

Report upon the Immobilization of White Rhinoceros
(Ceratotherium simum simum) using Fentanyl (R4263) (Janssen
Pharmaceutica, Beerse, Belgium).

Keep 1968

During the period 12th to 15th August 1968 a number of White Rhinos were immobilized for the purpose of obtaining bone marrow biopsies. These specimens were taken at the request of Prof. H.P.A. de Boom from Onderstepoort, to enable Miss G. Heinichen to continue her research upon the chromosome structure of these animals. Prof. de Boom made two similar visits to Umfolozi during 1967.

The opportunity was taken to carry out trials upon rhinos using Fentanyl, the first of a new group of 4-acylanilino-piperidines, which is a very short acting morphine-like analgesic. The citrate is a white powder, and aqueous solutions containing 15 mgm/cc were prepared.

With the present World political situation in mind I felt it was essential to find an alternative drug to Etorphine (M 99) for the routine immobilization of White Rhino, in case this drug becomes unavailable to us in the future. Etorphine is manufactured in England and Fentanyl in Belgium. There was no intention whatsoever to substitute Fentanyl for Etorphine in the routine capture of White Rhino, unless circumstances force us to do so. The materials and techniques employed to immobilize these animals were similar to those used at routine capture with M 99.

CODE	SEX	Estimated WEIGHT lbs.	DRUGS IN DART in mgm.			Additional Drugs mgm.	Lethidrone mgm (Nalorphine)
F ₁	♀	1750	7.5				
F ₂	♀	2250	10.0				
F ₃	♀	1200	10.0		50	Fentanyl 15 A. Prom. 3	125 i/v
F ₄	♂	4500+	20.0		75		
F ₅	♂	1500	30.0		100		250 i/v
F ₆	♀	3500	30.0		100	Fentanyl 22.5 Hyoscine 75 Azaperone 150	250 i/v
F ₇	♂	1000	22.5		75		125 i/v
F ₈	♂	2500	52.5	150	100		500 i/v

The above table summarizes the animals immobilized and the drug dosages used.

F₁ and F₂ were given an anticipated sub-immobilizing dose of Fentanyl, and no Hyoscine. This proved to be correct as the two animals were tranquillized but not immobilized. This also showed that Fentanyl does not have any extraordinary effect upon White Rhino which is not seen when the drug is used upon other species of animals.

Fentanyl has been used upon many species of wild and domestic animals with excellent results. It has been found to have a very wide safety margin, in most cases, even greater than M 99.

No antidote was given either of these two rhinos, and they recovered normally. When re-examined 3 hours after darting they showed little sign of narcosis.

F₃ was darted on foot when standing beside its immobilized dam. The calf did not run at all when hit by the dart. She was staggering after 4 minutes and went down suddenly onto her left side 7 minutes after darting. Her respirations were 12 per minute and body temperature 99°F.

She was pushed onto her brisket and at first tried to rise to her feet, then relaxed.

An hour after darting, while the biopsy was still being performed, she stood up, and a further injection of Pentanyl and Acetylpromazine given (see Table). The biopsy was then completed.

She got up and was very lively within 1 minute of the antidote (Lethidrone) being administered intravenously.

5 hours later she was standing quietly, but very alert, beside her mother.

F₄ ran about 600 yards after darting, and stood quietly tranquillized in one place for 2 hours. He did not go down, but I was able to walk up to him and remove the dart. He clearly received a gross underdose of drug.

No antidote was given, and recovery was normal.

F₅ was darted from a Land Rover and was staggering in 4 minutes, having only travelled about 200 yards. He was down on his brisket in 7 minutes. The respirations were then 12 per minute. $\frac{1}{2}$ hour after darting the respirations were 5 $\frac{1}{2}$ per minute but not laboured. (Below 4 per minute is considered dangerous.) There was no sweating, the weather being cool and overcast.

Immobilization was excellent throughout.

He rose to his feet very quickly after the administration of the antidote, and walked confidently a few yards, then stood quietly.

F₆ was darted from the Land Rover, but only ran about 300 yards. She was swaying after 7 minutes, but continued to walk slowly round in circles, blundering into bushes, for the next 20 minutes.

She was then given an intramuscular injection of Pentanyl, Hyoscine and Azaperone, using a hypodermic syringe. (See table.) Azaperone is a tranquillizer with an action similar to Acetylpromazine. 4 minutes later she went down onto her brisket, and remained flat till the antidote was given. She was, however, always sensitive to noise, but not trauma.

After the antidote was administered she stood up normally, but was not as alert as the previous animals had been, which had not received tranquillizer.

F₇ was darted on foot while standing beside his dam (F₆). He was staggering 4 minutes after injection and went down after 6 minutes. At 9 minutes he was deeply anaesthetized, and the respirations were forced and only 4 per minute.

The antidote was administered immediately and within 1 minute he was standing.

$\frac{1}{2}$ hour later he was standing quietly beside his mother. Recovery was normal.

This calf was given a considerable overdose of Fentanyl. The resulting symptoms were easily controlled, and at no time did he appear likely to die.

F₈ was darted from a Land Rover, and was staggering in 4 minutes. In 9 minutes he was down on his left side. Immobilization was excellent, but he was very sensitive to noise, and rose onto his feet $\frac{3}{4}$ hour after darting.

The antidote was given intravenously and he stood quietly but alert.

Fentanyl when administered to White Rhinos acts slightly quicker than M 99, but its effect is very much shorter in duration.

The rhinos are much more sensitive to noise, when immobilized, than they are when M 99 is employed.

Considerable overdose is required to reduce the respirations to a dangerously low rate. High body temperatures and sweating were not experienced. The drug has a wide safety margin.

A spectacularly rapid recovery is observed when the antidote is administered intravenously. This recovery is faster than when M 99 is employed, and the animal is more alert afterwards.

All darting was carried out in the morning, and all animals were inspected by Game Guards, and in some cases by me, later the same afternoon.

In all cases they had left the immediate area of immobilization by the next day.

3 adult White Rhinos, 2♀ and 1♂, were immobilized using a mixture of M 99 and Fentanyl together with Hyoscine, in order to compare their behaviour with those which received only Fentanyl and Hyoscine. Those receiving the former mixture showed no reaction to noise, and remained under deep narcosis for a longer period. The recovery when the antidote was administered was not so spectacular as when Fentanyl and Hyoscine only were employed.

As a result of these few trials I believe the following combinations and dosages are suitable for the successful immobilization of White Rhino.

Estimated wt. lbs.	Fentanyl mgm.	Azaperone mgm.	Hyoscine mgm.
1000	15	NIL	50
1500	27	NIL	50
2000	40	NIL	50
2500	50	150	100
3500(adult ♀)	60	200	100
4500(adult ♂)	70	250	100

J. E. Keep.

Veterinary Research Officer.