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SEXING COMMON SNIPE (*Gallinago gallinago*) IN THE FIELD – IS THERE ANY SIMPLE METHOD?

Radosław Włodarczyk, Tomasz Janiszewski, Krzysztof Kaczmarek, Piotr Minias, Anna Kleszcz

ABSTRACT

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There are a few methods used for sex determination in the Common Snipe. However, all proposed methods are based on data obtained from dead birds. The most important feature is the total length of the outermost tail feather. The performed analysis showed that the vane length was strongly correlated with the total length of this feather. It allowed to predict this measurement having only the vane length. Because the measurement procedure influences the vane length, new ranges of vane length typical for each sex are proposed. However, the analysis of the vane length distribution suggested that there were no two homogenous groups that would represent the two sexes. This supports the prediction that the total feather length should be used rather cautiously as a simple sex trait in the Common Snipe. Also the second trait based on the tail feather colour resulted in overestimation of the proportion of females.

R. Włodarczyk, T. Janiszewski, Dept. of Teacher Training in Biology and Biodiversity Studies, University of Łódź, Banacha 1/3, PL-90-237 Łódź, Poland, E-mail: wradek@biol.uni.lodz.pl; K. Kaczmarek, P. Minias, A. Kleszcz, Students' Ornithological Section, University of Łódź, Banacha 1/3, 90-237 Łódź

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INTRODUCTION

Waders show a wide range of features used in their sex identification (Prater *et al.* 1987). Males and females can differ in size (for example in Ruff *Philomachus pugnax*), plumage (Dotterel *Charadrius morinellus*) or presence of sexually unique features (longer and thinner bill of males in Avocet *Recurvirostra avocetta*). The Common Snipe belongs to species in which differences between sexes were carefully investigated. Many authors focused mainly on the differences in body measurements between sexes in this species (Strandgaard 1986, Green 1991, McCloskey and Thompson 2000). Despite careful studies nobody was able to find any single sex determinant. For example, Strandgaard (1986) proposed to use a combination of five different measurements to sex Common Snipes, whereas McCloskey and Thompson (2000) were able to reduce the list of these measurements to four. Such approach causes problems with application of this method during field studies. However, all of authors used the length of external tail feather as a key trait important for sex identification. Devort (1989) carried out in-depth analyses of this feature and proposed a procedure based on this single character. According to this author, about 85% of all birds can be sexed properly using the length and colour of the outermost tail feather. His analysis was used to construct the field key to ageing and sexing of the Common Snipe published by CICB and OMPO (2002). However, all mentioned studies were based on data obtained from dead birds. Moreover, Devort (1989) used the total length of the outermost tail feather for sex recognition. Such approach cannot be used for living birds without plucking out the feather. Meissner and Ściborski (2005) proposed the way of computing the total feather length using the vane length obtainable from living birds. However, it has never been checked whether such approach is correct and useful during field studies. This paper presents some pitfalls and problems with correct sex determination in the Common Snipe using known methods during field studies.

MATERIAL AND METHODS

Data were collected at the ringing site situated at the Jeziorsko reservoir, central Poland (54°39'N, 19°40'E) in two autumn seasons: 2000 and 2005. Birds were aged using features described in Prater *et al.* (1987) and CICB and OMPO (2002) key. Two age classes were distinguished: first year and adult birds. During the typical procedure connected with bird ringing two additional information were noted: the length and the colour of the outermost tail feather. The length of the tail feather (the vane only) was measured with accuracy of 1 mm using a ruler. Such measurement was done only in 2005. The colour of two outermost rectrices was described using the criteria presented in CICB and OMPO (2002) key to Common Snipe ageing and sexing. Finally, from large part of birds the tail feather was plucked and individually marked – 429 rectrices (367 from youngs and 62 from adults) were collected. Only the birds with no signs of moult within tail were used for data collection. Plucked feathers were used to obtain the vane length and the total feather length measurements. They were done with stopped ruler with accuracy of 1 mm, using technique described by Meissner and Ściborski (2005). Moreover, vane and feather length was measured using calipers to the nearest 0.1 mm. All statistical analyses were done using the STATISTICA 6.0 (StatSoft 2001) and FISAT 2 software (Annon 2000). To divide the multimodal distribution of the vane length into few unimodal ones, Hasselblad's method was used (Hasselblad 1966). This method allows to predict the presence of subgroups within one non-homogenous data set (Pauly and Caddy 1985). Separation index larger than 1.96 proves that the proposed division is statistically significant.

