

Behavioural Science

Non-invasive vocal sex determination in white-faced whistling duck (*Dendrocygna viduata*), a species without any visible sexual dimorphism

KLENOVA AV¹, VOLODIN IA^{1,2}, VOLODINA EV²

¹Dept. of Biology, Moscow State Univ., Vorobiovi Gori, 119899, Russia;
klenova2002@mail.ru

²Scientific Research Dept., Moscow Zoo, B. Gruzinskaya, 1, 123242, Russia

Any management of bird species without of sexual dimorphism often faces the problem of sex determination. Standard methods often require the capture of birds and this may be difficult in large enclosures. In addition, taking of blood samples or feathers for kariotyping, or handling of birds for cloaca inspection is at least unpleasant or even traumatic and stressful for the animal. In contrast, acoustic methods are completely non-invasive and, in some cases may be just as reliable.

In the present study, we investigated the sexual differences in loud whistles of white-faced whistling duck. Whereas the sex of some bird species without any sexual dimorphism may be recognised during the breeding period, both sexes of whistling ducks share paternal care. Loud whistles were tape-recorded in Moscow Zoo from adults that were individually marked (9 males and 2 females) and kept together in an outdoor enclosure. Sex determination was made by cloaca inspection. The loud whistle is a tonal call with well-expressed peaks of frequency modulation that form three maxima and two minima throughout the call. Five parameters of time and seven of frequency measurements were taken from 152 male and 42 female calls.

Discriminate function analysis showed a 100% correct assignment on sex. The 100% correct assignment was observed even in cases when all frequency or time parameters were omitted from the analysis. Moreover, six from seven frequency parameters (start frequency and each of frequency maxima and minima) showed a clear distinction between sexes, without any overlap or shared value ranges. Mann-Whitney U-test showed significant differences ($U=0$, $p<0.001$) for each of six frequency parameters. The male loud whistles were always lower in frequency, than female calls. These differences potentially allow recognition of bird sex by unassisted ears and provide a reliable tool for non-invasive sex determination in the white-faced whistling duck. The acoustic data even permitted a decision on ambiguous information for one individual from the cloaca inspection. With this method the male penis sometimes remains inside the body and the sex of this bird had been determined as a female with a questionmark. Acoustic data corrected this mistake, suggesting that this bird was undoubtedly of male sex.