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Induction of lactation and adoption of the orphan foal

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The Orphan Foal: what now?

- Absolute priority: nutrition (colostrum and artificial milk)
- Colostrum if neonate (preferably first)
- Difficult birth, do not ignore the foal!
- Check for absorption of IgG (after 24h)
- A nurse mare?!! (the next days)

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Hand raise the foal or nurse mare?

- Financial considerations
- Social environment for the foal
- Responsibilities over mare and foal
- Adoption mare available??

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Normal nursing



- 5–7 times/hour = every 12min?
- 10–15 % bodyweight over first 24 hrs
- 20–28% bodyweight/day in first week
- 15–19% bodyweight/day by 4–6 weeks
- 150 kcal/kg/day

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Colostrum



- Limited endogenous energy reserves
- Colostrum first source of nutrition
- High protein and fat
- 1350 kcal/kg
- 2–3 L

Animals	Water %	Proteins %	Casein %	Whey %	Fat %	Lactose %	Ash %
Human	87.5	1	0.5	0.5	4.5	7.1	0.2
Buffalo	83-84	4	3.5	0.5	6-10	4.8	0.8
Cow	86-87	3.5	2.8	0.7	3.7	4.8	0.7
Goat	86.5	3.6	2.7	0.9	4	4.7	0.8
Sheep	82	4.6	3.9	0.7	7.2	4.8	0.8-0.9
Camel	86.5	3.6	2.7	0.9	4	5	0.5
Horse	88.8	2.5	1.3	1.2	1.9	6.2	0.5

Mare's milk



- | | | |
|---|------------------|----------------|
| | Mare | Cow |
| ○ | 1.2% fat | ○ 3.7% fat |
| ○ | 2.3% protein | ○ 3.5% protein |
| ○ | 5.9% lactose | ○ 4.8% lactose |
| ○ | 480 – 600 kcal/L | ○ 70 kcal/L |

Bucket feeding



- Volume requirements calculated for healthy foal
- 20 – 25% bodyweight/day
- 1–2 hrs feedings for 2 weeks
- Gradually increase feeding interval to 2-4 hrs
- Avoid bottle feeding if possible ??

Milk replacer



- Commercial milk replacer best option if mares milk not available
- Less digestible ??
- Higher energy content
- Can be diluted an extra 10%
- Must be made carefully

Cow or goat milk



- Contains more fat and less carbohydrate
- Goat milk similar to mare milk ??
- Straight cow milk unsuitable
- Add 20g dextrose per L to 2% skimmed cow milk

	Protein (g)	Fat (g)	Lactose (g)	Energy (kcal)
Cow	3.3	3.9	4.6	66
Human	1.3	4.1	7.2	69
Water Buffalo	4.1	9.0	4.8	118
Goat	3.1	3.7	4.4	62
Sheep	5.4	5.8	5.1	93

Weight of the foal KWPN
(de Vries 2005)

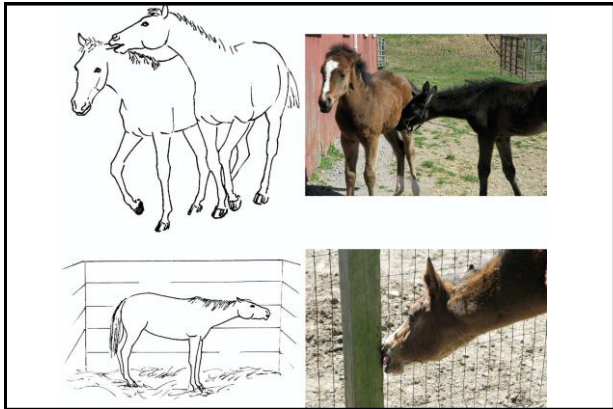
Age (months)	Weight (kg)
0	57
1	101
3	178
6	260
12	395
18	494
24	519
27	534

