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Proceedings of the
Annual Resort Symposium of the
American Association of Equine Practitioners
AAEP

Jan. 19-21, 2006
Rome, Italy



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Induction of Lactation and Adoption of the Orphan Foal

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Introduction

When facing an orphan foal due to the death of the mare or unwillingness to accept her foal, it is critical to find an alternative to feed the foal and create a suitable social environment for the upbringing of the foal. Most of the time, a nurse mare that will raise the foal as her own can be located. In some regions of the country, specialized farms offer nurse mares. But, in other areas, locating a nurse mare can be difficult. Other options include feeding a replacement formula using a bottle or bucket. There are excellent milk replacements on the market that enable us to feed an orphan foal to weaning age with excellent body development. However, prolonged bottle feeding of an orphan foal often results in a horse with poor social skills that can interfere with its future use.

The induction of lactation can offer practical and economical advantages. Lactation has been induced in ruminants using steroids (progesterone and estrogen) as a short-term treatment followed by a wide variety of drugs aimed at increasing prolactin secretion. These treatment protocols have resulted in lactation with milk production ranging between 25 and 82 % of a physiological, post-partum lactation. As a general observation, an induced lactation does not start with a production of colostrum. Several products (domperidone and sulpiride) have been used in recent years to increase endogenous prolactin secretion in mares either to advance the onset of reproductive activity in anestrus mares in early spring or to counter the ill effects of fescue toxicosis in pregnant mares at term.

Lactation can be induced in non-parturient mares that have foaled in previous years using a treatment that includes estrogen, progesterone and a dopamine D2 antagonist (sulpiride or domperidone). The initial treatment protocol for induction of lactation in mares consisted of a 2-wk treatment in which progesterone, estrogen, and a dopamine D2 antagonist (sulpiride) was administered daily. Mares were milked 1-2 days after the start of sulpiride treatment, and in some experiments, milking was continued after the end of treatment. The results of these studies indicated that lactation can be induced in mares that have foaled in previous years. Perhaps the most encouraging observation was that when regular milking (6-7x per day) was continued after the end of hormonal treatment, milk production continued at a constant rate for 7 or more days (see Figure 1).

A comparison between sulpiride and domperidone indicated that both products are effective in inducing milk production. The quality of the milk produced during these induced lactations appeared similar to a normal post-parturient lactation even though production of colostrum was only observed occasionally (2). Several attempts have been made to induce the production of colostrums but so far results have been disappointing and do not warrant inducing a mare for the purpose of producing colostrums.

More recent studies indicate that progesterone and/or estrogen are essential for the induction since a treatment based on sulpiride administration only does not induce lactation in

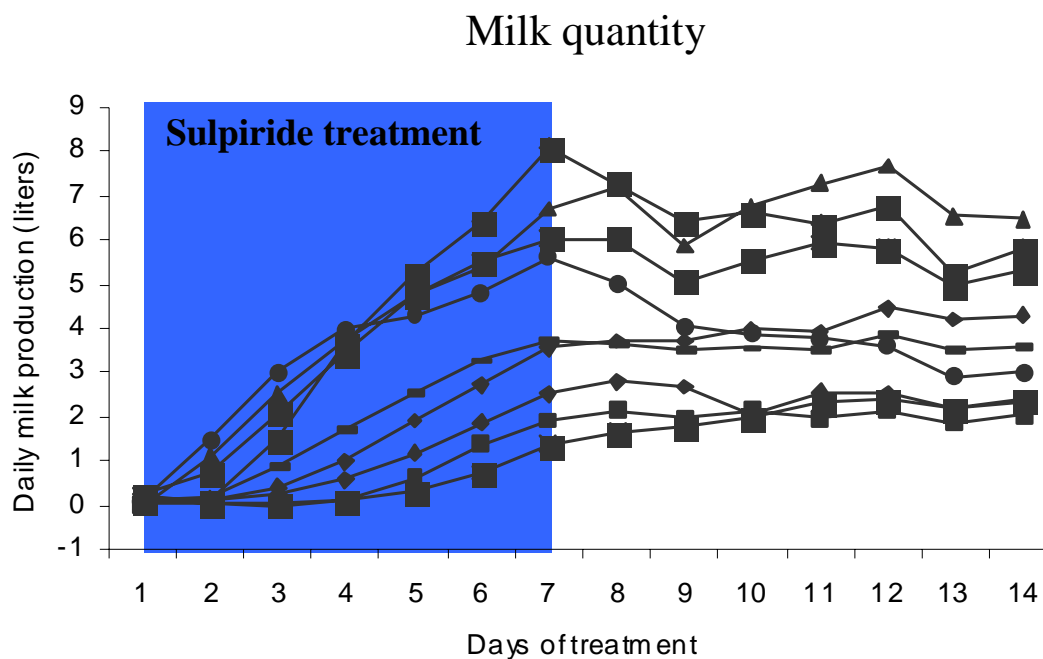


Figure 1

ovariectomized mares. Field experience suggests that in normal cycling mares, the supplementation of progesterone and estrogen may not be an absolute necessity and mares will start making milk with sulpiride administration only. Some caution should be used and certainly in anoestrus mares progesterone and estrogen are indispensable elements of the treatment protocol. Our recommendation remains to include estrogen and progesterone in the treatment protocol whenever possible. We have not observed seasonal differences in the amount of milk produced when lactation is induced in cyclic mares in early spring (March) and end of summer (September).

