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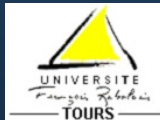


Establishment of mother-young relationships in farm mammals

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Mother and young : the perfect intimacy



... made for each other

- The young has to ensure its own survival
- The mother has to ensure the survival of her own progeny

RABBIT



1. Born in a nest
2. Immature neonates
3. Reduced thermoregulation
4. Limited sensory development
5. Large litter size
6. Stay in nest for a while
7. Stay in colony

Altricial

PIG



1. Born in a nest
2. Immature neonates
3. Reduced thermoregulation
4. Full sensory development
5. Large litter size
6. Stay in nest for a short time
7. Follow the mother

Semi-Altricial

SHEEP



1. Born in the sheep flock
2. Fully developed neonates
3. Matured thermoregulation
4. Full sensory development
5. Small litter size
6. No nest
7. Follow the mother

Precocial

Maternal behaviour style and stage of development of neonates: consequences on mother-infant relationships

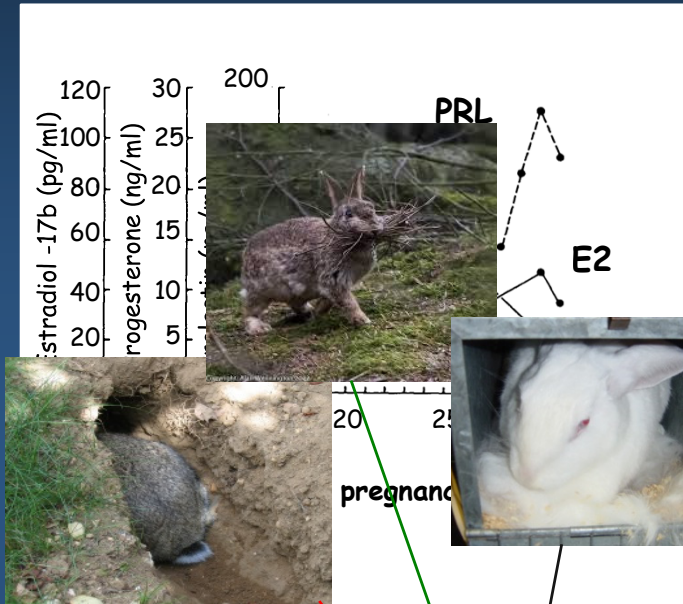
How is the mother-young relationship shaped by such constraints ?



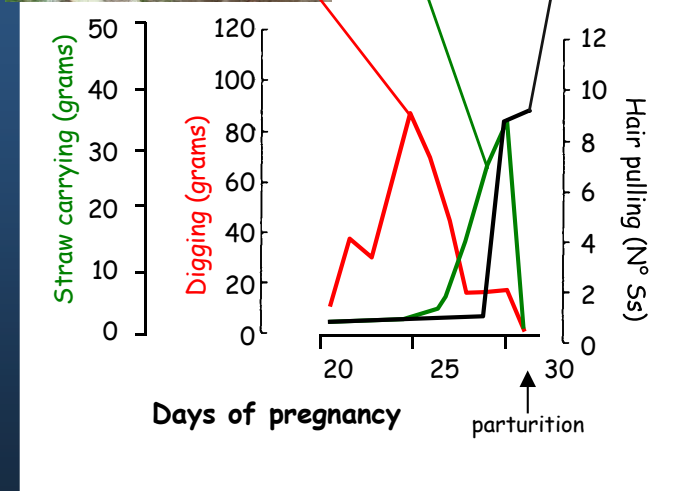
1. A brief summary on mothers
2. A particular focus on the young
3. Mechanisms involved in the development of a bond with the mother
4. Conclusions

The RABBIT DOE, the SOW and the EWE

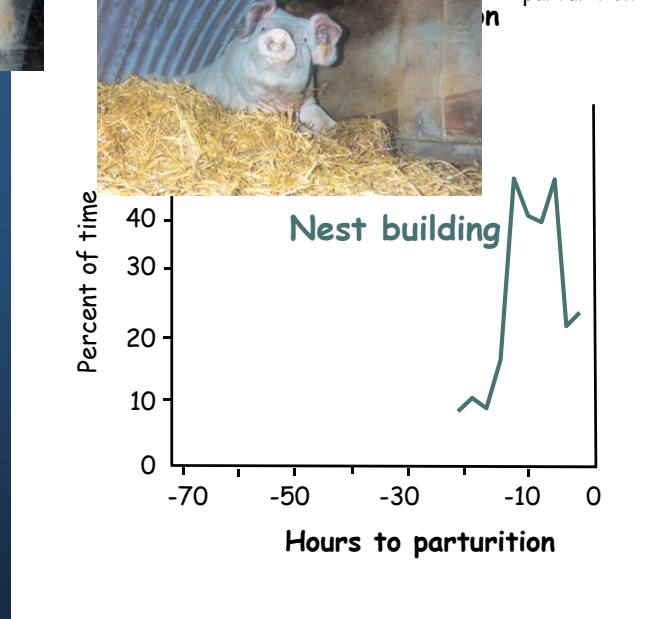
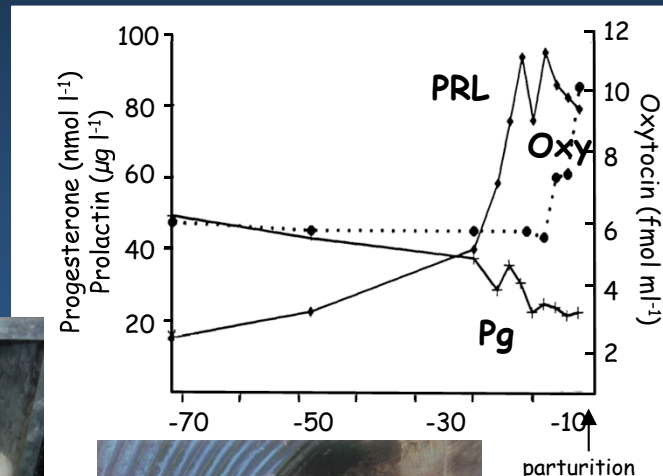
Hormonal Profiles