Artificial milk = 0,50 €/l


Feeding schedule of orphan foal by van der Berg & Bouwman 1995

Age	# meals/day	Interval between meals (hours)	Consumption/day (liters of milk)
Days 1-4	12	2	4-6 3€/d
Days 5-10	8	3	8 - 10 5€/d
Days 11-14	6	4	10-12 6€/d
Week 3	5	4 *	12-15 7€/d
Week 4-10	3-4	4-5*	± 15 7€/d
Week 11-12	2	6-8	7-8 4€/d
Week >12	1		3-4 3€/d

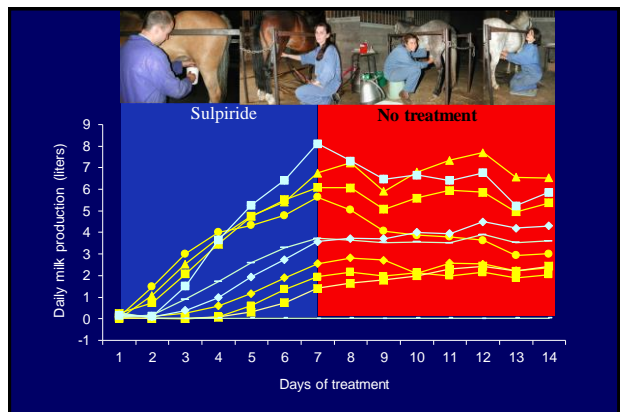
During the night one can skip 1 or 2 feedings. At 3 months of age the amount of milk can be gradually decreased and eventually stopped.







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How to induce lactation and make the mare adopt the orphan foal?




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Induction of lactation

- Administer dopamine D2 antagonist (sulpiride or domperidone) to increase prolactin secretion
- Give estradiol to increase response to dopamine antagonist (higher prolactin secretion)
- After a few days start milking the mare
- When sufficient milk, start adoption procedure

Dopamine Antagonist Preparations

Domperidone (1mg/kg):

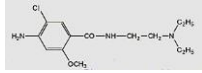
- Equidone Paste
- Motilium 10 mg tablets

Sulpiride (1mg/kg):

- Dogmatil Injectable
- Dolmatil®
- Sulpor®



Sulpiride = Dogmatil® Sanofi

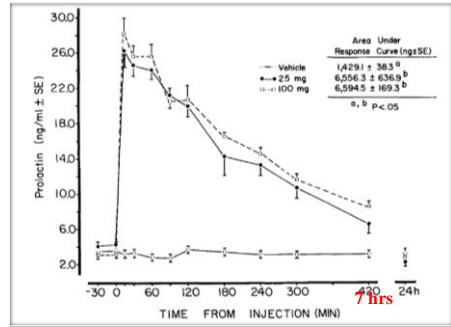


- First day, give PGF-2 α to induce estrus and increase oestrogen secretion
- Sulpiride 300-400 mg IM BID – morning & evening – during 7-10 days
- Dogmatil® 3-4 ampules 100 mg/2ml - cost 3,60 €/day

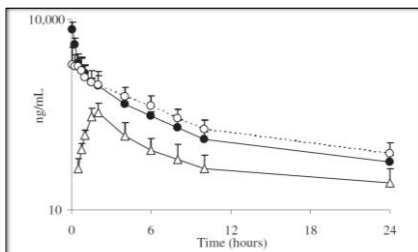
- Do not attempt in winter anestrus mares!!
- Do not attempt in nulliparous mares!!



Prolactin secretion with 25mg and 100mg IM



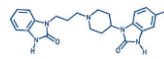
Prolactin secretion with oral and IM/IV



Oral dose =
3x IM dose

Fig. 3. Observed mean plasma concentrations of SLP after IV (—●—, n = 6), IM (---□---, n = 6), and PO (—△—, n = 5) administration of SLP (1 mg/kg) in adult mares. Bars represent standard deviation of the mean.