Over the years, we have developed a protocol for the induction of lactation that consists of a minimum of one-week hormonal treatment with milking at the end of the treatment period. We have also developed an effective method to make mares with an induced lactation adopt a foal and nurse it until weaning age without further treatment.

Induction of Milk Production

The details of the treatment protocol detailed below were worked out in several experiments that have been previously described (3) and are also based on our experience in our clinical program.

Selection of Mares - Mares must have given birth and successfully nursed a foal at least once in their life. Mares that have raised several foals tend to have a mammary gland that is more developed and a more predictable maternal behavior. Mares must be in good body condition, free of disease and mammary abnormalities, gentle and calm. Mares must be willing to stand confined behind a contention bar for prolonged periods of time and have a history of being a “good mother”. The success of the induction procedure does not seem to be influenced by the

age of the mare nor by the interval since the last foaling, although extremes should probably be avoided.

During the induction period, mares must be fed as a nursing mare with a high proportion of concentrate. Keep in mind that these mares were not pregnant prior to the lactation and that they probably do not have the same capacity of ingesting large volumes of food as postpartum mares. A higher than usual proportion of concentrate may help these mares.

Hormonal Treatment - The induction procedure starts with a clinical examination and a test in confinement. Once the mare has been approved, she receives a single intramuscular injection of estradiol-benzoate (50 mg/500 kg mare) and the same day she is started on daily altrenogest administration (22 mg/day per os) and twice-a-day injections of sulpiride (1 mg/kg IM, q 12 h).

Sulpiride is prepared as suspension in peanut-oil (100 mg/ml) and kept in sterile bottles 4C. It is important to warm the oil-suspension and shake hard before injection. Alternatively, domperidone can be used at twice the recommended daily dose. Human preparations are also available for injection.

The mammary gland is inspected daily and the size and shape are noted. When the mammary gland is significantly increased in size, has a "filed" appearance and/or milk drops are present at the teat, milking can be started. Generally, milking is started on the 4th to 7th day of treatment. Once milking has started, it is important to continue milking 5-7 times a day. Keep in mind that mares have very limited storage capacity and that foals nurse at 30-60 min intervals. Infrequent milking and accumulation of milk in the udder have a tendency of causing a drying up effect.

Milking - Milking can be done by hand or with a milking machine. The majority of mares adjust to these manipulations without much resistance. Mares that continue to resist hand and/or machine milking should be considered poor candidates for adoption. For optimal milk letdown and fast milking, administer 5 IU oxytocine IM 1-2 minute before milking. Machine milking is done with a milking machine equipped for milking sheep and goats. The settings we use are 120 aspirations/min, vacuum 22cmHg, alternation vacuum/rest 50/50. It generally takes less than 1 minute to empty a lactating mare. When using hand milking: try using a large Pyrex type measuring container - 32 ounce capacity. Milk directly into this recipient shows at once how much milk has been obtained.

Duration of Treatment - After 3-4 days of milking, production should have reached 3-5 liters per day for a 500 kg horse. At this point, the mare is ready for adoption. In our hands, mares that are not producing a significant amount of milk on day 7 (> 3 liters) are not suitable adoption candidates. Altrenogest treatment is generally stopped on Day 7 and sulpiride (or domperidone) treatment is continued until several days after adoption is completed.

Adoption Technique

Environment and confinement of the adopting mare – The best location for the adoption is a closed stall with no contact with neighboring horses. It is critical to have a reliable confinement system, for the safety of the handlers, the foal and the mare. It is important that the setup is solid and inspires confidence. A situation whereby the handlers cannot rely on the safety and integrity of the confinement material often results in tension and unnecessary

excessive disciplinary actions towards the mare. In our hands, a simple metal tube placed at the level of the hip of the mare and solidly attached to both lateral walls of the stall offers the best setup for a safe and relaxed adoption attempt (Fig. 2). The metal pipe should be positioned in the back of the stall parallel to the back wall leaving only enough space for the mare to stand comfortably. The mare should not be able to make significant lateral movements. A solid ring in the back wall through which a rope can run from the mare's halter to the mare handler is helpful.



Figure 2. Mare placed behind contention tube.

Introduction of the foal - Several experiments were conducted to investigate the most efficient system for adoption (3). In these studies, adoption was realized using one of two methods.

The discipline method - Welch pony mares were placed in an individual stall and confined behind a padded bar placed horizontally at chest height. Newborn foal was removed from its natural mother at birth and presented immediately to the adoptive mare.

