Sexing Common Snipe: linear regression instead of plucking feathers – a method for estimating the total length of the outer tail feather

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Meissner, W. & Sciborski, M. 2005. Sexing Common Snipe: linear regression instead of plucking feathers – a method for estimating the total length of the outer tail feather. *Wader Study Group Bull.* 108: 57–59.

Keywords: Common Snipe, *Gallinago gallinago*, sexing criteria

The length of the outermost tail feather is one of the most useful criteria for sexing Common Snipes *Gallinago gallinago.* The parameter is usually given as the total length of the plucked feather. However, removing outer tail-feathers may have a detrimental effect on the birds, as these are particularly important to males for "drumming" display flights. In this paper we present a linear equation converting the vane length of the outermost tail feather to total feather length. This enables total feather length to be estimated without removing feathers. Moreover vane length is best suited to the examination of museum skins and to other cases where feather removal should be avoided.

INTRODUCTION

Male and female Common Snipe *Gallinago gallinago* differ in habitat selection (McCloskey & Thompson 2000a), behaviour during the breeding season (Green 1991, Rouxel 2000) and in the timing of spring and autumn migration (Rouxel 2000). Therefore the ability to sex live birds may be of crucial importance in field studies.

One of the most useful criteria for sexing Common Snipes is the length of the outermost tail feathers, male outer tail feathers being longer than in females (McCloskey & Thompson 2000b, Rouxel 2000). Recently, CICB & OMPO (2002) issued a detailed key to ageing and sexing Common Snipes in which the length of the outer tail feather is given as the total length of the plucked feather. This parameter can also be found in other publications (e.g. Rouxel 2000). Only McCloskey & Thompson (2000b) used two different measurements in their analysis of sex differences. In some publications, the method by which the tail feather was measured is not specified (e.g. Strandgaard 1986, Green 1991).

Removing outer tail feathers may be detrimental to birds, especially males, as they are crucial to producing sound during the "drumming" display flight (Glutz von Blotzheim *et al.* 1977). Therefore most researchers would probably like to avoid this. According to CICB & OMPO (2002), the length of the outermost tail feather, from the tip to the skin, is 7 mm shorter than the total feather length. However such measurement cannot be taken precisely due to flexibility of the skin around the quill.

In adult Common Snipes, the colour of the tips of the outer tail feathers may be an additional character that can provide corroboration of sex. However, this does not apply to juveniles (CICB & OMPO 2002).

We propose measurement of vane length, which can be expected to be highly correlated with total feather length. We present a simple method that allows the calculation of total feather length from vane length.

MATERIALS AND METHODS

Common Snipes were caught during autumn migration 2002 at the WRG KULING ringing site at Nisko (54°04'N, 21°03'E) in NE Poland. Fieldwork covered mid July to mid September. All juveniles caught during this period did not have any active moult in their tail feathers. Each bird was aged (Glutz von Blotzheim *et al.* 1977, CICB & OMPO 2002) and the outermost tail feather (rectrix) was plucked for further measurements of total feather length and vane length to an accuracy of ±1 mm (Fig. 1). We define quill length as the difference between the total feather length and the vane length. The measurements were made with a stopped ruler with the feather lying freely on the ruler (i.e. it was not straightened or stretched along the ruler). One outer tail feather was collected from each of 163 juvenile and 24 adult Common Snipes. Analyses were carried out using the STATISTICA 6.0 software (StatSoft 2001).

RESULTS

Adult Common Snipes have significantly longer outer tail feather than juveniles, both vane length and quill length being greater in adults (Table 1).

There was a significant and strong correlation between vane length and total length of the outer tail feather for juveniles (r = 0.97) and for adults (r = 0.95). The relationship is linear and the regression equations for each age-class are:

Total feather length adults = 0.99 vane length + 10.02 ($R^2 = 0.90$)
Total feather length juveniles = 1.03 vane length + 7.62 ($R^2 = 0.93$)

There is a significant difference in the elevations of the two regression lines because the quills of adults are longer than in juveniles (test for two elevations, $t = 46.1$, $p < 0.001$). However, the slopes of the regression lines did not differ sig-

Table 1. Outermost tail feather length in adult (N = 24) and juvenile (N = 163) Common Snipes.

Measurement (mm)	Adults		Juveniles		t-test
	Mean	SD	Mean	SD	
Vane length	54.4	3.28	48.4	3.10	t = 8.67, p < 0.01
Quill length	9.4	1.05	8.8	0.90	t = 3.04, p = 0.01
Total feather length	63.8	3.43	57.3	3.43	t = 8.97, p < 0.01

Table 2. Marginal values of outermost tail feather measurements for sexing Common Snipe.

Measurement (mm)	Adults		Juveniles		Source
	Males	Females	Males	Females	
Total feather length	>66	≤63	>58	≤56	Rouxel (2000)
Vane length	>56	≤53	>49	≤47	this study

nificantly (ANCOVA, $F_{1,182} = 0.02$, $p = 0.90$). Therefore data from both age-classes can be pooled. The resulting equation is:

Total feather length = 1.04vane length + 6.86 ($R = 0.97$; $R^2 = 0.95$; SEE = 0.87)

The standard error of estimation (SEE) is low and coefficient of determination (R^2) high. Therefore the regression equation predicts total feather length with great accuracy (Fig. 2).

