

Spontaneous Erection and Masturbation in Equids

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INTRODUCTION

Spontaneous erection accompanied by an activity thought to be and referred to as masturbation occurs in stallions. Spontaneous erection involves extension of the penis from the prepuce with engorgement to its full length and rigidity, in a solitary, rather than heterosexual, context. The activity known as masturbation involves rhythmic bouncing, pressing, or sliding of the erect penis against the abdomen achieved by rhythmic contraction of the ischiocavernosus muscles and/or pelvic thrusting (Fig. 1). With such stimulation, the glans penis usually enlarges as during copulation, and pre-sperm fluid may drip from the urethra. This behavior in horses seems analogous to spontaneous erection and masturbation noted in several other mammalian species.¹⁻³

The significance of spontaneous erection and masturbation in horses, as in other species, is not well understood. Traditional views of spontaneous erection and masturbation in domestic horses follow those held for similar behavior observed in other domestic and captive wild animals. One theme is that these are aberrant behaviors, similar to other stable vices, resulting from regimentation or restricted activity of captive or domestic existence.⁴⁻⁶ Another theme is that spontaneous erection and masturbation represent an expression or "venting" of sexual frustration resulting either from inherent hypersexuality or from thwarted access to heterosexual activity.^{6,7} Further, it has been asserted that masturbation limits the potential fertility of an individual stallion by depleting semen reserves and sexual energy. Accordingly, spontaneous erection and masturbation in horses are often discouraged. An array of management schemes and devices such as stallion rings, brushes, and cages have been employed to inhibit spontaneous erection and disrupt masturbation.⁸ Attempts to inhibit spontaneous erection and masturbation involve considerable management effort as well as risk of genital injury to the horse.

This paper summarizes some of our recent studies as well as work in progress designed to characterize the frequency of occurrence and characteristics of spontaneous erection and masturbation in equids, from which are emerging convincing evidence that these activities represent normal equid behavior.

BEHAVIORAL STUDIES

Stabled Horse and Pony Stallions

Subjects included 15 horse and 10 pony stallions of various breeds and reproductive histories and ranging in age from 2 to 23 years. All animals were observed continuously for 24 hours in box stalls (horse, 3 m X 3 m; pony, 2.5 m X 2.5 m) where they were housed. Horse stallions were fed hay and/or grain twice daily, and were provided paddock exercise approximately three to five times weekly. Pony stallions remained stabled continuously and were fed hay only. During the period of this study, all stal-

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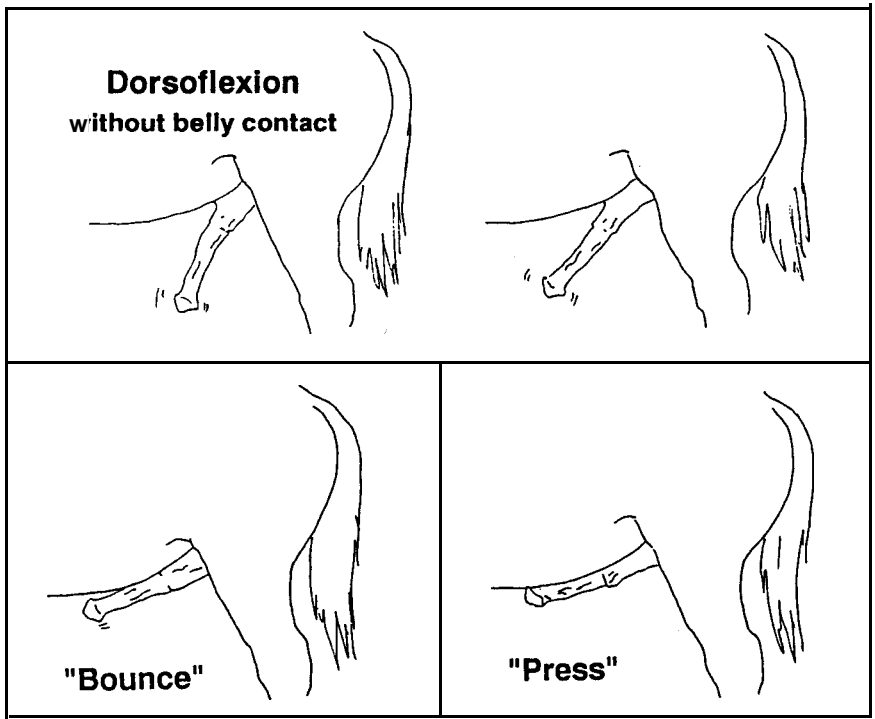


Fig. 1. Typical penis movements comprising masturbation in equids.

lions were provided heterosexual experience three to five times weekly in a standardized semen collection procedure.

Stall observations were conducted by video camera with a low light rated (1-6 lux) wide angle lens which facilitated continuous view of the stallion. Supplemental stall lighting was used 24 hours per day. Video tapes were scanned by trained observers at **20X** real time to identify occurrence of each spontaneous erection. Erection and masturbation episodes were then viewed at real **time** for the entire duration of penis drop. Penis activity and associated behavioral events were recorded with a hand-held microcomputer event-recorder:

Behaviors recorded and endpoints derived included

Spontaneous Erection (full extension and erection of the penis in an apparent non-sexual situation):

1. Frequency.
2. Duration.
3. Preceding activity: principal activity occurring within 2 minutes before erection (feeding, resting standing, sternal or lateral recumbency, drinking, walking, autogrooming).
4. Subsequent activity, as in 3 above.

