

ULTRASONOGRAPHY OF THE FEMALE REPRODUCTIVE SYSTEM IN THE SUMATRAN RHINOCEROS

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SUMMARY

Captive breeding of endangered species is hindered by a lack of understanding of their reproductive biology. This paper reports the results of ultrasound examination of the reproductive system of four Sumatran rhinoceroses in captivity. Ultrasonic examinations could be used in the Sumatran rhinoceros to monitor reproductive events such as follicular development in the ovaries, predicting oestrus by determining the preovulatory follicle and the diagnosis of pregnancy. Abnormalities were also detected in the cervix, uteri and ovaries.

INTRODUCTION

Currently, the breeding of rhinoceroses in captivity is difficult particularly, the Sumatran rhinoceros. Eight males and 15 females (Sumatran rhinoceros International Studbook, 1993) distributed at 10 captive facilities worldwide reduces the choices of effective pairing of the animals for breeding. Basic information on the anatomy and physiology of Sumatran rhinoceros are required to furnish wildlife experts, veterinarians and scientists with a clear understanding of the reproduction in this species.

The female Indian, black and white rhinoceros reaches sexual maturity at 4 years of age, although they rarely conceived before the age of five (3). The rhinoceros is polyoestrous and the length of oestrous cycle ranges between 35 and 58 days with oestrus lasting 24 hours (2).

There are similarities in the reproductive system of these species and those of the mare and the cow. Postmortem specimens of the female reproductive system of the rhinoceros has been studied in detail (6). The cervix is convoluted with interdigitating folds. A short uterine body leads to a bicornuate uterus which lies loosely on top of the intestines and courses cranially toward the kidneys. The ovaries are oval and flat if quiescent or round during active folliculogenesis. Ultrasonography in species of rhinoceroses other than the Sumatran rhinoceros has provided vital information on the reproductive tracts and the ovaries. Follicular growth and maturation as well as tumours have been diagnosed by ultrasonography (7).

This paper reports the ultrasonic findings in the reproductive system and the ovaries of four adult Sumatran rhinoceroses maintained in captivity in Malaysia.

MATERIALS AND METHODS

Three wild-caught and one captive-born Sumatran rhinoceros females, 5-10 years old and maintained at the Zoo Melaka, Malaysia were examined by ultrasound. Each animal was kept in an individual enclosure consisting of a night stall (4 m x 4 m) and a connecting conical outdoor paddock, 17.5 m long with the widest end measuring 23.8 m and the narrowest 4.6 m. The animals were fed mainly on forages (30-40 kg daily) fruits, vegetables and concentrates. Clean water was available *ad libitum*.

Each animal was sprayed with water to initiate defaecation and to remove mud or faecal material from their body. The animal was then baited with bananas into the chute and three 4-inch galvanized iron pipes were fitted into slots on the floor to prevent the animal moving backwards. The ultrasound scanner was the Aloka Echo Camera (Model SSD-210 DX II) with a 5 MHz linear rectal probe. A well-lubricated gloved hand was inserted into the rectum to remove faeces. The probe coated with transducer gel was inserted into the rectum, then moved along the pelvic cavity in the following sequence: bladder, cervix, uterine body, uterine horns, left ovary and right ovary. All ultrasonic images were documented of the reproductive tract were on a video recorder for later study.

RESULTS

During scanning, the first structure to be located was the bladder. The cervix was located on top of the bladder and showed annular folds within the lumen. As the probe was moved further cranially, images of the uterus at various angles were visible. The uterus was

visible at the pelvic brim. The horns of the uterus traversed cranially as in the mare. The ovaries were located at a depth of about 40-50 cm. The forward and backward movement of the animals made it difficult to scan the ovaries in detail. None of the animals were pregnant. Details of the ultrasound findings in individual animals are given below.

Studbook number 23: The right ovary was 3.5 cm wide and moderately enlarged. A 3.0 cm follicle is located on the posterior pole. Two smaller follicles (1.4 and 1.0 cm) were situated at the anterior pole.

Studbook number 1: In this old female, several large cysts were found on the cervix. A mass measuring 4.8 cm with an unorganised centre and numerous smaller masses were also found in the region of the cervix-uterus. Numerous fluid filled structures were also in the uterine lumen. The left ovary was small, flat and echolucent with follicles at the posterior lateral pole. A very large follicle (cyst) was located at the anterior medial pole. The right ovary was small, 5.5 cm long. A 2.5 cm x 3.1 cm asymmetrical ovarian cyst was located laterally at the posterior pole. The other follicles ranged from 1.0 cm to 1.5 cm diameter.

Studbook number 13: In this young adult, the left ovary measured 3.5 cm x 6.5 cm and contained 6-7 small follicles (< 1.0 cm). The right ovary was 3.0 cm x 6.0 cm in size. Two follicles were more than 1.0 cm with the largest averaging 1.3 cm at the anterior medial pole. A well demarcated mass was observed at the anterior pole of the right ovary, measuring 2 cm. One follicle (1.0 cm diameter) was also located on the right ovary.

Studbook number 19: This female showed a 2.0 cm follicle occupying the anterior pole of the right ovary. Two other smaller follicles (1.3 and 0.8 cm) were found at the caudal pole. Three days later, enlarged masses measuring 2 cm x 2 cm, with a 0.5 cm

fluid-filled cavity in the centre and smaller masses on medial aspect were observed. The follicles on the left ovary were slightly enlarged. Masses were also observed in the uterus, an echolucent 1.5 cm diameter mass in the myometrium and a dense 1.2 cm x 2.0 cm mass in the endometrium.

DISCUSSION

Ultrasonography using a handheld rectal probe could be performed to scan the reproductive system and the ovaries in of the Sumatran rhinoceros. This is because of its small size and the previous training to enter the chute. The ultrasonographic anatomy of the Sumatran rhinoceros are similar to those of the Indian, Black and White rhinoceroses (1,6,7). Ultrasonic examinations could be used in the Sumatran rhinoceros to monitor reproductive events such as follicular development in the ovaries, predicting oestrus by determining the preovulatory follicle and the diagnosis of pregnancy.

The ultrasonic examination of the reproductive tracts revealed several abnormal structures but whether they were tumours could not be ascertained. Endometrial cysts were reported in a female Asian elephant and horses (1,5). A case of adenocarcinoma was previously reported in a rhinoceros (4).

The cysts and tumours observed in the cervix and uterus of the old female Sumatran rhinoceros suggested that it would not be able to maintain pregnancy. Thus, screening of the reproductive tracts would give vital information on the reproductive status of the Sumatran rhinoceros selected for breeding. In addition, the ultrasonic examination of the ovary could be correlated to the other reproductive procedures such as the serum progesterone, urinary and fecal hormone analysis.

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