RESULTS

Tail feathers of both adult and juvenile Common Snipes showed a significant correlation between total feather length and the vane length (r = 0.98 for juveniles and r = 0.97 for adults). The relationship between these two measurements was linear and allowed for predicting total feather length (*TFL*) having the vane length (*VL*) only. The equations are as follows: (1) for adult birds: $TFL_{ad} = 1.01VL_{ad} + 7.96$ ($R^2 = 0.98$, $SEE = 0.68$, $F_{1,62} = 1.571$, $p < 0.001$); (2) for juvenile birds: $TFL_{imm} = 1.02VL_{imm} + 7.44$ ($R^2 = 0.97$, $SEE = 0.57$, $F_{1,367} = 10.837$, $p < 0.001$). Described relationships were used for construction of equations that allowed to estimate the vane length having the total feather length only. It was done to transform data about sex differences between males and females in the total feather length presented in CICB and OMPO (2002) publication. It gave the range of the vane length typical for each sex and age class, following the mentioned key (Table 1).

Table 1
The ranges of the total feather length and the vane length typical for each sex in the Common Snipe, according to CICB and OMPO identification key (2002)

Age class	Vane length		Total feather length	
	Female	Male	Female	Male
Adults	< 54 mm	> 57 mm	< 63 mm	> 66 mm
Youngs	< 47 mm	> 49 mm	< 56 mm	> 58 mm

However, such data transformation causes some problems taking into consideration the application of this method in field conditions. It is so because the way of taking the feather measurement influences the obtained results. Mean vane length measured by stopped ruler (x_1 = 48.5 mm) is significantly longer than the same feather measured by calipers (x_2 = 48.2 mm; $t = 5.92$, $df = 245$, $p < 0.001$). The vane length taken before and after plucking showed significant differences. The same feather measured before plucking was longer than after such procedure (x_1 = 51.6 mm, x_2 = 50.5 mm; $t = 12.1$, $p < 0.001$). It means that new equations explaining the relationship between total feather length and vane length based on measurements obtained before plucking procedure should be constructed: (1) for adult birds: $TFL_{ad} = 0.98VL_{ad} + 8.71$ ($R^2 = 0.92$, $SEE = 0.04$, $F_{1,54} = 635.107$, $p < 0.001$); (2) for juvenile birds: $TFL_{imm} = 0.92VL_{imm} + 11.58$ ($R^2 = 0.90$, $SEE = 0.04$, $F_{1,79} = 710.67$, $p < 0.001$).

Such change in final equations noticeably impacts the range of the vane length used for sex discrimination, changing earlier results by one millimetre in plus for each sex and age class (Table 2). Such compilation of methodological problems induced us to analyse the vane length distribution to check whether this trait can be regarded as sexually dependent. It was done only for juvenile birds due to data sufficient for such analysis. Hasselblad's method revealed the three-modal pattern of the vane length distribution (Fig. 1). Separation index showed significant differences among groups with mean values 45.8 mm, 51.6 mm and 59.7 mm (Table 3). Such division was not consistent with the assumption that the distribution of the tail feather length was bimodal and each subgroup was clearly recognizable. Such assumption is necessary if one wants to treat the outermost tail feather length as a key feature for assignment of each individual to a certain two sex groups.