- 5 . Activity during erection, as in 3 above, and apparent level of consciousness (alert, drowsy, asleep).

Masturbation (rhythmic movement of the penis during spontaneous erection):

1. Frequency of episodes (1 or more distinct movements of the penis).
2. Frequency of movement of the penis (Fig. 1):
 - a. without contacting the abdomen
 - b. with bounces against the abdomen
 - c. with pressing of the penis against the abdomen
 - d. with pelvic thrusts.
- 3 . Episode duration: time from first penis movement to last penis movement.
4. Glans erection (Fig. 2A) and glans flare (Fig. 2B).
- 5 . Ejaculation and number of jets of semen.

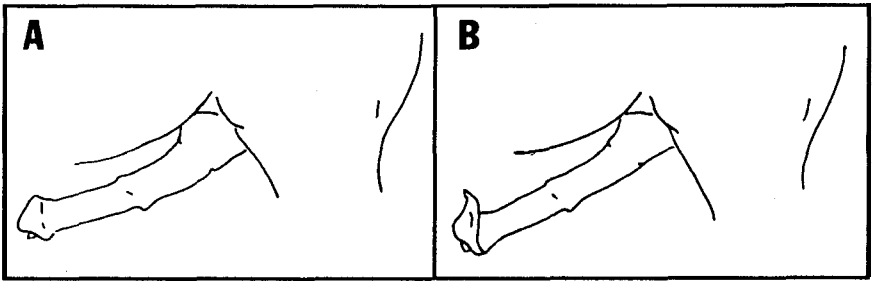


Fig. 2. Erection (A) and flare(B) of the glans penis.

Our laboratory's intra- and interobserver reliability estimates are high for recording from both live and videotaped penis activity of stabled stallions (e.g. erection **frequency, Pearson $r = 0.98$, $p < 0.001$; erection duration, $r = 0.99$, $p < 0.001$).^b Similarly, interobserver reliability coefficients for video recording are also high, ranging from 0.92 to 1.0 for erection and general behavioral responses measured in these studies.**

Figure 3 illustrates the occurrence of each spontaneous erection and masturbation episode observed for each of the 25 stallions. The frequency of spontaneous erections ranged from 7 to 30 (mean, 17.9; **s.d.**, 5.1) for a total erection duration of 12.5 to 128 minutes (mean, 36.66; **s.d.**, 23.55). Each erection typically lasted 2 to 3 minutes (mean erection duration for 447 erections observed, 2 min; **s.d.**, 41 **sec**). Approximately 75% of spontaneous erections (334 of 447) included masturbation. The 24-hour masturbation frequency for the 25 stallions ranged from 6 to 23 episodes, for a **24-hour** total duration of masturbation of 4.2 to 32.8 minutes (mean, 13.4; **s.d.**, 6.7). Episodes consisted of 1 to 34 penile movements over a period of 1 to 179 seconds. Approximately 83% of the episodes observed included "bounces," while 57% included "presses" (see Fig. 1). Only 13% of the masturbation episodes observed included pelvic thrusts.

During spontaneous erection and masturbation, these animals simultaneously engaged in other normal stall activities, including standing quietly (approximately **50%**), feeding or drinking (approximately 30%), and less frequently, autogrooming or slow walking. When the horse was bouncing or thrusting the penis, the facial expression

^b Diehl NK, McDonnell SM. Reliability of data recorded from videotaped stallion sexual behavior trials, in *Proceedings, Animal Behavior Society Annual Meeting, 1989; Abstract #209.*

