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Body dimensions and coloration of the winter pelage of a Moravian population of sika deer, *Cervus nippon*

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A b s t r a c t . We assessed five body dimensions and winter coat coloration in a feral population of sika deer. In total, 37 stags and 45 does (age = five years or older) were assessed by sex. Results were compared with those obtained previously from different feral or enclosed populations. Moravian sika deer belong to the group of "nipponoid" forms.

Key words: sika deer, males, females, body dimensions, coloration

Introduction

In previous studies we have described the skull dimensions (B a r u š et al. 1982) and antlers (Z e j d a & B a b i č k a 1983) of a population feral sika deer living in the surroundings of Bouzov Castle (49°45'N, 16°55'E). Later we also reported data on the population's age composition (H r a b ě et al. 1989) and body weights (Z e j d a & H o r á k o v á 1988). As these articles only presented limited data on deer body dimensions (seven males and nine females) and no data on coloration, we measured all animals killed during the 1982 to 1986 hunting seasons and analysed the coloration of the winter coat. The aim of the study was to answer whether the study population was: (a) homogenous in body dimensions and coloration, and (b) whether it was possible to assign this population to any existing sika deer subspecies.

Material and Methods

A description of the study area is given by O b r t e l et al. (1982). In total we measured and described the coloration of 164 individual animals aged five years or over. Age was assessed according to tooth wear and body weight and, in some cases, also on the basis of tooth cement layers (B a r u š et al. 1982, H r a b ě et al. 1989).

Body measurements and colours of the fur were taken and evaluated following B a r t o š & Ž i r o v n i c k ý (1984). The following characters were noted: weight, head and body length, height at withers (measured with hoofs), hind foot length, tail length (to the end of the bone) and ear length. The following colours were noted and scored: coat (1 = black, 2 = grey, 3 = dark red, 4 = red); neck (1 = black, 2 = grey, 3 = red); chin (1 = red, 2 = white, 3 = white with black margins); upper lip (1 = black, 2 = red, 3 = white); ear (inner side) (1 = not rounded with black, 2 = partly rounded, 3 = all rounded); spotting (1 = missing, 2 = inexpressively present along dorsal line only, 3 = inexpressively present on the whole body, 4 = pronounced, but along dorsal line only, 5 = pronounced on the whole body); colour of metatarsal gland-hock gland (1 = the same colour as the background, 2 = different and distinct from background, 3 = white); mid-dorsal strip (1 = missing, 2 = present to the base

of the neck only, 3 = from the head to the rump); rump patch (1 = ringed with dark stripe, 2 = white, 3 = rusty); tail colour (inner surface) (1 = dark, 2 = white, 3 = rusty); tail colour (upper surface) (1 = black central stripe slightly pronounced, 2 = black central stripe, 3 = black rounded, 4 = white, 5 = rusty with white tip, 6 = rusty).

Two-tailed t-tests were performed to check sex-specific differences. Differences in coat colouring were compared by the GOF (Goodness-of-fit) test (χ^2).

Results and Discussion

Evaluation of the measurements showed that except for tail length ($t = 1.195$; $P = 0.236$) sexual differences were found in remaining measurements ($t = 4.27 - 13.1$; $P<0.001$). When comparing different population samples of fully-grown animals, only those of the same sex could be compared.

Baruš et al. (1982) concluded that our feral study population consisted mostly of individuals that most closely resembled the Japanese population inhabiting the Nara Park (Ohtaishi 1977). Description of our larger sample indicates that: (a) in individuals older than five years the variability of individual measurements was rather low and the population seemed to be homogenous and thus suitable for comparison with other samples, and (b) the comparison of body measurements with data given in other papers was difficult because these samples often also included younger individuals (*i.e.* 2, 2.5 or 3 years old) (Feldhamer et al. 1985, Krapp & Niethammer 1986, Vajner & Hromas 1988) so that the range of variability was larger and the average values lower than in our sample. Other samples were either of low size (Horwood & Masters 1981) or only the average values of the range of values are published (Ohtaishi 1977). Many articles also fail to describe their methodologies, particularly with regard to the basis for measurements. We summarised published measurements from all the above papers in the following way: (a) weight ranges (for eviscerated adults with heads) were between 33 and 78 kg (average from 48 to 53 kg) (stags) and 19 to 50 kg (average 32 to 38 kg)(does), (b) the head and body lengths ranged from 81 to 155 cm (stags) and 86 to 145 cm (does), (c) the height at the withers ranged from 62 to 100 cm (stags) and 59 to 90 cm (does), (d) the ear length ranged from 9 to 17 cm (stags) and 7 to 19 cm (does), and (e) the tail length ranged from 7 to 20 cm (stags) and 6 to 19 cm (does).

