

USE OF AN ANDROGENIZED MARE  
AS AN AID IN DETECTION OF ESTRUS IN MARES

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ABSTRACT

A study was conducted over a 2-mo period to compare estrus detection results obtained using an androgenized teaser mare with those obtained with a stallion, using the same group of 10 normally cyclic mares. The teaser mare was androgenized by administration of boldenone undecylcnate (500 mg i.m. every 1 to 2 wk), and allowed to run loose with the mare group. Estrus was determined by observation of the group for a 30-min period daily. In the second month of the experiment, a marking harness was used on the androgenized mare to help detect mares mounted when in estrus. Estrous periods detected by each teasing method were 1) first month: stallion, 18; androgenized mare, 5; 2) second month: stallion, 16; androgenized mare, 9. There were no estrous periods detected by the androgenized mare that were not also detected by the stallion. Under these conditions, the androgenized mare was not an adequate estrus detection aid. Also discussed are the successful results of an independent trial on a breeding farm using an androgenized mare as an estrus detection aid.

INTRODUCTION

Detection of estrus is a critical factor in successful breeding management of the horse. Behavioral response to a vigorous teaser stallion is the most widely used criterion to evaluate whether a mare is in estrus (1). Several basic systems have

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evolved which utilize a stallion as an aid for detection of estrus. These include 1) presenting a mare and stallion under halter across a fence or barrier, 2) leading a stallion within a pasture of mares or along the fenceline, 3) placing a stallion in a small enclosure (stallion box) within a pasture of mares, and 4) several variations of taking the stallion under halter to the mare's stall door or the mare to the stallion's stall. In each of these systems, a major management consideration is the danger and expense of maintaining a stallion. The possibility of unwanted breeding or spread of venereal infection exists whenever working with a teaser stallion. Though the use of geldings or vasectomized teasers may prevent unwanted pregnancy, it may spread venereal infection.

Under the influence of androgens, mares develop stallion-like social and sexual behavior (2,3). If effective as teasers, androgenized mares would offer several advantages as estrus detection aids. In a recent study, we concluded that androgenized mares that were exhibiting vigorous stallion behavior in a pasture herd were not an adequate substitute for the stallion in across-the-fence or stallion-box estrus detection situations (2). In addition, under conditions of an experiment in which 10 androgenized mares were grouped with 20 normally cyclic mares, only 36% of the mares in estrus were identified within a 30-min observation period. However, it was recognized that competitive interactions among the 10 androgenized mares may have decreased the efficiency of estrus detection by direct observation. There was evidence (ruffled hair coat over the hindquarters) that mares that were not detected to be in estrus on observation of interaction with the androgenized mares had been mounted while in the pasture with the androgenized mares..

We report here the results of a study in which we compared the effectiveness of detecting estrus using a single androgenized mare pastured with a herd of 10 mares with that of using a stallion for daily across-the-fence teasing. We also describe the first year results of an, independent trial on a breeding farm using an androgenized mare as a pasture teaser for 34 barren and maiden mares.

## MATERIALS AND METHODS

This study was conducted during June and July, 1986. The study herd consisted of 11 Thoroughbred, Standardbred, and Quarter Horse mares, aged 2 to 14 yr, maintained together in a **5-acre** pasture with run-in shelter. Eight of the mares had been pastured together as a University teaching and research herd for at least one year before the start of this study. Three mares had been added to the group within **15-30 d** before the **start** of the study. The mares were subjects of concurrent research requiring daily palpation and ultrasound examination per

rectum when in estrus. Some were removed from the pasture herd when an ovulatory follicle reached  $\geq 35$  mm in diameter and were returned to the herd after aspiration of the follicular fluid.