Spontaneous Erection and Masturbation in 25 Stabled Pony and Horse Stallions

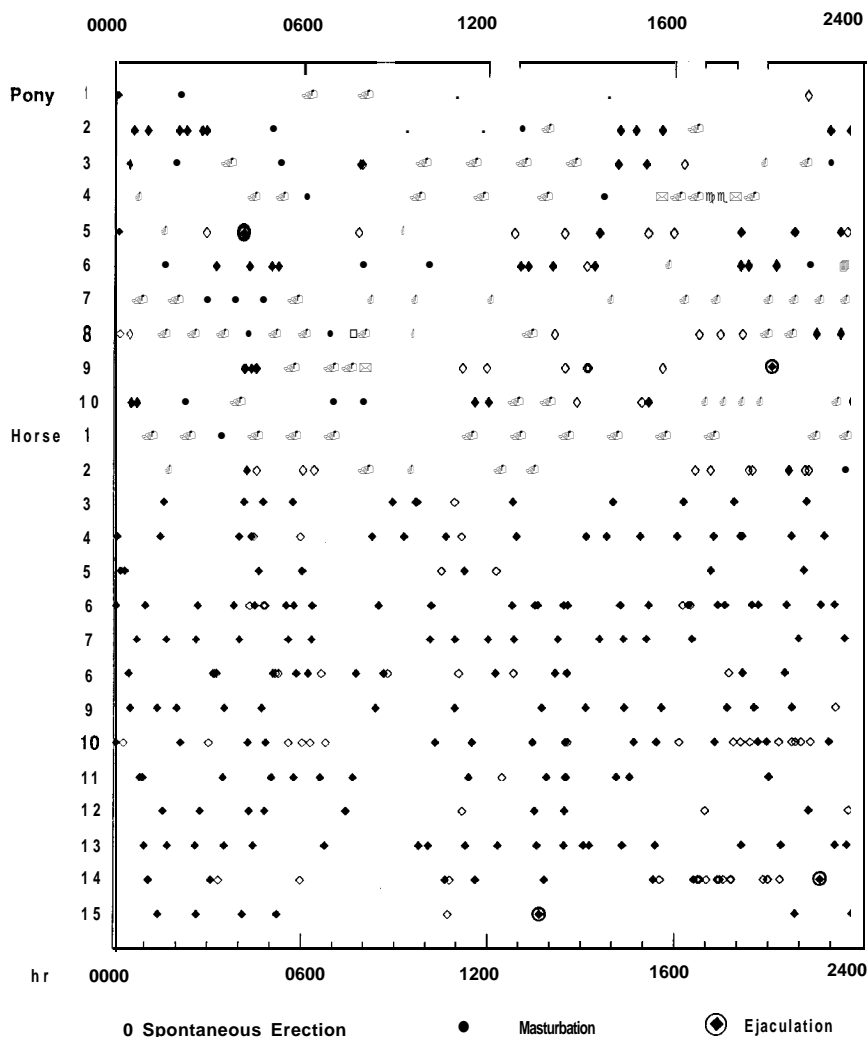


Fig. 3. Spontaneous erection and masturbation of 25 stabled horse and pony stallions during 24-hour videotaping of stag activities.

usually suggested pleasure and contentment similar to that observed during solitary grooming. A trance-like, glazed-eye appearance was occasionally evident. During spontaneous erection and masturbation, the stallions appeared normally alert during 84% of the occurrences and drowsy during 16% of the occurrences. Spontaneous erection and masturbation did not commence during vigilant states and were reliably interrupted by disturbances in the stable. As indicated in Figure 3, ejaculation was infrequent (four ejaculations in 447 erections observed, 0.9%). Two of the four **ejacula-**

tions observed occurred when the penis was not fully erect. One of these occurred about 30 seconds before complete erection and preceded a masturbation episode, while the other occurred as the penis was being withdrawn following a masturbation episode.

Most notable among these results is the high frequency and apparent regularity of spontaneous erection and masturbation. These results suggest higher frequency of spontaneous erection and masturbation than previously reported for stabled stallions. Tischner's continuous direct observations of seven stabled stallions for 7 days revealed an average of four masturbation episodes per horse per 24-hour day.⁷ In that study, stallions exhibited erection without masturbation three to 17 times per day. Over the 7-day period of that study, ejaculation occurred three times in 363 masturbation episodes (0.8%), a rate similar to that in our study.

Pastured Horse, Donkey, and Pony Stallions

Traditional explanations for masturbation in horses hold that it is related to inactivity, regimentation, and associated boredom of stable life, ⁹particularly isolation from natural social or sexual interaction. Masturbation has been observed among feral horses,^{c,d,10} among which it has been noted in harem stallions as well as in bachelor and solitary stallions. Feist reported erection, flexing of the penis, and thrusting similar to that which has been observed in domestic horses.^d He found that the activity occurred at all times of the day and in all classes of males (harem stallions, immature stallions, and bachelors).

We have evaluated the occurrence of spontaneous erection and masturbation in a number of horse, pony, and donkey stallions maintained under a variety of field conditions. Typically, field observations were conducted continuously during daylight hours by a single observer walking or in a motor vehicle positioned for visual access with minimal disturbance of the herd. The focal stallion or herd was scanned continuously during the observation period, with the primary goal being to detect any penis drop or movement. Binoculars were used as needed. The event-recorder described earlier was used to record behaviors for derivation of all endpoints described above as well as all heterosexual (harem maintenance, teasing, breeding, etc.) and general maintenance activities (grazing, grooming, elimination/marking, etc.) of the focal stallion.

Figure 4 illustrates masturbation activity of one mature Belgian stallion pastured with 15 estrus-synchronized mares.^e Hours of observation are indicated by solid lines. This stallion masturbated at an estimated average rate of 10 times per day (24 hours). Each masturbation bout lasted approximately 1 minute with an average of five bounces per bout. This stallion masturbated approximately every 2 hours while teasing mares at an average rate of four times per hour, breeding approximately every 2 hours, and performing the many maintenance activities typical of a harem stallion. This stallion masturbated as soon as one minute after ejaculation during breeding. No ejaculations during masturbation were observed. Similar frequencies of spontaneous erection and masturbation have been recorded among other field-breeding stallions. ^f

In another study, ^f similar patterns of spontaneous erection and masturbation were observed in a mature donkey stallion observed during daylight hours (0600 to 1800)

c Berger J. Personal communication, 1986.

d Feist JD. Behavior of feral horses in the Pryor Mountain Wild Horse Range. Ann Arbor, Mich:University of Michigan; 1971. Master's thesis.

e McDonnel, Bristol. Unpublished data.

f McDonnel, Henry. Unpublished data.

