et al.*, 2008).

The Czech Goose is a direct descendant of the wild grey goose. The gene pool of the breed remained exceptionally homogenous until the 1870s throughout the country. Later, the domestic breed was often crossed with various imported breeds. The original gene pool of the breed was largely destroyed and preserved only through successful regeneration in 1930s. An even worse crisis befell the breed in the 1960s and 1970s, when the government ordered blanket introduction of foreign breeds (in particular Italian and Rhine geese). After this intervention, the Czech Goose was rescued as a breed virtually at the eleventh hour by preserving and using several of the last remaining birds from Eastern Bohemia (Pavel, 2008). Czech Goose was included in genetic resources of the Czech Republic in the year 1992 (Mátlová and Gardiánová, 2006). It is an original breed of geese developed by domesticating the wild greylag goose in Bohemia and Moravia and being lighter, undemanding goose, with a robust constitution; it is particularly suitable for extensive conditions of smaller breeding operations. The bird is favoured for its high dressing percentage and good meat quality. The feathers are of excellent quality with a high ratio of down. The goose lays 15 or more white eggs in one or two laying cycles. The brooding instinct and tending to the hatching is preserved in the vast majority of geese (Pavel, 2008).

In the 1970s and 1980s, several breeders, mainly from Rychnov nad Kněžnou County, attempted to stabilize the gene pool of the Czech Crested Goose. The crest had been an intermittent feature of the Czech Goose for centuries. The attempt was successful and in the year 1988 the Czech Crested Goose was recognized and registered as a separate native breed developed form the Czech geese, free from external genetic introductions. Thanks to its attractive appearance and utility comparable to the Czech Goose, the breed continues to grow in popularity (Pavel, 2008).

The aim of this study was to identify and characterize the population size of reared Slovak and Czech national breeds of geese.

MATERIAL AND METHODS

For this study certified flocks of Slovak Goose and Suchovska Goose controlled by Slovak Union of Breeders were used. The certificate of acceptance contained pointed evaluation of comparison of exterior of breed with standard, performance, participation at poultry show, surroundings and hygiene in poultry keeping. Data needed to analyze the effective population size were obtained from study books and annual reports of the Czech Goose and the Czech Crested Goose Breeders Club. Data used in this study included population of fowl into genetic resources.

From these materials we analyzed total number of birds, number of breeding males and number of breeding females. We calculated effective population size (*Ne*) according to the formula given by Simon and Buchenauer (1993) and Wright (1931):

$Ne = 4*M*F/(M+F)$

where: M is the number of males, F is the number of females

We evaluated the populations of analyzed breeds of goose categorizations by Scherf (2000) based on criteria such as overall population size, number of breeding females, number of breeding males, trend in population size, active conservation programme: extinct breed (it is no longer possible to recreate the breed population), critical breed (the total number of breeding females is less than or equal to 100 or the total number of breeding males is less than or equal to 5, or overall population size is decreasing), critical-maintained breed (critical breed for which an active conservation programme is in place), endangered breed (the total number of breeding females is higher than 100 and less or equal to 1000 or the total number of breeding males is higher than 5 and less than or equal to 20), endangered - maintained breed (endangered breed for which an active conservation programme is in place), breed not at risk (the total number of breeding females and males is higher than 1000 and 20 respectively).

RESULTS AND DISCUSSION

Genetic resources have represented and still represent even in our modern society important sources for human existence and survival, due to their actual and potential values (Tošovská and Roudná, 2006). Table 1 gives a survey of number of Slovak Goose during the period 2001-2008. The lowest number of Slovak Goose was found in the year 2001 (34 birds), however, the highest number of poultry was detected in the year 2005 (83 birds). Important for maintenance of population

is the choice of parents and sufficient number of parents (Cabarello and Toro, 2000).

Table 1 showed that the effective population size of Slovak Goose varied widely from 28.24 (year 2001) to 76.86 pcs (year 2008) with average of 56.26 pcs. On the basis of obtained data we categorized the Slovak Goose as a critical breed. Szalay *et al.* (2009) recorded higher effective population size of the national geese breed in Hungary.

In case of the Suchovska Goose (Table 2) we detected the lowest total number in the year 2003 year (67 birds) and the highest number in the year 2005 (143 birds).