Androgenized mare. A 2-yr-old Quarter Horse mare selected from this herd was androgenized using boldenone **undecylenate**<sup>a</sup> (500 mg i.m., every 7 to 15 d to maintain stallion-like behavior).<sup>a</sup> Stallion-like precopulatory (sniffing, nuzzling, flehmen response, following, attention to urine and feces) and copulatory (mounting) behavior was observed within 2 d of the first treatment, at which point the study began. Each element of stallion-like behavior was present, however during these observation periods, this mare exhibited qualitatively less vigorous male-type behavior than most other androgenized mares we have observed in previous experiments (2). During the first month, the herd was observed daily for 30 min by a single experimenter. Based on observed interactions of the mares with the androgenized mare, a determination of "estrous," "no interaction: or "questionable" was recorded for each mare. A mare was recorded in estrus if she 1) stood for mounting by the androgenized mare or 2) presented to the androgenized mare (presented hind-quarters or stood in breeding posture plus lifted tail plus winked or urinated). During the second month the androgenized mare was fitted with a modified ram marking harness" depicted in Figure 1. Each morning between 0800h and 1200h, a single experimenter inspected the mares for crayon marks and then changed the crayon color. In addition to recording marked mares, the observer noted any interactions suggesting estrus (as **described** above) observed during this brief inspection period. Daily inspection and changing of crayon took approximately 10 minutes.

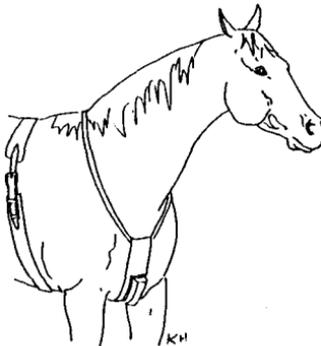


Figure 1. Marking harness worn by the androgenized mare. The crayon color was changed daily.

<sup>a</sup> Equipoise, Squibb, Princeton, N. J.

<sup>b</sup> Sire Sine, **Hortico** Ltd, Laverton North, Victoria 3026, Australia.

Stallion. Once daily, all mares were placed in a 16 x 30 m enclosure. A 19-yr-old experienced teaser stallion was presented under halter along one side of this enclosure. An observer categorized each mare as "estrous," "questionably **estrous**," or "diestrous" based on the mare's approach, presentation, tail lift, wink, and urination responses, as well as nonreceptive or aggressive responses. This procedure took approximately 15 min per day.

The experimenter using the androgenized mare as an estrus detection aid did not know the stallion estrus detection results. The experimenter using the stallion recorded only those mares responding **behaviorially** to the stallion, without regard for crayon marks on the mares, current harness crayon color, or observed interactions of the mares with the androgenized mare.

A third experimenter reviewed both **sets** of results daily. When a mare determined to be in estrus by the androgenized mare observer was concurrently judged to be "questionable" or in "dicstrus" by the stallion observer, this third experimenter obtained jugular blood samples for assay of plasma **progesterone**.<sup>c</sup>

## RESULTS

During the first month a total of 18 estrous periods were detected using the stallion. Only 5 of these (27%) were detected using 30-min direct observation of the androgenized mare in the pasture. During the second month, 16 estrous periods were detected using the stallion, of which 9 (56%) were detected using the androgenized mare with the marking **harness**.

On three occasions involving 3 different mares, a determination of "**estrous**" was made using the androgenized mare when a **determination** of "diestrous" had been made using the stallion. However, in two of these instances, the mares were detected in estrus by the stallion the following day, and in the third instance, the mare had been detected in estrus by the stallion the previous day. Progesterone values were 12.6 and 0.3 **ng/ml** for the first 2 mares, and 6.6 **ng/ml** for the third mare. There were no estrous periods detected by the androgenized **mare** which escaped detection using the stallion.

It appeared that the androgenized mare did not interact with some mares, while repeatedly interacting with others. Nine of the 10 mares experienced 2 or more estrous periods over the 2 months of the study. Of these mares, 4 were not ever detected in estrus using the androgenized mare, while 3 were consistently detected using the androgenized mare. For each of the **remaining** 2 mares, 1 or more estrous periods were detected using the androgenized mare, while 1 or more others were not.

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<sup>c</sup> Radioimmunoassay (5), New **Bolton** Center Clinical Endocrinology Laboratory.