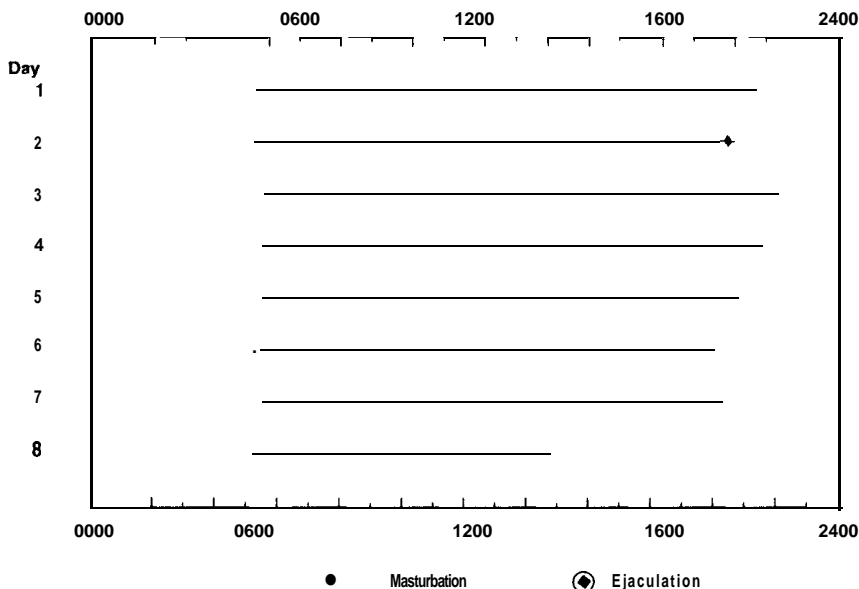


Fig. 4. Masturbation episodes (black diamonds) of a Belgian stallion at pasture with 15 **estrus-synchronized** mares. Hours observed are indicated by solid lines.

during 6 days with 20 naturally cycling **jennets**, followed by 10 days with the same **jennets** in synchronized **estrus**. This particular jack had never been stabled and had been maintained exclusively under field-breeding conditions. **Again**, in spite of a remarkably high level of heterosexual activity (107 observed breedings during 176 hours of observation over a **16-day** period), this jack exhibited 32 spontaneous erections and 24 episodes of masturbation, with durations and patterns of penile movements similar to those observed in horse stallions.

We have also observed 8 of the 10 pony stallions described earlier (Fig. 3) while pastured together as a bachelor band. Similar frequencies and patterns of spontaneous erection and masturbation were observed while the ponies were under these **semi-natural** conditions.

Level of Heterosexual Response and Level of Spontaneous Erection and Masturbation in Stallions

Conflicting untested assumptions hold that a relationship exists between the level of heterosexual behavior and the level of spontaneous erection and masturbation in stallions. Figure 5 illustrates mean erection and masturbation frequencies of the 25 horse and pony stallions described above, by category of high, average, or low heterosexual response based on overall arousal and response in a series of 10 or more trials using standard semen collection procedures.¹¹ Differences among groups were not significant (**ANOVA**, $p > 0.05$).

Sociosexual Environment

To further evaluate the possibility that factors related to domestic environments may influence spontaneous erection and masturbation in horses, we are conducting

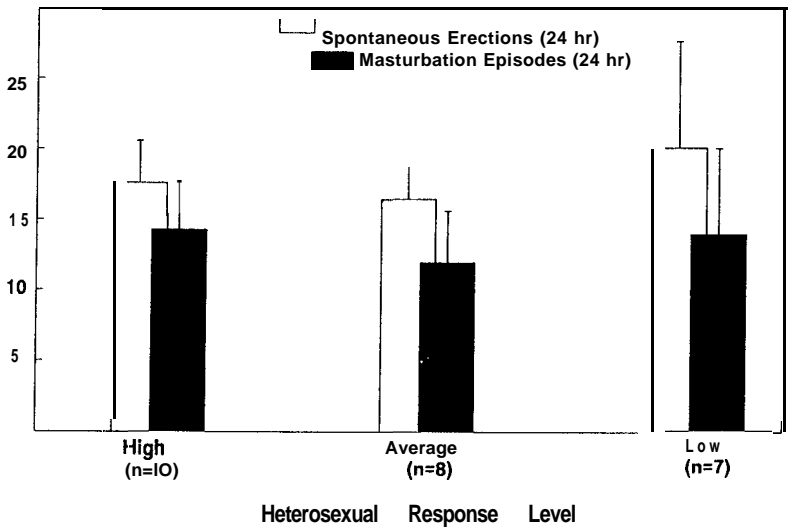


Fig. 5. Mean (SD) erection and masturbation frequencies for stallions ranked according to high, *average*, and low heterosexual response.

