

BRIEF COMMUNICATION

Novel Environment Suppression of Stallion Sexual Behavior and Effects of Diazepam.

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McDONNELL, S. M., R. M. KENNEY, P. E. MECKLEY AND M. C. GARCIA. Novel environment suppression of stallion sexual behavior and effects of diazepam. PHYSIOL BEHAV 37(3) 503-505, 1986.—Pony stallions were given sexual behavior trials in experimental "home" and "novel" environments, similar in all major features except location. In the novel environment, erection latency was increased and erection time decreased. Treatment with an anxiolytic benzodiazepine derivative (diazepam) appeared to block these effects.

Male sexual behavior Stallion Novel environment Benzodiazepine Diazepam

SEXUAL behavior dysfunction comprising low sexual arousal, apparent shyness or preferences for certain mares or handling conditions, extreme aggressiveness, and unexplained disruption of the mating sequence occurs among domestic stallions, often without accompanying physical or endocrine defects. Dysfunction is frequently linked to negative experiences such as painful injury during copulation, punishment for showing sexual arousal at "inappropriate" times, or rigorous handling and discipline during training for performance or breeding [4]. Recent work with pony stallions has shown that response-contingent punishment of erection together with negative reinforcement of loss of erection results in rapid suppression of sexual arousal and response similar to spontaneously occurring dysfunction [5].

Stallion sexual behavior problems sometimes appear in association with a sudden change in environment, such as when a stallion is moved from one breeding farm to another. The common interpretation of this association is that an unfamiliar environment may induce fear that interferes with arousal or disrupts sexual performance. Relocation of a stallion involves many other possible factors that might affect sexual performance, including changes in nutrition, social arrangement, handling and breeding procedure, and stimulus mares. Therefore it is difficult in such instances to identify a

possible cause-effect relationship between novel environment and sexual performance. The question has been further complicated by the fact that a change in location sometimes appears to improve the sexual performance of a stallion. The purpose of Experiment 1 was to study the effect of a novel environment on precopulatory behavior of pony stallions.

Numerous laboratory animal experiments and human studies have shown that benzodiazepine derivatives attenuate the inhibitory effects of a novel environment on eating and drinking goal-directed behavior [3]. In stallions, diazepam treatment effectively reversed response-contingent aversive suppression of precopulatory behavior [5]. Experiment 2 was conducted to evaluate the effect of diazepam treatment on sexual behavior of stallions in a novel environment.

EXPERIMENT 1

Method

Four pony stallions were randomly assigned to two groups. Each group was then assigned to one of two "home" test environments. These two environments were similar in all major aspects except location. After eight trials in the

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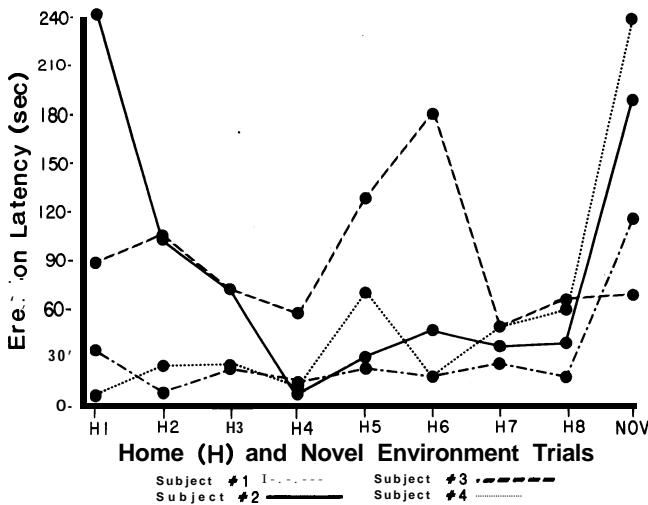


FIG. 1. Erection latencies of four pony stallions in each of eight 4-minute home trials (H1-H8) and one novel environment trial (NOV).

respective "home" test environment, each group was tested in the other, or "novel," test environment. The home trial 8 and novel environment test performances were compared using related t-test procedures [1].

The subjects were mature (aged 4 to 13 years), mixed-breed, pony stallions, acquired at local auction. Throughout this experiment these animals were stabled in individual tie-stalls (1.3 × 1.5 m) in an unshuttered barn.

Trials were conducted on a Monday-Wednesday-Friday schedule. Each trial consisted of a 4-minute presentation under halter to a mare restrained in a stock (approximately 2 m long, 1 m wide, with solid sides 1 m high) within one of two indoor breeding areas (approximately 6 × 7 m and 10.5 × 8.5 m). The two breeding areas were in different buildings on the same research farm. The stimulus mares were ovariectomized estrogen-primed (estradiol cyclopentyl propionate, ECP, Upjohn, 1-2 mg/week IM) estrous pony mares. The handler, mare, and observer were the same for each stallion in the home and novel environments. Precopulatory responses were recorded on a time base using a hand-held microcomputer event-recorder (Observational Systems, Model OS-3). Sniff, lick, and nuzzle frequency, flehmen frequency, erection latency, erection time, and bite, kick, and vocalization frequencies were measured as previously described [5].

## Results

As shown in Fig. 1, all subjects had greater erection latencies in the novel environment. Mean erection latency was greater,  $t(3)=2.61$ ,  $p<0.05$ , in the novel environment than in home trial 8. Mean erection time tended to be lower,  $t(3)=1.33$ ,  $p<0.10$ , in the novel environment than in home trial 8. For sniff, lick, and nuzzle frequency, flehmen response frequency, bite frequency, kick frequency, and vocalization frequency, differences between home trial 8 and novel environment test were not significant ( $p>0.10$ ).

