E. Afr. Wildl. J., 1976, Volume 14, pages 335–338

An identification method for black rhinoceros (*Diceros bicornis* Linn. 1758)

Introduction

In wildlife management and research identification of individual animals is a major tool for obtaining detailed information over long periods, by constant follow-up of known individuals. The use of artificial marking is usually not permanent and often too expensive to apply to greater numbers of individuals in a population. It has been possible to photograph individuals of certain species and later again identify them in the field from photographs. Such an identification system has been applied by Foster (1966) to giraffe (*Giraffa camelopardalis* Linn.) using coat pattern; Rudnai (1970) to lion (*Panthera leo* Linn.) using vibrissae arrangement; Klingel (1969) to Burchell's (*Equus burchelli* Gray) and Grevy's zebra (*Equus grevy* Oustalet) using stripe pattern. Petersen (1972) produced a sophistication of the zebra stripe method enabling a large number of individuals to be identified simultaneously.

Black rhinoceros, like other species whose bodies are not striped or spotted constitute a more difficult case but the use of wrinkle patterns, sex, size and shape of horns and peculiarities of the ears can be a considerable aid to positive identification.

For black rhinoceros identification from photographs has been used by Goddard (1966), Klingel & Klingel (1966), Hamilton & King (1969).

The classification system

The study involved animals living in the wilderness. To carry out the work efficiently, a short wheel base Land-Rover, 8×30 Zenith binoculars, a Nikkormat camera with 500 mm, f8 mirror lens were used. A fast black-and-white film Kodak TRI-X Pan, ASA 400, was used throughout the study period.

From photographs the following designated marks were used for classification of ears, horns and wrinkles on the face (Figs. 1 and 2).

(a) The edge of each ear was divided into four equal parts and numbered I, II, III and IV commencing from the median edge (Fig. 1).

(b) The horns were divided into four equal vertical parts and numbered 1, 2, 3 and 4 from the base of each horn (Fig. 2).

(c) The front of the face was divided into four quarters by an imaginary line running vertically from the base of the anterior horn to the mid-point of the upper lip and another line horizontally from one nostril to the other. The imaginary line from one nostril to the other is actually a true wrinkle. The four quarters were lettered A, B, C and D (clockwise) starting with the right lower quarter (Fig. 1).

In addition to the photographs the two sexes were readily distinguished by the appearance of the external genitalia, as mentioned by Hamilton & King (1969). It was found that it took a short time to identify sex organs particularly when a rhinoceros is running, defecating or urinating since the tail is mostly lifted. When a rhino is

Fig. 1. Formula: M; RUIV; IB, IC, YB, YC. Male rhino with U-cut, branched and discontinuous wrinkles.

walking or running the alternation of hind legs allows more light to the under-parts hence making sex organs more noticeable particularly in case of males.

The following key was used in describing the classification of an individual animal: M, male; F, female; R, right ear; L, left ear; N, normal ear; V, V-cut present on the ear; U, U-cut present on the ear; W, finger-like cuts on the ear; T, long hair tufts on the ear; S, posterior horn short; K, erect horn; Z, curved horn; Q, anterior and posterior horns are of similar lengths; P, posterior horn; O, anterior horn; X, cross-over wrinkle; I, wrinkle is discontinuous before reaching vertical mid-line; Y, wrinkle is branched.

The observed characteristics are expressed in the form of a general formula (M; RLN; OZ2; PS). All of the characteristics described under the previous key were noted in various individuals of the population. However, the best two examples are illustrated in Figs. 1 and 2.