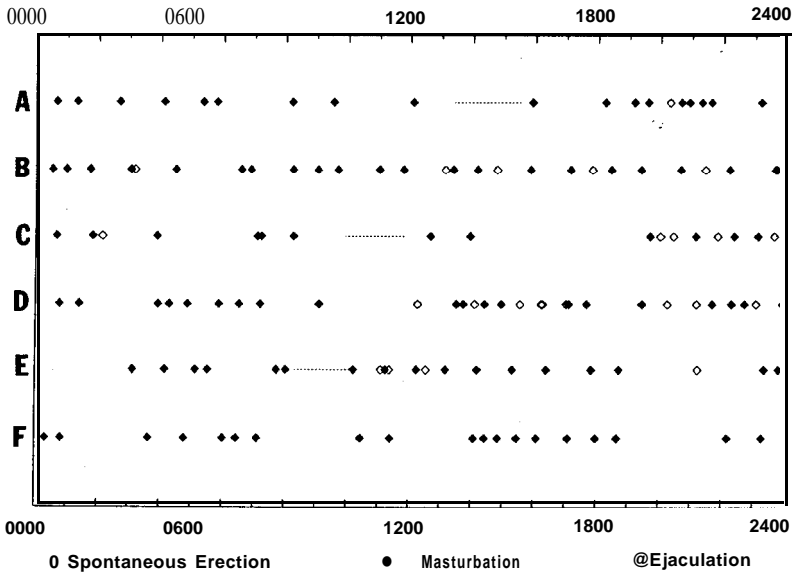


Fig. 6. Occurrence of spontaneous erection and masturbation of a single 2-year-old pony stallion observed during each of six different sociosexual conditions: A. Box-stall rest plus daily hand-breeding; B. First day in a box stall following 60 days at pasture with seven other mature pony stallions; C. Fifth day of box-stall rest with no access to females; D. **Box-stall** rest on seventh day of daily hand-breeding; E. Box stall rest on seventh day of teasing exposure to a mare without breeding; and F. Seventh day of confinement in a 1 m X 2 m tie-stall, in a barn with no other animals. Lines indicate feeding and stall cleaning periods during which observations were generally interrupted.

systematic studies of stallions under a variety of sociosexual and management conditions. Stallions are sequentially exposed to a number of distinctly different sociosexual environments, during which 12- or 24-hour samples of spontaneous erection and masturbation activity are obtained with the methods described earlier. For example, Figure 6 illustrates the occurrence of spontaneous erection and masturbation of a single 2-year-old pony stallion observed under a series of markedly different sociosexual conditions. In studies of this and other pony and horse stallions, we have been unable thus far to demonstrate significant differences attributable to what appear to be highly dissimilar housing and sociosexual conditions.

Table I. Spontaneous erection and masturbation of five pony stallions each sampled for 24 hours during box-stall housing and for 24 hours during tie stall housing.

	Box Stall	Tie Stall
Erection:	Mean (s.d.)	Mean (s.d.)
Frequency	17.0 (5.9)	15.0 (6.4)
Total Duration (min)	32.2 (14.0)	29.3 (14.4)
Mean Duration (sec)	115.8 (22.3)	119.8 (35.6)
Mean Interval (min)	85.1 (51.1)	71.4 (12.7)
Masturbation:		
Frequency	13.2 (6.1)	13.4 (5.3)
Total Duration (min)	13.1 (5.7)	9.7 (4.5)
Mean Duration (sec)	59.4 (14.7)	* 45.0 (12.6)
Mean Number of Penile Movements	9.6 (2.8)	8.9 (3.9)

* $p < 0.05$, dependent t-test.

Table I summarizes spontaneous erection and masturbation activities of five pony stallions, each sampled for 24 hours during box-stall housing, and again for 24 hours when housed in an isolated tie-stall. Total masturbation duration was greater under the box-stall condition than under the tie-stall condition. For all other endpoints, differences between box-stall and tie-stall were not significant (dependent t-tests, $p > 0.05$).

Other Observations

Social Facilitation of Masturbation

When stabled or pastured together, horses are often observed masturbating simultaneously when within close proximity of one another. In a study of pony stallions pastured together and another study of pony geldings housed together in a barn in individual box stalls which permitted inter-pony visual access, one or more individuals frequently masturbated **simultaneously**.¹² Within less than 1 minute after one animal commenced masturbating, one or more others also displayed spontaneous erection and masturbation. The animals appeared to be acting in consort, standing in similar orientation, starting and stopping masturbation simultaneously, and performing similar activities between erection and masturbation bouts. Feist noted a similar **occurrence** among a group of six stallions in a feral bachelor band, the members of which simultaneously extended the penis or **masturbated**.^d In groups of eight to 10 mature

d Feist JD. Behavior of feral horses in the Pryor Mountain Wild Horse Range. Ann Arbor, Mich:University of Michigan; 1971. Master's thesis.

pony stallions pastured together, we regularly observe anywhere from two to five stallions masturbating simultaneously. For example, "buddy" pairs have been observed standing head-to-head or head-to-shoulder, simultaneously masturbating. These observations suggest possible social facilitation of masturbation, reminiscent of apparent social facilitation of **resting, rolling**, drinking, urinating, or grazing. As with those other activities, it remains unclear whether this phenomenon represents true social facilitation or whether simultaneous exposure to an unidentified environmental stimulus independently elicits each individual's behavior.