A 4-yr-old intact Standardbred mare was treated with boldenone undecylenate (300 mg i.m. weekly). Stallion-like precopulatory and copulatory behavior, as described above, emerged within 6 wk after the treatments were started. Starting in January of 1987, this mare was turned out for approximately half the day with each of 2 groups of mares, maiden mares and mares that had not carried foals to term from the 1986 breeding season (barren mares). The eight maiden mares were housed in a 4-acre field, the barren mares in a **6-acre** field. Mares were removed from the barren group when they were determined to be pregnant, and new mares were added to the group during the breeding season. The total number of mares in the barren group for the season was 26. One experienced farm supervisor and a helper who was not previously experienced in estrus detection periodically observed the activities in the paddocks to identify mares in estrus. For these 2 groups of mares, the androgenized mare was the only aid employed in estrus detection. In previous years, and for farm mares with foals, a **stallion in-hand** within the pastures was used for teasing.

The veterinarian/farm manager (W. L. C.) judged the androgenized mare teasing system to be an excellent alternative to the use of a stallion, and in some aspects considered this method to be superior to any of the stallion teasing programs he had used on this and other breeding farms. All but 1 of the mares in these groups were observed being mounted by the androgenized mare. Mares in both the maiden and barren groups exhibited extremely regular, pronounced estrus. Even mares normally considered to be timid by the veterinarian/manager freely exhibited estrus to the androgenized mare. All eight maiden mares and 22 of the 26 barren mares became pregnant over the breeding season. These pregnancy results are as good or better than recent years on this farm using a stallion teaser. Mares newly introduced to the barren mare herd were initially rejected and excluded from the rest of the herd by the androgenized mare, and later accepted into the herd after a period of approximately 2 wk.

#### DISCUSSION

In the University herd study, 3 instances of estrus were detected using the androgenized mare on a day when a determination of diestrus had been made using the stallion. In only 1 of these instances was the progesterone value consistent with estrus. In each case, if a stallion had been used as the estrus detection aid, ovulation would have been detected, since the stallion results were positive for estrus at on at least one occasion before ovulation occurred. In contrast, use of the androgenized mare resulted in detection of only 27 to 56% of the estrous periods that were detected using the stallion. Under the conditions of this study, the androgenized mare was not a satisfactory estrus detection aid.

The farm trial results were more encouraging than those of the University herd study. Several factors may have accounted for this. The male-type behavior of the University mare was subdued compared to that of some other androgenized mares with which we have worked (McDonnell and Garcia, unpublished data). Although quantitative comparisons were not made, we suspect that the farm's androgenized teaser mare exhibited more intense stallion-like behavior than the University teaser mare did. Prior to androgenization, the **University** teaser mare had been a low ranking member of the particular group of mares within which she was observed. This factor may have contributed to her apparently low sexual activity level compared to some others we have observed. Schumacher and coworkers proposed a similar hypothesis following observation of androgenized pony mares that exhibited less male-type behavior **when** in the presence of larger, apparently more dominant horse mares than when among mares of equal size (4). Thus consideration of a mare's individual characteristics may be important in the selection of androgenized teaser mares, much as certain stallions are better suited to **serve** as teaser stallions.

Another factor possibly contributing to the more consistent estrus detection achieved in the farm trial may have been the amount of time spent observing the herds. Farm personnel observed the androgenized teaser mare intermittently for half-day periods with each group of mares, while the University study observation period was limited to 30 minutes, or 10 minutes with marking. Although the marking system employed during the second month confirmed actual mounting, it did not reveal any of the precopulatory behaviors that signal estrus.

The farm manager believes that there are **advantages** to having an androgenized mare in the pasture with the mares. The continuous socio-sexual interaction with a male-type stimulus animal may **serve** to familiarize maiden mares with the breeding experience. Based on the observation of clearly defined, regular estrus in the farm study **mares**, it is possible that there may exist a stallion effect on the mare reproductive cycle, similar to that in the sheep, goat, pig, and laboratory rodent (6,7).

An interesting observation was that the University androgenized mare continued to exhibit normal estrus throughout the study. Over the 2 months, behavioral response to the teaser stallion as well as among the other mares suggested that this androgenized mare experienced 2 estrus periods of normal length. During these estrus periods, we **occasionally** observed this mare, in essence, teasing herself. While in estrus she responded to her own frequent urination and defecation with male-type sexual behavior, including sniffing, flehmen, and elimination/markings (covering) responses (8). In a previous study, mares given similar doses of boldenone undecylenate continued to cycle normally during treatment but did not show estrus (3). Likewise, the mare used in the farm trial did not exhibit estrus or "self-teasing" behavior.

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