Conclusion

It can be seen that the application of above-mentioned keys readily allows a great number of classes to be used and at the same time makes it easier for the observer to

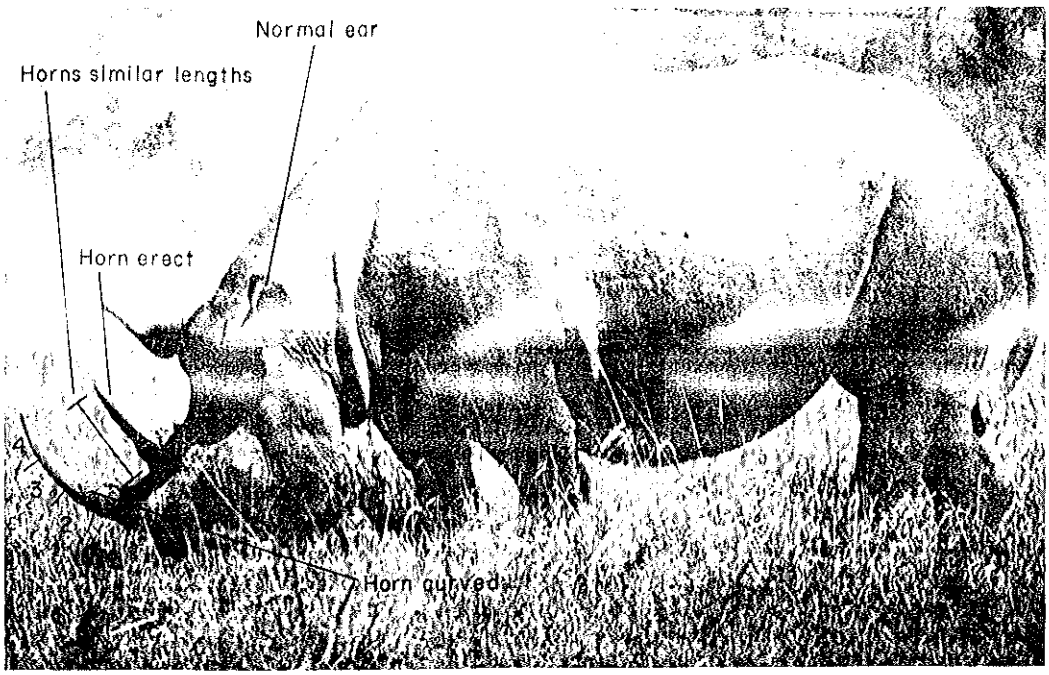

Fig. 2. Formula: F; LRN; PK, OZ2, Q. Female rhino with normal ears, horns of similar length, posterior horn erect and anterior horn curved from the second quarter.

identify the individual quickly. It is possible with a quick look at an animal to note down its marks when pictures are arranged in a filing system indicating whether the animal has been observed and recorded before; and the place of location. Rhinoceros maintain home ranges which overlap, and a group of less than ten rhinoceros were observed having separate adjacent home ranges.

The lengths and the shapes of the horns varied with age and sex. In the mature females both horns tended to be of similar lengths and the posterior horn erect while the anterior horn was curved from the 2nd quarter. In the mature males, the posterior horn was usually shorter (erect and in some cases curved from the 3rd or 4th quarter) than the anterior horn. In the sub-adult (both sexes) the anterior horn was short and curved half-way while the posterior horn was noted to be very small. In the calves the anterior horn is very small and only position of posterior horn can be seen as a swelling, and they were mainly identified through the association with their mothers.

There were considerable variations in hair tufts and cuts on the ears, while some rhinoceros were noted to have normal ears.

In all of the 108 rhinoceros observed the wrinkle joining the two nostrils was continuous and straight. The wrinkles between the base of the anterior horn and the upper lip varied from five to eleven in number. In all cases the first wrinkle at the tip of the lip was considerably shorter than the others and also cut the vertical imaginary line while the other wrinkles got longer towards the base of the horn. Variations in the wrinkle patterns were considerable, particularly in the upper two quarters above the nostril-to-nostril imaginary line.

Acknowledgments

This study was made possible by a grant from the Ford Foundation made available to me through the Zoology Department of University of Nairobi. Appreciation is also extended to Dr C. J. Pennycuick and Dr J. B. Sale for their advice, assistance, encouragement and supervision.

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(*Manuscript received* 5 *March* 1974)