The equation that allows conversion of total feather length to vane length is:

Vane length = 0.91 Total feather length – 3.73

DISCUSSION

Adult and juvenile Common Snipes differ in tail feather length. Therefore each bird should be aged before sexing (CICB & OMPO 2002). In adults, if the total length of the outermost tail feather is >66 mm, it indicates a male; if it is ≤63 mm, it indicates a female. In juveniles, the marginal values are 58 mm and 56 mm respectively according to Rouxel (2000), but 58 mm and 58 mm according to CICB & OMPO (2002). The discrepancy between these reports needs to be investigated.

As expected in a case of two measurements where one includes the other, the correlation between them is very high and the standard error of estimation is low. Therefore the equation presented above makes it possible to convert vane length into the total feather length with great accuracy and without plucking the feather. Vane length would also be the best method of sexing museum skins.

The mean quill length in this study is about 2 mm longer than that indicated by CICB & OMPO (2002). However, they indicate that 7 mm of the quill length is subcutaneous quill. Therefore the missing 2 mm might be the exposed part of the quill. However this is only presumption, because CICB & OMPO (2002) do not give details about the methods used in their analysis.

The marginal values of total outermost tail feather length for males and females given by Rouxel (2000) and CICB &

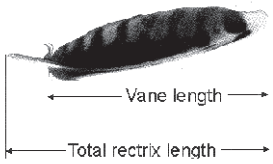

Fig. 1. The method of measuring the outermost tail feather.

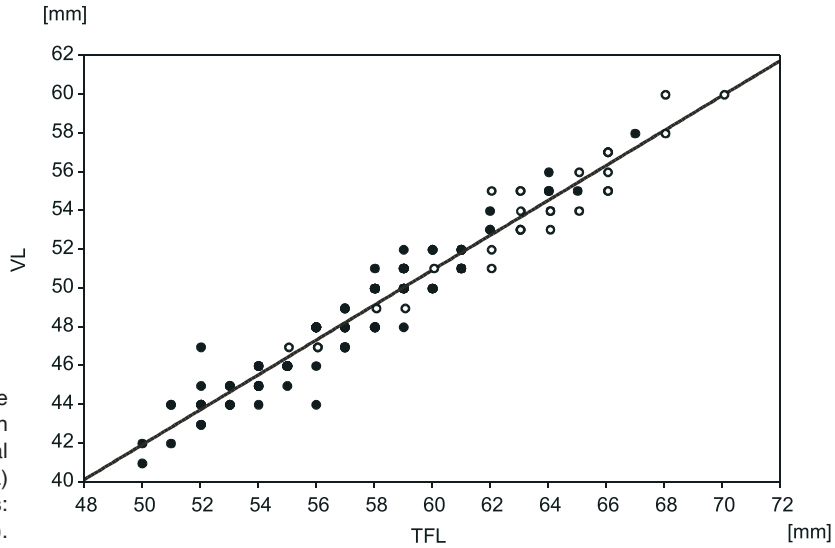

Fig. 2. Vane length (VL) of the outer tail feather in Common Snipes plotted against the total length of the same feathers (TFL) (adults: open dots; juveniles: black dots).

OMPO (2002) can be converted to vane length using the equation derived in this study (Table 2).

According to CICB & OMPO (2002), 85% of juveniles can be sexed using total outer tail feather length. Similar accuracy should be expected using vane length. Nevertheless, the accuracy of the marginal values needs to be verified using birds sexed by dissection or molecular methods.

It should be noted that although this method is shown to apply to the nominate subspecies of Common Snipe, *gallinago*, it should not be assumed that the principle applies or that the same figures apply to the other subspecies. These almost certainly differ in the dimensions of the vane and quill of the tail feathers. In particular it seems that the American subspecies, *delicata*, has shorter outer tail feathers than *gallinago* (McCloskey & Thompson 2000b).

ACKNOWLEDGEMENTS

We are grateful to all colleagues who took part in the wader catching programme at Nisko and for their help during fieldwork, especially for leaders of the ringing site: M. Koss, A. Wlodarczak and G. Zaniewicz. John Marchant made useful comments on an earlier version of manuscript. This is publication No. 121 of Waterbird Research Group KULING.

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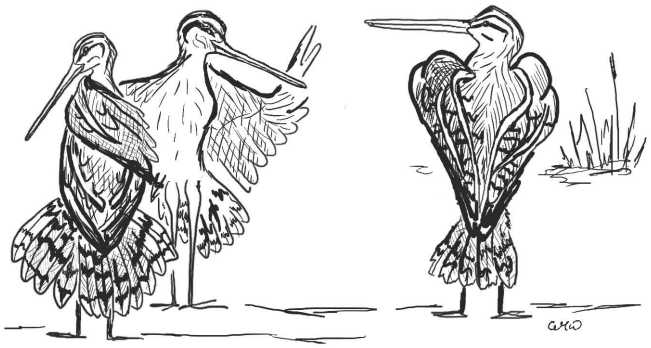
"Next time avoid crazy ringers, my dear."



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