Domperidone = Equidone Paste

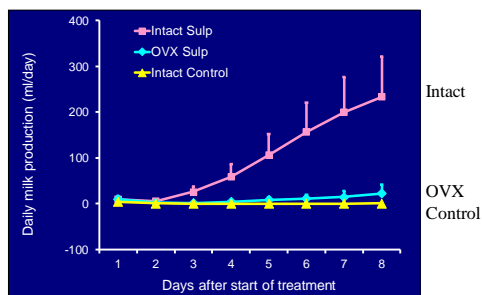


- First day, give 50mg estradiol benzoate or give 10mg estradiol 17 β daily for 5 days
- Domperidone 1,1mg/kg PO – morning (& evening) – during 7-10 days
- Equidone Gel

- Do not attempt in winter anestrus mares!!
- Do not attempt in nulliparous mares!!

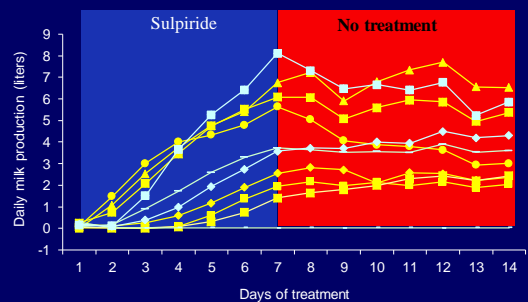


Milk production in anestrus mares



Milk production in intact and OVX mares

Milk production during and after sulpiride

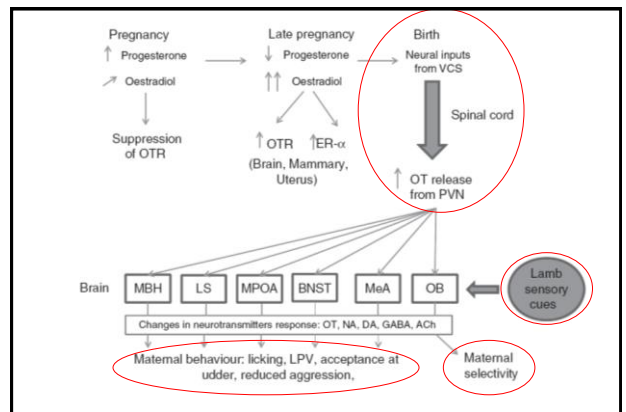
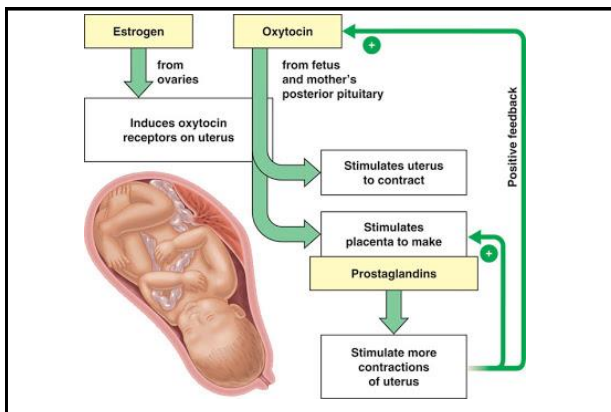


Induction of lactation: How long?

- In most mares adoption is possible within 5-7 days after start of treatment
- Need a minimum production to keep foal interested in nursing from mare
- With frequent suckling the milkproduction will steadily increase
- Approx 3 liters/day is good for adoption
- When milking must keep it up at 7-8x/day

Adoption method

- Forced adoption
- Adoption with stimulation of the cervix
- Maternal behaviour triggered by prostaglandine administration

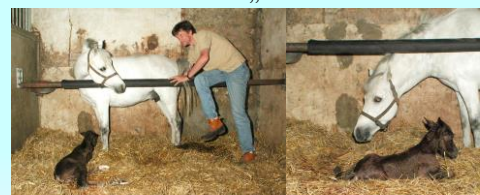


Adoption Method 1: Disciplined into accepting the foal “an eye for an eye ...”



	Total	Aggression 5-25 h	No aggression <2 h
Forced	16	14	2

Adoption Method 2: Stimulating the Ferguson Reflex by vaginal/cervical massage.

