DESIGN AND APPLICATIONS OF A "FREE-STALL" CHUTE FOR PASSIVE RESTRAINT OF THE NON-SEDATED WHITE RHINOCEROS *(Ceratotherium simian simum)*

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In most instances, the large size and unpredictable nature of the rhinoceros mandates some form of chemical restraint to permit hands-on evaluation of the animal for medical or research purposes. Risks are always present whenever an animal undergoes sedation or anesthesia, and the risks of serial immobilizations for research purposes are obviously to be avoided. A variety of chute styles have been designed to facilitate handling and restraint of rhinoceros species, but uncooperative animals can be difficult to evaluate even in these enclosed structures.

A novel approach to the safe restraint of untranquilized white rhinoceros has been implemented at the Fossil Rim Wildlife Center. The system employed incorporates a "free-stall" chute design analogous to that used in dairy barns, with some modifications for use in these large, extremely strong mammals. The purpose of this chute design is to allow the rhinoceros to *choose* its own response to a situation, an option not available when utilizing more conventional restraint via a closed chute or chemical immobilization. While this design by nature introduces new challenges for personnel, the benefits of a nonstressful restraint situation far outweigh the lack of total restraint a free-stall by definition provides.

The need to develop a *nonstressful* method for the reproductive evaluation of the female white rhinoceros was the driving force behind the design of this chute. The idea stemmed from early work with transrectal ultrasonography of the female white rhino in a closed chute situation in which three of four females were successfully scanned, although stress was a factor in repeatability of the procedure in most animals. The rectal exam itself went practically unnoticed on most days. The four-wall closed chute restraint, however, was a common source of subject anxiety. The fourth female would enter the chute, but would react aggressively when enclosed completely despite the reward of sweet feed. Multiple attempts at conditioning this female to the closed chute design failed. Thus, with the realization that the rectal exam was tolerated far better than the act of restraint, the free-stall design concept was developed.

The results obtained to date have proven remarkable considering the fact that this female was, prior to the application of the free-stall, an uncooperaative subject for the reproductive ultrasound research undertaken at Fossil Rim. In our attempts to elucidate the normal reproductive biololgy of these large Perissodactylids, this design has allowed for thorough daily to every-other-day evaluations of the female rhinoceros. Over the course of several weeks, the formerly intractable female became accustomed to feeding in the free-stall, allowing successful application of daily transrectal ultrasonography. The free-stall chute is located within the holding pen at the rhino barn as illustrated in Figure 1. The rhinos are kept out of the chute via a swinging gate when not in use. When the gate is opened, the female rhino can enter the chute and eat a mixture of sweet feed and alfalfa hay, with additional feed being given as needed during a procedure. The design incorporates a 24 inch wide, 7 foot tall section of vertical pipe that extends into the chute from the right-hand side and allows the researcher safe access to the caudal end of the rhinoceros as well as a safe exit outside the pen if the rhino backs out of the chute (see Figure 2 and Figure 3). This wall provides the examiner with a "safe" area from which he/she can perform rectal palpation and ultrasonography. This design also readily facilitates routine medical examinations and minor procedures such as blood collection. If used properly, the potential disadvantages of this type of restraint in the rhinoceros are minimal. Obviously, safety of personnel is of prime concern. The fact that the veterinarian is literally in the same enclosure with these large and sometimes unpredictable mammals adds some element of risk not associated with other methods; the design

described here attempts to minimize that risk. The ability of the rhino to back out of the chute at any time suggests that the application of moderately invasive techniques such as transrectal ultrasonography would prove difficult, if not impossible. However, the adaptation of this method of restraint to transrectal ultrasonography in the white rhinoceros actually has proven beneficial. We have found that a rhinoceros that can choose between entering or leaving the chute soon becomes confident with this arrangement and allows more intensive manipulation. The absence of complete confinement makes for a calmer research subject, with less likelihood of self-inflicted trauma.

The elimination of *stress* as a variable in the behavior of the rhinos is beneficial in at least two important ways. Firstly, stress with its associated release of corticosteroids can adversely affect the steroid hormone profile and thus interfere with a thorough evaluation of basic reproductive biology in these species. Secondly, only when the entire handling protocol enhances overall efforts at positive reinforcement will the rhinoceros subjects continue to return to the chute. This aspect of conditioning is crucial to projects such as transrectal reproductive ultrasound where serial monitoring over time is fundamental to understanding normal biology.