Drug-induced Masturbation

During recent studies of the effects of various psychotropic drugs on sexual behavior and semen of horses, we observed a curious side-effect of treatment with the tricyclic antidepressant drug imipramine.¹³ Within a few minutes after intravenous injection of imipramine hydrochloride, animals assumed a posture typical of masturbation, attained erection, and masturbated. These animals continued to masturbate intermittently for 1 to 2 hours following each injection. All features of the behavioral sequence appeared as in spontaneous masturbation, including ejaculation on rare occasions. This behavioral sequence was distinct from the penis drop associated with phenothiazine tranquilization, in which the penis is extended but flaccid. In the same studies, animals receiving oral doses of imipramine were observed to masturbate with greater frequency than saline-treated control animals. Similar responses were observed in horse and pony geldings treated with imipramine.

Erection has been reported in laboratory **rats**¹⁴ and in **men**¹⁵ following treatment with apomorphine. Masturbation and ejaculation apparently did not accompany the erection. Drowsiness and yawning often preceded and accompanied the drug-induced penile erections, as we observed in the imipramine-treated horses. It is tempting to speculate that erection and masturbation in the horse are dependent upon or associated with a particular state of consciousness. All imipramine-induced erections and masturbation we observed, as well as 16% of spontaneous erections observed in stallions described above, were associated with a characteristic trance-like, drowsy state. Interruption of that state interrupted masturbation. Erection, stimulation, and ejaculation in the absence of a sexual partner reported in several other mammalian species often occur in association with a particular level of consciousness. In men and boys, for example, nocturnal penile tumescence occurs four to five times per night in association with rapid eye movement **sleep**.¹⁶ Emission of semen may also occur. Spontaneous erection, self-stimulation, emission, or ejaculation has been reported in association with a particular state of consciousness in laboratory rats, a cat, shrews, and hibernating **bats**.^{2, review} Together this evidence suggests a normal mechanism of spontaneous **genital** activity, emission, and ejaculation, possibly related to a particular **state of** consciousness.

Masturbation without Erection

We recently studied a stallion which, because of fibrotic changes of the corpora cavernosa following prolonged untreated priapism, was unable to achieve a rigid erection or retract the penis. At rest, 6 to 9 inches of the flaccid penis was continuously exposed. With prolonged teasing, the penis lengthened and enlarged only slightly. Video observation of this stallion in his stall revealed a pattern of periodic increased tumescence (to the level achieved with prolonged teasing) and jerking movements similar to

masturbation. The frequency and duration of this behavior was within the range described above for normal stallions, despite the obvious inability to bounce the glans against the belly or effect glans stimulation.

Ejaculation without Erection

In approximately 2,000 episodes of masturbation we have observed thus far in the various studies reported here and in progress, we have observed 13 ejaculations. Six of these ejaculations, while associated with erection and masturbation, occurred either before the stallion achieved erection and penile movement or following an episode and after the erection had subsided, as described earlier. These ejaculations consisted of the normal four to six jets of semen of decreasing sperm density, followed by one or two jets of gel. The flaccid penis jerked dorsally with the force of each ejaculatory jet.

Masturbation during Heterosexual Interaction

We have observed several donkey stallions, one horse stallion, and two pony geldings masturbating during attempts to collect semen or during sexual behavior trials. In such situations, the masturbation appeared to be clearly distinct from heterosexual interaction. In these instances, the animal appeared to be consumed with self-stimulation rather than interaction with the female, as was the case with the horse and donkey stallions pastured with estrous mares (described earlier).

Masturbation in Immature Stallions

We are presently studying immature colts of various ages to evaluate development of spontaneous erection and masturbation in horses. Clearly, spontaneous erection and masturbation occur in foals and yearlings. Study of the sexual responses of a colt observed daily from birth to 6 months of age revealed almost daily occurrence of erection and masturbation from age 7 days on.

Spontaneous Erection and Masturbation in Geldings

Spontaneous erection and masturbation are also seen in geldings. Figure 7 illustrates results of **24-hour** video observation of each of 14 stabled geldings. These geldings exhibited significantly lower spontaneous erection frequencies (independent t-test, **$p < 0.05$**); the rate of spontaneous erections in geldings was less than half the rate of erections and masturbation episodes of stallions observed under similar conditions. As is typical for geldings, these 14 showed a range of residual stallion-like heterosexual and aggressive behavior. Comparison of these geldings, which had been ranked as exhibiting *no*, *low*, or *moderate* residual stallion-like behavior during standardized behavior trials, revealed no significant differences (**$p < 0.05$**) among these three categories (Fig. 8).

