

Stallion Behavior and Endocrinology: What Do We Really Know?

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Housing arrangements and social environment need to be considered as a primary therapeutic approach for stallions with chronically low libido and associated low testosterone concentrations. Testosterone concentrations and sexual and aggressive behavior of stallions clearly increase with sexual activity and exposure to mares. Author's address: New Bolton Center, School of Veterinary Medicine, University of Pennsylvania, 382 West Street Rd., Kennett Square, PA 19348-1692.

1. Introduction

In recent studies of domestic stallions kept under a variety of semi-feral social conditions, researchers have found that an extremely wide variation in testosterone concentrations, sexual behavior, and aggressive behavior can reliably be produced by manipulation of sociosexual conditions.¹ These findings suggest mechanisms for the social modulation of reproductive physiology of domestic stallions. They also raise questions as to whether some commonly accepted horse-breeding industry housing and management practices may be limiting the reproductive function of stallions. This report describes a series of studies exploring possible effects of exposure to mares and to other stallions on the sexual behavior and endocrinology of breeding stallions. The findings of ongoing research, though preliminary, similarly suggest an extremely wide variation in testosterone concentrations and behavior in domestic breeding stallions that is attributable to social environment.

2. Materials and Methods

Thirty light horse and pony stallions kept at the same research facility were studied, with general feeding,

care, and handling standard for all stallions except for experimentally varied conditions described below. In addition, 26 light horse stallions brought from local farms to our facility for breeding soundness examinations or semen collection were studied.

A. Experiment 1

Jugular blood samples were obtained for the measurement of plasma testosterone concentrations (radioimmunoassay) from each of 16 normal, mature breeding stallions during breeding season months under each of the following conditions: (a) immediately before and after 10 min teasing of an estrous mare; (b) immediately before and after standard semen collection (tease to estrous stimulus mare, immediately wash erect penis, then immediately proceed with mount of dummy); and (c) before the start and at the completion of 1 week of daily 10-min teasing followed by standard semen collection. Sexual and aggressive behaviors were recorded during all teasing and semen collection trials.

In a clinical follow-up trial that used the light horse stallions that had been brought to our clinic, jugular blood samples were obtained immediately before and

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within 5 min after semen collection for measurement of testosterone concentrations.

B. Experiment 2

In a repeated measures switch-back design, testosterone concentrations were measured in mature breeding stallions ($n = 6$), kept either (a) in a barn with other stallions with no mares or (b) as the only stallion in a barn with mares.

C. Case Studies

Sexual behavior and testosterone concentrations of stallions with chronically low libido are being monitored before and during extended social exposure to mares (kept at pasture near mares or in the same pasture with mares).

3. Results

A. Experiment 1

During 10 min of teasing to an estrous mare, testosterone concentrations increased an average of 32% (range, 0-87%; dependent t tests, 15 df, $p < 0.01$). From the beginning to completion of a single session of standard semen collection, testosterone concentrations increased an average 11% (range, 0-32%; dependent t tests, 15 df, $p < 0.05$). From sexual rest to the completion of 5 consecutive days of once-daily 10-min teasing and semen collection, testosterone concentrations increased an average of 522% (range 14-2460%; dependent t tests, 15 df, $p < 0.0001$). For all 16 stallions, sexual and aggressive behavior clearly increased from sexual rest to day 5 of daily teasing and semen collections.

For the 26 clinic case stallions, testosterone concentrations rose from a mean of 0.98 ng/ml in the samples obtained immediately prior to semen collection to a mean of 1.11 ng/ml in the samples obtained within 5 min of ejaculation (mean increase of 28%; $p < 0.01$, paired t tests, 25 df).

B. Experiment 2

To date, six stallions have been evaluated under each of two stabling conditions. Testosterone concentrations were significantly higher when stallions were stabled with mares than when stabled with other stallions (dependent t tests, 5 df, $p < 0.05$).

C. Case Studies

To date, three stallions with chronically low libido and low testosterone concentrations have been provided extended continuous exposure to mares (several days to several weeks). Testosterone concentrations, sexual behavior, and aggressive behavior all increased dramatically with extended exposure to mares. Testosterone concentrations increased an

average of 529% within the first 2 weeks of constant exposure to mares. Sexual behavior dysfunction for in-hand breeding resolved, and sexual performance continued at adequate levels, even after extended exposure to mares was discontinued.

4. Discussion

These findings suggest a much more dynamic character to testosterone concentrations and sexual behavior of domestic stallions than has been previously assumed. Though we have thus far only evaluated testosterone, other reproductive hormones are probably subject to similar influences. Sociosexual environment has not been systematically addressed in previous studies of stallion endocrinology. These and other modulating factors may be involved in what has traditionally been understood as very wide ranges of reproductive hormones. Teasing exposure to mares consistently resulted in increased testosterone concentrations and higher levels of sexual and aggressive behavior. Simple collection of semen with minimal teasing resulted in a relatively small increase in testosterone concentrations in breeding stallions brought to our clinic. These findings, together with previous research on pastured stallions¹ also point to the impact of management and housing conditions on breeding stallions, particularly for those stallions exhibiting inadequate libido in association with low testosterone concentrations. This research is also of possible importance in the management of captive wild and zoo equids, for which reproductive behavior problems are common.² Especially in light of the recent controversy^{3,4} concerning problems arising from the hormone treatment of subfertile stallions, modifications in housing arrangements and social environment have to be considered as a primary therapeutic approach. Certainly, further research is necessary to characterize these effects and the underlying physiology.

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References

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