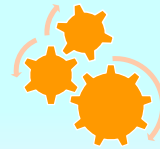


	Total	Aggression 5-25 h	No aggression <2 h
Forced	16	14	2
With vaginal stimulation	16	1	15

Adoption Method 3: Simulating the Fergusson Reflex by OXYTOCIN INJECTION



	Total	Aggression 5-25 h	No aggression <2 h
Forced	16	14	2
Oxytocin IM 100units	16	15	1



The New Adoption Method

1. Give the mare 3-4 ml of Estrumate
2. Wait 15-20 min until side-effects are obvious (sweating, cramping)
3. Bring foal to the mare
4. Place foal in front and side of mare
5. Let the mare smell and lick the foal
6. Encourage the foal to nurse
7. Adoption is success when mare follows/guards the foal



Preparation before adoption

- not strictly necessary -

- Place the mare and foal in adjacent stalls so that they can see and smell each other
- After several days allow the foal to nurse from the mare under very strict restraint (oxytocin, nose-twitch)
- Stimulate bonding between foal and mare by separating them for short periods

Normal Adoption



Foal that is afraid of the mare



Very young, naive foal



Young foal that is not able to find the udder



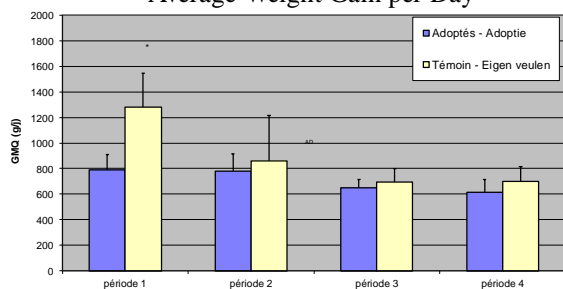
Recommendations:

- Choice of the mare
- Solid large stall
- Away from other horses
- Reserve sufficient time

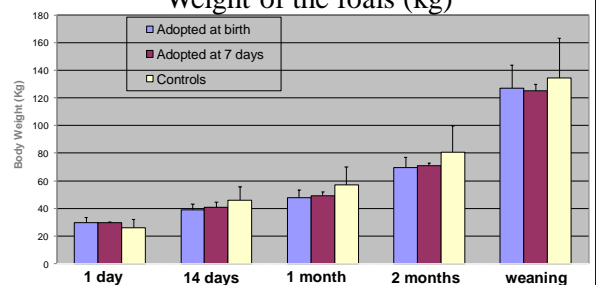
Recommendations

- One person for the mare and one for the foal.
- Bring the foal to the front of the mare but avoid nose-to-nose contact.
- Allow the mare to smell and lick the foal
- Use a baby bottle to lure the foal to the udder
- Be very patient.
- Stay calm with the mare.

Average Weight Gain per Day



Weight of the foals (kg)



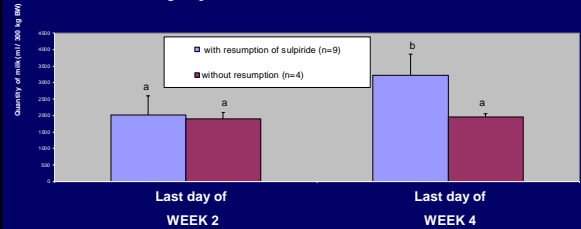
Supplementing milk



- Monitor mare and foal behavior
- Maternal aggression
- Foal frustrated and not resting
- Domperidone – Sulpiride
- Improve plane of nutrition
- Cocoa?

Milk production after restarting sulpiride Tx

- Left: daily milk production after 2 weeks of sulpiride Tx
- One week without treatment
- Resumption of sulpiride treatment
- Right: daily milk production after 1 week of sulpiride Tx (blue) and control group (red)



Nutrition of the foal

- Before adoption: feed ad libitum at 1-2 h intervals.
- After adoption: feed every 3-4 h
- Continue sulpiride Tx for about 1 week
- Feed mare like a nursing mare
- Even if the foal needs to be supplemented, the companionship and education that the foal receives is most important

Can we use PGF in mares that do not accept their foal?

- If adoption fails the first time try again 12hrs later with same protocol.
- If (maiden) mare refuses her foal, the PGF treatment has proven to be useful in some cases