In a subsequent experiment, seven of these 14 geldings were treated with a low level of replacement testosterone sufficient to restore low to moderate levels of heterosexual behavior (10 **$\mu\text{g}/\text{kg s.c.}$** every other day). Figure 9 illustrates mean frequencies of spontaneous erection of the 25 stallions described earlier, these 14 long-term geldings, and 7 of the same long-term geldings during testosterone treatment. Masturbation frequency, as well as spontaneous erection and masturbation durations (not shown), was significantly lower in untreated geldings (**$p < 0.05$**) than in stallions. **Testo-**

14 Long-Term Pony Geldings Stabled

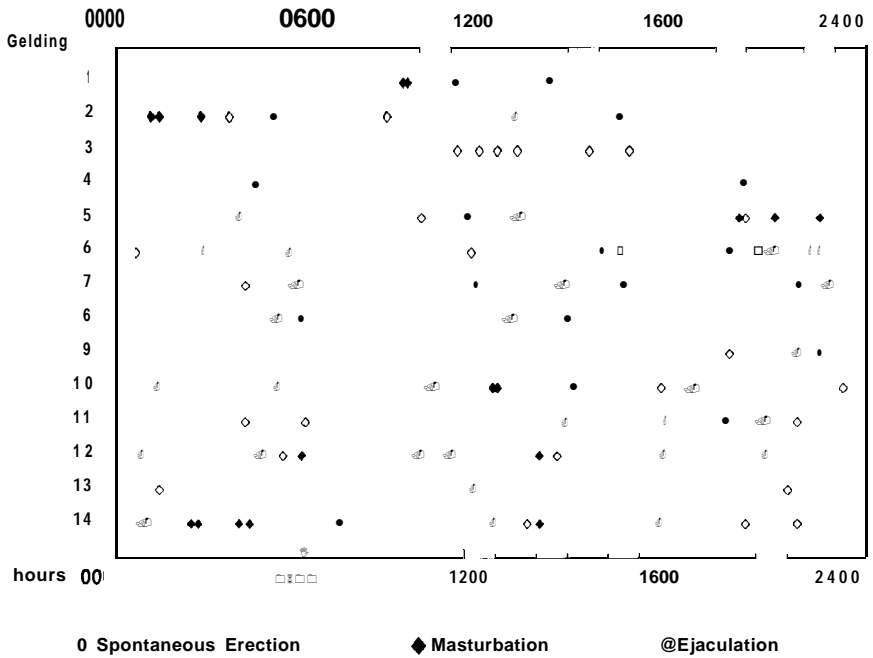


Fig. 7. Spontaneous erection and masturbation of 14 stabled pony geldings. The lines indicate morning feeding and stall cleaning periods (0700 to 0900) during which observations were generally interrupted.

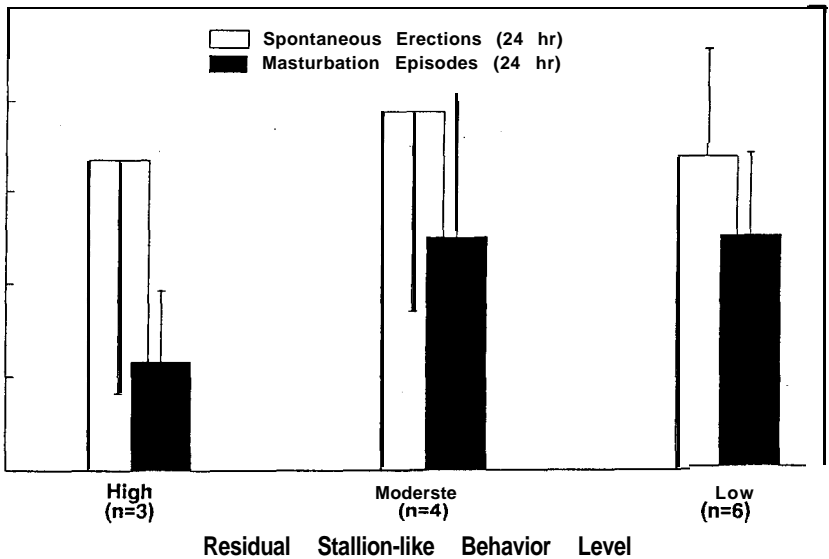
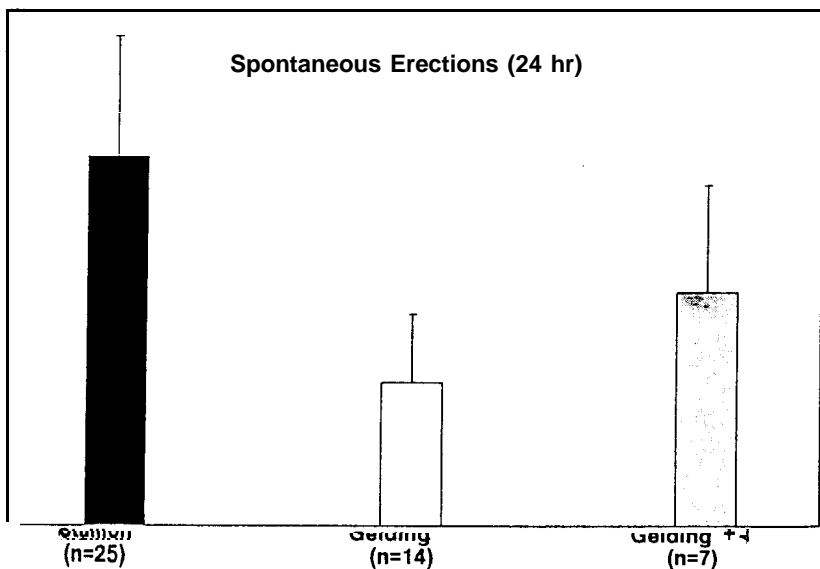


Fig. 8. Spontaneous erection and masturbation of geldings ranked according to high, moderate, and low residual stallion-like sexual and aggressive behavior.