The ability to monitor large, nondomestic species like the rhoinoceros in a nonstressful manner has proven valuable in the consistent daily to every-other-day evaluation of reproductive events. The free-stall approach, although not ideal for all situations, can provide a unique alternative to more conventional chute restraint or chemical immobilization in a variety of contexts.

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Figure 1. Female holding pens in white rhino barn, Fossil Rim Wildlife Center.

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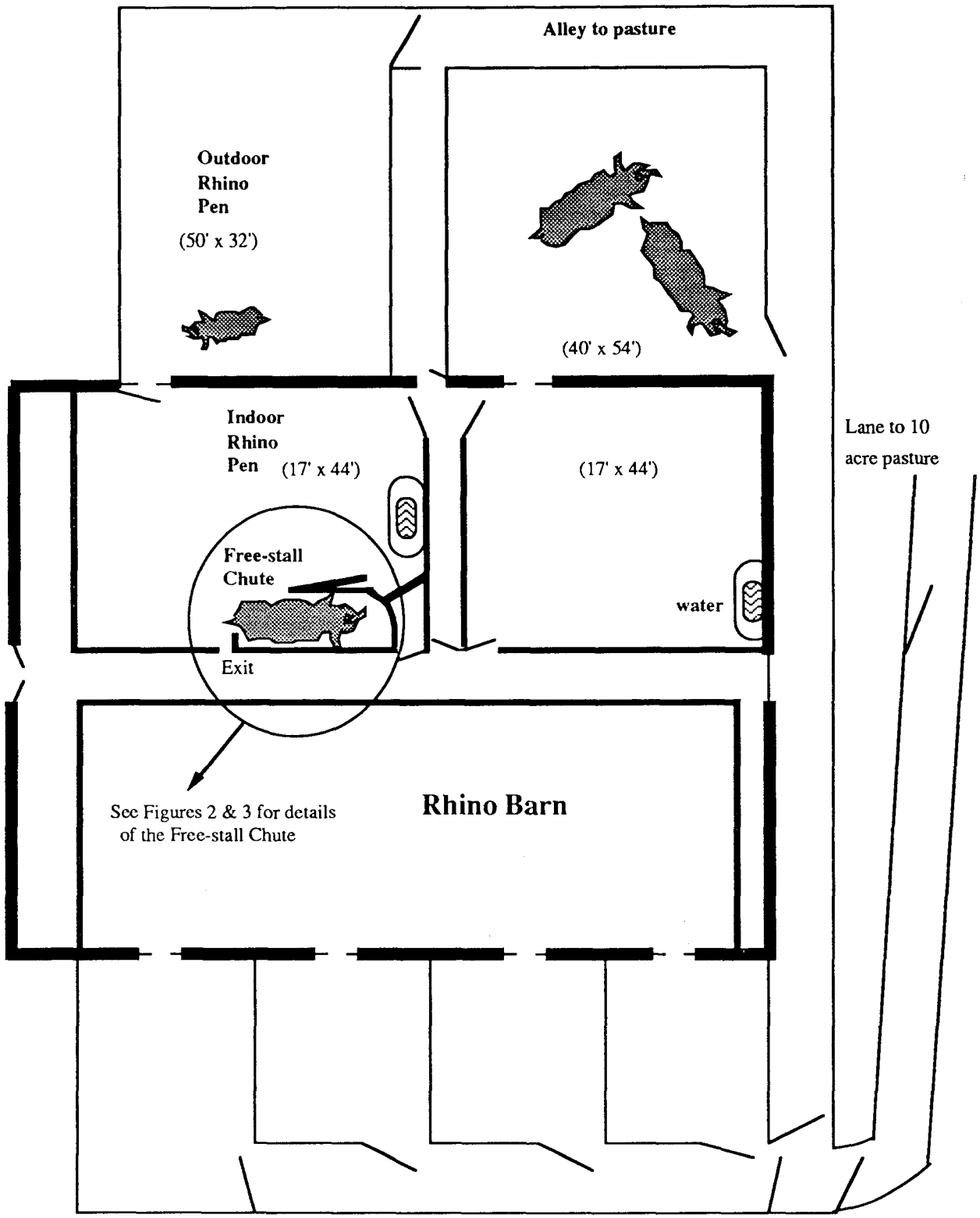

Drawing not to scale

Figure 2.