When compared with our results (Table 1) a slightly larger range for weight and all other body measurements is clearly visible in this summary of different sika deer population samples. However, any statistical evaluation of these differences is difficult impossible because of the differences in sample homogeneities, and because data on individual animals are usually missing. Data by Feldhamer et al. (1985) indicate that sika deer from Maryland mainly have shorter tails, and comparison with the data of Krapp & Niethammer (1986) shows very similar body dimensions for sika deer from Germany and Moravia. In principle we can accept the conclusion that the samples under consideration did not differ in their bodily dimensions, even if statistical evaluation was impossible.

In the case of winter coat coloration (Table 2) the following were significantly prevalent in both sexes: coat and neck grey, inner side of the ear partly rounded with black, the spotting of the coat was missing (but more variable in females), hock gland lighter than the background, rump patch white, tail dorsum with black central stripe and a white inner surface. In both sexes the coloration of the chin was variable, a black upper lip black was

Table 1. Body dimensions of sika deer (weight in kg, length in cm).

Measurements	sex	N	min	max	mean	s.d.
Weight	m	37	31	54	40.9	6.25
	f	45	21	34	27.1	3.05
Head and body length	m	37	118	151	132.1	7.95
	f	45	108	140	123.4	7.74
Height at withers	m	37	68	88	81.3	3.93
	f	45	67	84	76.7	4.41
Hind foot length	m	37	30	42	39.0	2.46
	f	45	30	40	36.4	2.01
Tail length	m	37	12	20	14.4	1.57
	f	45	12.5	16	14.1	1.01
Ear length	m	37	13	15	14.2	0.59
	f	45	12	15	13.5	0.77

significantly more common in females (P<0.01) and a mid-dorsal stripe that reached the base of the neck was significantly more frequent in males (P<0.01).

For intersexual comparisons of winter coat coloration, we must also bear in mind that the change from the summer to winter coat starts in females later than in males (M i u r a 1984). In Moravian does the moult is not yet completed in the second half of October, and some colours (typical of the summer coat) disappear much later. So, if this is really the case, the larger variability in the coloration of the females (e.g. spotting) found in our sample is understandable. As for the larger samples described in the literature, descriptions of the winter coat (or of the coloration at all) are usually absent. Only B a r t o š & Ž i r o v n i c k ý (1981) and B a r t o š & V í t e k (1993) (in papers on hybridisation between red deer and sika deer) described characters that might be used when evaluating the coloration of any specimen. We used the same method for the description of our study population (Table 2).

From our results we may conclude that Moravian sika deer belong to the smaller-sized sikas. However, the coloration of the winter pelage is newly described and does not allow any comparison with other populations for which data area lacking.

Table 2. Coloration of males and females (% of frequency, legend to the number of colours is in methods, significantly prevailing colours are with asterisks: P< 0.05*, P< 0.01**, P< 0.001***).

MALES No. colour	coat	neck	chin	upper lip	ears	spotting	hock gland	dorsal strip	rump patch	tail inner	tail upper
1	13	19	31	53		68***	3	6	19	3	25
2	84***	81***	22	47	78**	16	75***	49**	69***	84***	63***
3	3		47		22	7	22	45	13	13	9
4						10					
5											3
FEMALES											
1			20	51**	14	37**	16		36	11	20
2	93***	95***	42	40	50**	29	73***	56	49*	82***	66***
3	7	5	38	9	36	20	11	44	16	7	9
4						12					
5						2					2
6											2

The historical problems of sika deer nomenclature today only permit categorisation of anthropogenically founded stocks (including reintroduced animals) as either nipponoid or hortuloid. These two groups differ in beam measurements (E i c k 1993) and in body size - smaller in nipponoid and larger in hortuloid forms (G e i s t 1998). In this respect Moravian sika would seem to belong to the smaller nipponoid form.

A c k n o w l e d g e m e n t s

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