## EXPERIMENT 2

Four pony stallions were given five home sexual behavior

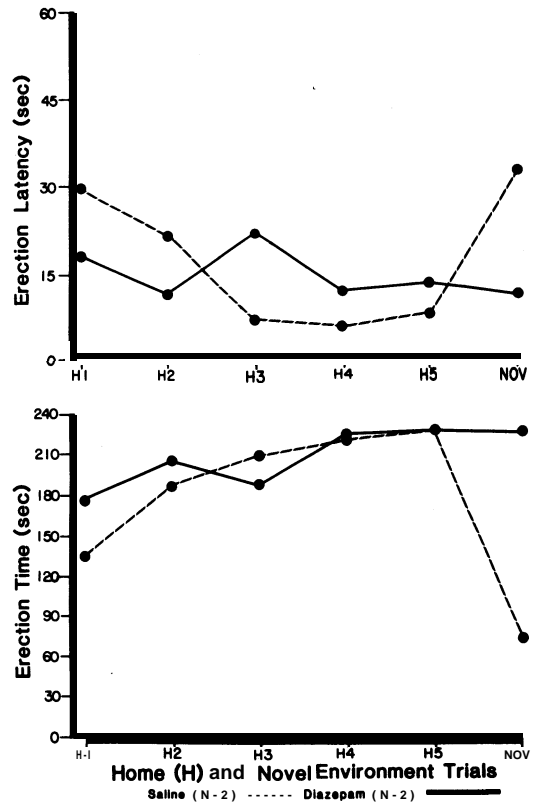


FIG. 2. Mean erection latencies and erection times of pony stallions during five 4-minute home trials (H1-H5) and one diazepam ( $n=2$ ) or saline-treated ( $n=2$ ) novel environment trial (NOV).

trials and one novel environment test as described in Experiment 1. Subjects were randomly selected for diazepam ( $n=2$ ) or saline ( $n=2$ ) treatment for the novel environment test. Diazepam treatment consisted of slow (about 4 ml/min) intrajugular injection of 0.05 mg/kg (Valium, Hoffmann-LaRoche, Inc.) 5 to 10 minutes before the start of the trial. Saline treatment consisted of equivalent volumes of saline. The handler and observer were blind to diazepam or saline treatment condition.

Subjects were mature (aged 4 to 14 years) mixed-breed pony stallions acquired at local auction. Ponies were stabled in individual box stalls (approximately 2.5 × 2.5 m) with other stallions in an unshuttered barn, and were maintained on hay, grain, and water. Related t-test procedures were used to compare home trial 5 and novel environment test values for each group.

## Results

Mean erection latencies and times are shown in Fig. 2. Mean erection latency appeared to increase for saline-treated subjects, however the difference between home trial 5 and novel environment test for this measure was not significant ( $p>0.10$ ). For diazepam-treated stallions, erection latency did not increase in the novel environment. Mean erection time for saline-treated subjects tended to be lower,  $t(1)=1.00$ ,  $p<0.10$ , in the novel environment test than in home trial 5. Diazepam-treated subjects did not show reduced erection time in the novel environment. Similar patterns between groups were found for sniff, lick, or nuzzle

frequency, flehman response frequency, kick frequency, bite frequency, and vocalization frequency, but significance was not demonstrated.

#### GENERAL DISCUSSION

Results of Experiment 1 indicate a negative effect of novel environment on sexual behavior of stallions. Results for saline treated subjects of Experiment 2 are consistent with this. In rats and mice, both feeding [6] and exploratory [3] behaviors are suppressed in a novel environment. The present results suggest that sexual behavior may be similarly affected by novel environment. The negative effect of novel environment might result from two processes. Unfamiliar features may induce fear that interferes with sexual response or elicit competing escape responses. In addition, the absence of familiar objects that have become conditioned stimuli or safety signals for arousal may result in lower arousal. As early as the third home trial, these stallions showed signs of anticipating sexual exposure, including penis drop, erection, and characteristic precopulatory vocalization. Although each stallion showed the usual anticipatory penis drop or erection when taken from the stall on the novel environment test day, it was noted that as soon as the alternate path was taken to the novel test location the penis was withdrawn and arousal appeared to diminish.

These experimental results support suggestions derived from clinical observations that sexual behavior problems can be related to a change in breeding environment. This experimental novel environment was limited to one factor, breeding area. In practice, relocation of a breeding stallion would

almost always involve an array of novel salient features, including physical arrangement, handler, stimulus mare, and breeding procedures.

Novel environments may also have a positive effect on goal-directed behavior. In stallions with sexual behavior problems, it is not uncommon for the behavior to show marked improvement in a novel environment. Perhaps the effect of novel environment depends on the quality of the familiar environment. For example, breeding stallions often develop abnormal sexual behavior under the conditions of confinement and regimentation of breeding farms. These "bored" or "stale" stallions, as they are known, often respond favorably when moved to a new farm. The positive effect of novel environment may be analogous to the well studied **facilitatory** effect of novel mate, known as the Coolidge effect [2].

Diazepam treatment appeared to block the suppressive effects of novel environment on sexual behavior of both treated animals. This is consistent with earlier findings that diazepam treatment attenuates the suppressive effects of aversive conditioning on stallion sexual behavior [5].

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