•Free-Stall Chute Design•

top view

•Scale: 1" ≐ 2'

- •Vertical pipes at corners = 4 & 1/2"
- •Horizontal pipes = 2 & 7/8"
- •Vertical pipes = 2 & 7/8"
- •Total height = 7'2"

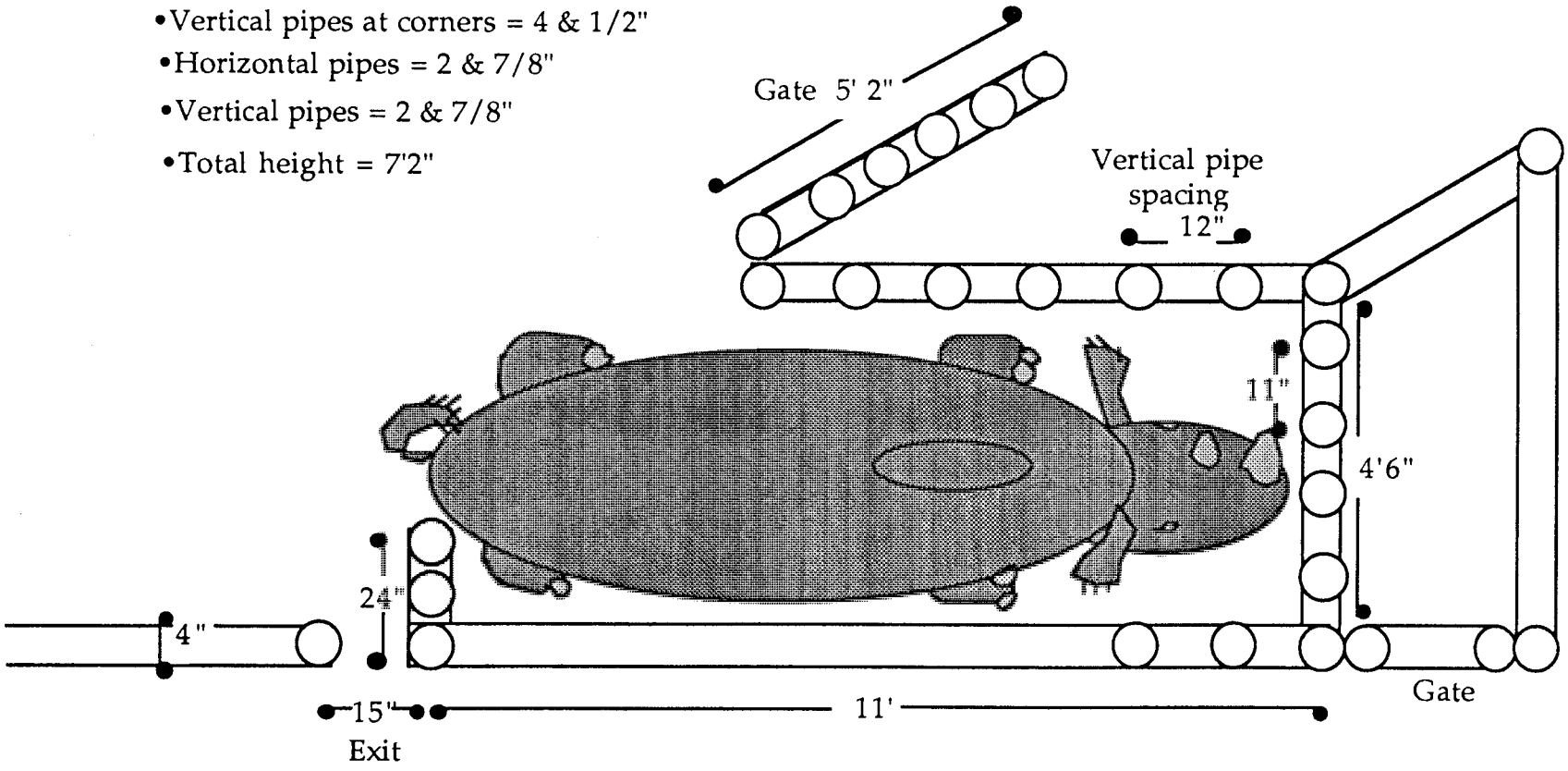

Figure 3.

•Free-Stall Chute Design•

•Scale: 1"= 2'

right side view