Table 2
The range of the vane length typical for each sex in the Common Snipe proposed in this study and applicable for field studies

Age class	Vane length	
	Female	Male
Adults	< 55 mm	> 58 mm
Youngs	< 48 mm	> 50 mm

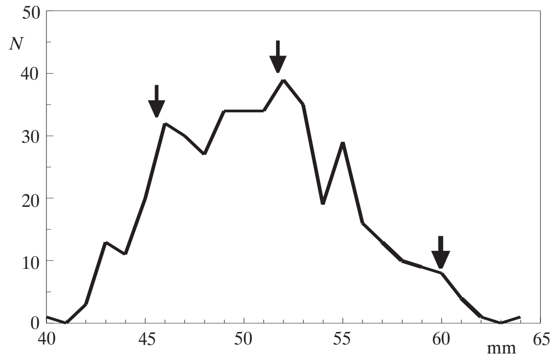

Fig. 1. Division of the vane length distribution into subgroups by Hasselblad's method (1966) – see Table 3. Arrows – mean values of subgroups.

Table 3
Results of the separation of the multimodal vane length distribution into three unimodal distributions with the given mean and SD values, using Hasselblad's method (1966)

Group	Mean	*SD*	Number of cases	Separation index
1	45.78	1.87	75	–
2	51.59	3.80	336	2.05
3	59.72	0.95	13	3.42

The analysis of the feather colour showed that despite the ringer, only 64-78% of sexed birds had the same sex determinants (feather length and colour). It means that sexing of snipes using both traits separately will give opposite results in 22-36% of birds. There was a strong significant difference between the mistakes made, despite the age class. Having taken into account tail feather colour as a single sex trait gave a significantly higher frequency of females in comparison with males ($\chi^2 = 28.35$, $df = 1$, $n = 299$, $p < 0.01$). It means that a ringer made mistakes more often while sexing the females than the males (Table 4).

Table 4
Relation between birds' sex obtained from separate analyses of the tail feather length and colour

Feather colour	Feather length	
	Female	Male
Female	103 (55%) (correct)	83 (45%) (mistake)
Male	27 (24%) (mistake)	86 (76%) (correct)

DISCUSSION

Analyses of traits used in the key for Common Snipe ageing and sexing published by CICB and OMPO (2002) and based on data obtained from hunted snipes showed that there was no simple application of such a key in field studies. This key has at least one discrepancy, which was mentioned by Meissner and Ściborski (2005). The CICB and OMPO key (2002) was based on data published by Devort (1989) and cited by Rouxel (2000). However, both authors gave different total feather length range sex specific in the case of young birds. According to them young females have total feather length shorter than 56 mm, whereas in CICB and OMPO key the same group of birds is recognizable by total feather length shorter than 58 mm. Such a difference between the sources makes it unclear which range is correct. The method of computing the total feather length from the vane length alone, proposed by Meissner and Ściborski (2005), also has some pitfalls. The presented results show different ranges of the vane length typical for each sex in adult birds obtained using the same measurement procedure. It is probably connected with a larger sample size, as Meissner and Ściborski (2005) based their study on data from 24 adults, while 64 adult birds were analysed hereby. Moreover, higher determination coefficient (R^2) suggests that equations presented in the present study work more precisely. Not only the sample size can influence obtained result, but also the technique of measurements. As it was shown, stopped ruler *vs* calipers and the procedure of feather plucking can give additional differences. This element of the methods of measurement can change the range of the vane length typical for each sex by one millimetre. Finally, the presence of three different unimodal groups within the vane length distribution was inconsistent with the assumption that this characteristic alone could be used as a simple sex discriminant. A trait typical for each sex should have bimodal distribution representing two unimodal groups of two sexes: males and females. The observed distribution of the tail feather length in the Common Snipe can be caused by geographical differences in the tail length among birds that originate from different parts of the species home range. This is supported by data from China, where Common Snipes have significantly shorter tails than in western Europe (Devort 1997). It can also result from differences between two ecological eco-types observed in this species (Svazas 2001, Mongin 2002). The second trait presented in CICB and OMPO (2002) key and based on the tail feather colour also causes discrepancies. It resulted in overestimation of the proportion of females in the sample in comparison with males due to higher number of mistakes in favour of females. It means that ringers more often see brown colour on both tail feathers and more accurately notice a lack of brown colour on the outermost rectrix. The described problems with the application of the key proposed by CICB and OMPO (2002) suggest that sexing of Common Snipes is still an open question and needs further investigation. However, assuming that the outermost vane length is sex-specific, the presented vane length ranges (Table 2) seem to be the most appropriate for living birds.

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