During the analyzed period (year 2001 – 2008) we detected minimal effective population size of Suchovska Goose as 57.78 (year 2001) and maximal of 125.33 pcs (year 2006) with an average 96.72 pcs. We also categorized the Suchovska Goose as a critical breed.

In Table 3 the trend of changes in effective population size of Czech Goose is presented. Total number of Czech Goose was the highest in the year 2000 (226 birds were bred), the smallest number being in the year 2008 (only 111 birds). Lower number of fowls in population can change their adaptability (Romanov *et al.* 1996). Good adaptability to extensive management, better disease resistance in native goose breeds of national breeds were recorded.

Table 1: Trend of number and effective population size (*Ne*) of Slovak Goose during the years 2001- 2008

Year	Number of males	Number of females	Total number	Effective population population size
2001	10	24	34	28.24
2002	22	46	68	59.53
2003	20	32	52	49.23
2004	22	53	75	62.19
2005	24	59	83	68.24
2006	18	48	66	52.36
2007	19	45	64	53.44
2008	33	46	79	76.86
Average	21.00	44.13	65.13	56.26

Table 2: Trend of number and effective population size (*Ne*) of Suchovska Goose during the years 2001- 2008

Year	Number of males	Number of females	Total number	Effective population population size
2001	20	52	72	57.78
2002	29	53	82	74.98
2003	26	41	67	63.64
2004	34	88	122	98.10
2005	43	100	143	120.28
2006	47	94	141	125.33
2007	44	96	140	120.69
2008	40	96	136	112.94
Average	35.38	77.50	112.88	96.72

The effective population size was in the range from 101.20 (year 2005) to 168.50 pcs (year 2000) with average effective population size of 116.03 pcs (Table 3). The Czech Goose was categorized from the year 2000 to 2003 as endangered and was maintained with an active conservation programme in place. From the year 2004 to 2008 it was categorized as a critically-maintained breed with an active conservation programme in place.

The highest total number of Czech Crested Goose was noted in the year 2004 (Table 4), and there were about 39 birds (26 females and 13 males) in the breed, the smallest number being in the year 2005 (only 25 birds: 16 females and 9 males).

The effective population size was in the range from 23.04 (year 2005) to 34.67 pcs (year 2004) with an average size of 29.49 pcs (Table 4). We categorized the Czech Crested Goose as a critically-maintained breed with an active conservation programme in place.

In comparison, Szalay *et al.* (2009) recorded in case of Frizzles Hungarian Goose decrease in total number from 657 birds (year 2005) to 263 birds (year 2008). Similarly, for Hungarian Goose in varieties white, gray and spotted decrease in total number was observed from 367 birds (year 2006) to 233 birds (year 2008). For reducing the inbreeding rate in population, the effective population size needs to be increased for which many strategies are. These can be equalization of family sizes (Wang, 1997), choice of parents (Cabarello and Toro, 2000) and various systems of breeding (Nomura and Yonezawa, 2000).

Table 3: Trend of number and effective population size (*Ne*) of Czech Goose during years 2000 - 2008

Year	Number of males	Number of females	Total number	Effective population population size
2000	56	170	226	168.50
2001	45	125	170	132.35
2002	34	108	142	103.44
2003	36	101	137	106.16
2004	35	94	129	102.02
2005	37	80	117	101.20
2006	44	90	134	118.21
2007	43	84	127	113.76
2008	37	74	111	98.67
Average	40.78	102.89	143.67	116.03

Table 4: Trend of number and effective population size (*Ne*) of Czech Crested Goose during years 2003 - 2008

Year	Number of males	Number of females	Total number	Effective population population size
2003	11	21	32	28.89
2004	13	26	39	34.67
2005	9	16	25	23.04
2006	14	21	35	33.60
2007	11	19	30	27.87
2008	11	21	32	28.86
Average	11.50	20.67	32.17	29.49

CONCLUSION

During the evaluated period the trends of number and effective population size of observed breeds of geese depended on breed, and possible factor of country could also be considered. On the basis of number of females and males we can consider both Slovak and Suchovska goose as critical breeds as compared to Czech breeds.

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