Mares were disciplined if they responded aggressively to the foal. Mares that initially displayed high levels of aggression toward the foal received a tranquilizer once or twice (acepromazine to effect). The disciplinary action was a simple action-reaction technique by which the mare was discouraged to act against the foal. Gradually the actions shifted from physical action to voice cues and within hours mares were conditioned not to react when the foal attempted to nurse.

The vaginal stimulation method - The foal was held close to the mare's head while the mare received vaginal-cervical stimulation. The stimulation consisted of a vigorous massage of the external portion of the cervix and some attempt to dilate the cervix. This stimulation was applied twice (2 min each) at 10 min interval. During and after the stimulation the foal was held at close proximity of the head and shoulder of the mare to allow the mare to sniff and lick the back and buttocks of the foal.

Adoption took significantly longer for the mares that did not receive vaginal-cervical stimulation than for mares in the vaginal-cervical stimulation condition. Under experimental conditions, 14 out of 16 mares adopted the foal immediately and maternal behavior developed completely and immediately following the cervical massage. In the mares that did not undergo vaginal/cervical stimulation, only 2 mares adopted immediately and the remaining 14 mares displayed aggressive and potentially harmful action towards the foal for anywhere from 4 to 24 hours. It is interesting to note that all mares finally adopted the foals and that maternal behavior was complete and indistinguishable from that of mares that stayed with their own foal.

Subsequently these methods were used in a commercial program using large Warmblood-type mares (n=50) and client foals. All adopting mares were subject to a vaginal massage at the introduction of the foal. Foals were presented for adoption from 1-2 days after birth to several weeks. In this setting, using large sized mares, on average 3 out of 4 mares adopted immediately and without aggression. In the remaining mares, firm disciplinary action combined with positive reinforcement were needed and adoption was obtained in 90% of the cases after 1-4 days. Again, it is important to note that the maternal behavior, once installed, was complete. Clients very rarely observed "poor" maternal skills.

Growth of the foals – In the initial studies, foals and mares were not supplemented after adoption and foals had to rely 100% on the mare's milk production. Moreover, sulpiride treatment was ended two days after adoption and mares and foals were turned out in pasture. Under these (experimental) conditions, a significant delay in weight gain between adopted and control foals was seen in the first two weeks and in some foals also in the second two weeks (Fig. 3). However, at weaning age we were unable to demonstrate a statistically significant difference in bodyweight between the adopted and control foals. While foals lacked in body weight in the first two weeks, they appeared alert and growing normally (subjective observation).

In our commercial setting, sulpiride treatment was continued for 7-10 days after adoption in an effort to maximally stimulate the milk production. It is probably not useful to continue sulpiride treatment beyond 20 days (total duration) because we and others have observed a decreasing effect over time on prolactin secretion. On a few occasions, we have stopped treatment and reinitiated treatment one week later to boost milk production.

All client-owned foals were supplemented with artificial milk 3-5 times per day (1-2 liters each time). This was continued until the foals refused the artificial milk or when it was judged that the mare produced sufficient milk. Although, we were never able to quantify the weight gain in these foals nor evaluate objectively the impact of these interventions, we noted a very high client satisfaction rate and it was felt that the lack of milk that likely existed during the first days after adoption was sufficiently compensated to allow normal development of the foal. Incidentally, the 2004 champion female foal of the French Warmblood Studbook was an adopted foal still nursing the adoption mare. Subsequently, this method has been adopted by several nurse-mare farms in Europe.

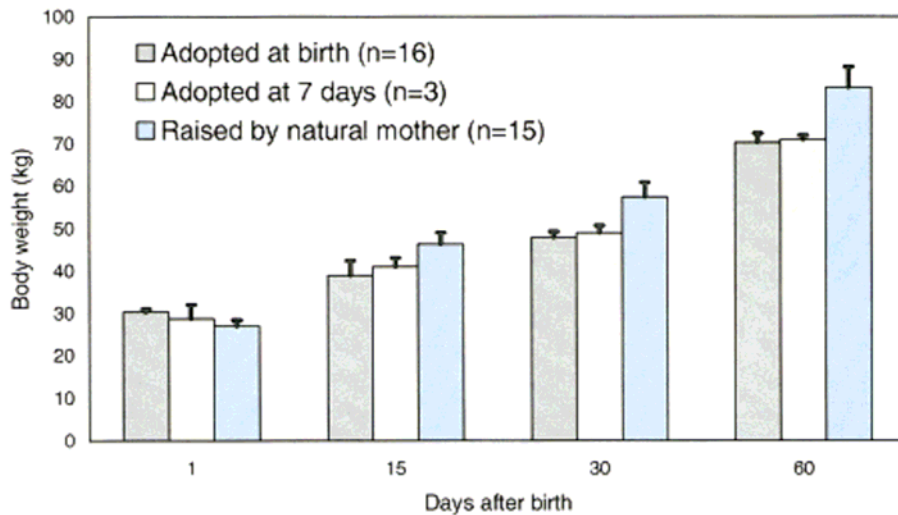


Figure 3 (adapted from Reference 3)

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