All groups differ significantly ($p < .05$.)

Fig. 9. Twenty-four-hour frequency of spontaneous erection and masturbation of stallions, geldings, and geldings given low-level testosterone replacement.

sterone-treated geldings exhibited significantly greater spontaneous erection and masturbation frequencies than untreated geldings ($p \sim 0.05$). The duration of erection and masturbation, as well as the intensity of masturbation, in terms of number of penis movements and frequency of glans erection and flare, were also significantly lower for untreated geldings ($p < 0.05$) than for stallions, and **were also** significantly increased by testosterone treatment (data not shown). As yet, we have not observed ejaculation during masturbation in geldings.

GENERAL DISCUSSION AND CONCLUSIONS

These observations of spontaneous erection and masturbation, together with previously published data, indicate that these activities represent normal, rather than abnormal, behavior in horses. Masturbation in horses has been presented in the literature as abnormal behavior. Traditional texts include discussion of masturbation among the abnormal reproductive behaviors such as ejaculatory failure, inability to mount and thrust, excessive aggression toward mares,⁴ or among the stable vices such as stall weaving, cribbing, coprophagia, fence chewing, digging, and **savaging**.⁶ Masturbation is viewed as the result of excess sexual energy⁶ or as abnormal sexual behavior that should not occur with great frequency in "breeding stallions that are well adjusted with regard to the sexual **act**."⁵ This supposition may have been precipitated when observers unfamiliar with masturbation in normal stallions observed masturbation among stallions exhibiting breeding problems. A frequently articulated frustration of managers of behavior problem stallions is a stallion's erection and masturbation in the stall following inadequate sexual response in the breeding situation. Although it might seem logical to associate the masturbation with lack of breeding suc-

cess, many stallions with normal breeding behavior have been observed to occasionally masturbate within a few minutes after breeding. Masturbation occurs with equal frequency and duration among stallions with various levels of libido and access to breeding, and among free-running as well as intensively managed, stabled animals. Evaluation of time budgets of free-running, pastured, and stabled stallions across various management schemes indicates that solitary erection and masturbation occur at remarkably similar frequencies. Interestingly, the frequency of masturbation bouts is no less than that of many other behaviors, such as lying down, drinking water, or rolling. Similar patterns of self-stimulatory behavior have been observed in several other mammalian species, including felids, **canids**, ungulates, marsupials, and primates. Little difference due to captive or free-ranging environment or access to heterosexual activity is noted. Frank Beach,^g with regard to similar behavior observed among red deer, porcupines, porpoises, monkeys and chimpanzees, noted, "masturbatory activity is shown in the natural habitat by adult **males...even** though they have unrestricted access to receptive females."

Although it has been speculated that masturbation may possibly cause reduced fertility in domestic breeding stallions, little of the existing data support this concern. Individual stallions may exist which ejaculate more frequently than most, and there have been stallions in which such behavior was associated with low fertility. ^g Certain of these stallions have shown improvement in breeding behavior and fertility with use of a stallion ring. However, among all stallions we have systematically studied, ejaculation during masturbation was remarkably infrequent and, in the ongoing work in this laboratory, there appears to be no relationship between level of fertility and frequency of masturbation.

In conclusion, spontaneous erection and masturbation appear to be normal and frequent behaviors in stallions and geldings. Spontaneous erection and masturbation appear to reflect contentment, rather than frustration or boredom. These activities appear to be quite distinct from, and probably unrelated to, heterosexual **precopulatory** and copulatory responses. Ejaculation occurs in fewer than 1% of observed episodes in stallions and has not been observed in geldings. In work still in progress, we have been unable to demonstrate any effects of management or sociosexual environment on frequency or duration of spontaneous erection and masturbation. There is little evidence supporting the notion that masturbation is associated with or leads to infertility in stallions, or in any way impairs the health or performance of horses. Apparently there are no published reports of cases in which masturbation has resulted in injury or interfered with the general health of the animal. On the other hand, there have been cases in which devices employed to thwart masturbation have traumatized the penis. There is moderate variation among individual stallions in the frequency of masturbation, with some stallions masturbating as frequently as once per hour. However, in the animals we have systematically studied and in our clinical experience, we have not identified any instances in which masturbation became arepetitive response consuming the animal's attention to the exclusion of other normal maintenance behavior, as frequently is the case with behaviors such as stall weaving, cribbing, or **self-mutilation**. For all these reasons, I believe spontaneous erection and masturbation should not be discouraged in horses.

^g Kenney R. Personal communication, 1989.

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