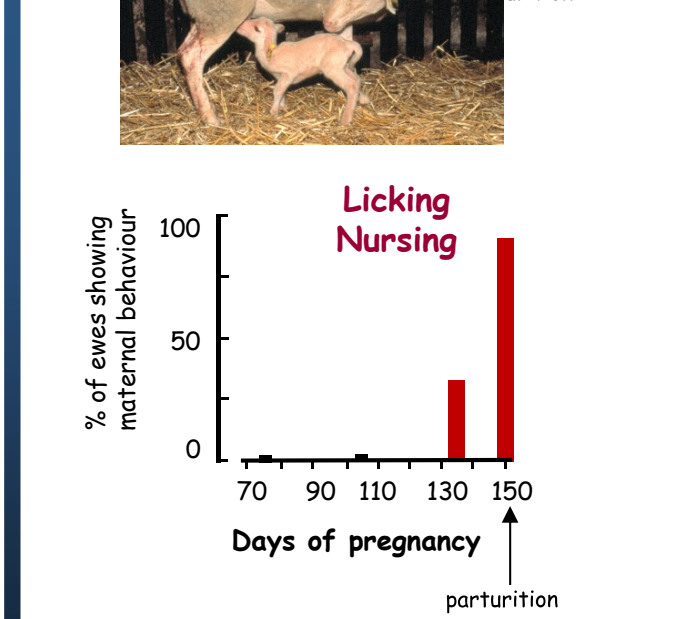
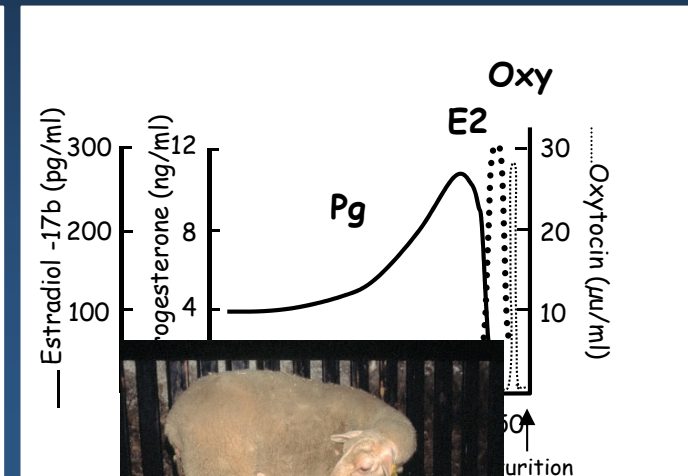
Behaviour



González-Mariscal & Rosenblatt (1996)



Widowski et al (1990)



Poindron & Le Neindre 1980; Lévy et al (1996)

The RABBIT DOE, the SOW and the EWE

Preference for their young ?

Rabbit :

- Passive maternal behaviour - Nurses alien young while in the nest
- Once pups out of the burrow, aggressive towards young that are not colony members
- Gland marking : colony specific odour

González-Mariscal et al. (1998; 2007) ; Mykytowycz (1985) ; Mykytowycz & Dudzinski (1986)

Sow:

- Passive maternal behaviour - May nurse alien young while in the nest
- Recognises nest site and litter odour by 7 days
- When leaving the nest, no response to piglets that remains in it
- Very little aggressive behaviour towards alien piglets

Horrel & Hogson (1992) ; Jensen (1986)

The RABBIT DOE, the SOW and the EWE

Preference for their young ?

Ewe :

- Cares for alien young only at parturition
- And only if they are covered with amniotic fluids - Active maternal behaviour
- Develops selective nursing within 1-2 h post-partum (olfactory recognition)
- Vocal recognition within 24 h post-partum

Maternal selectivity in the EWE

At parturition



6 h post-partum



CONCLUSIONS on MOTHERS

Preference for their young ?



How does the young fit in that story ?



No individual recognition of young while in the nest

Recognition of colony odour



No individual recognition of young while in the nest

Recognition of litter odour but permissive mothers



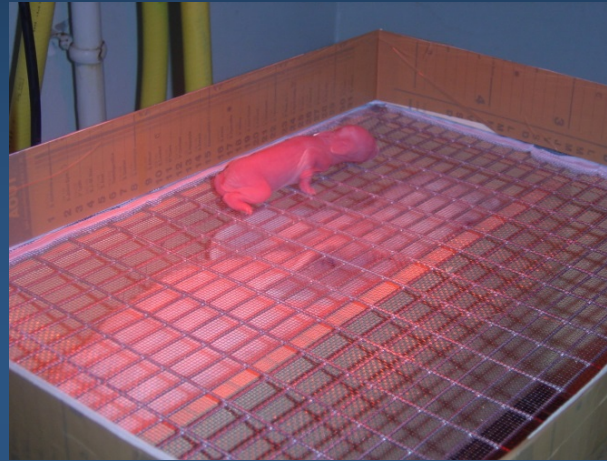
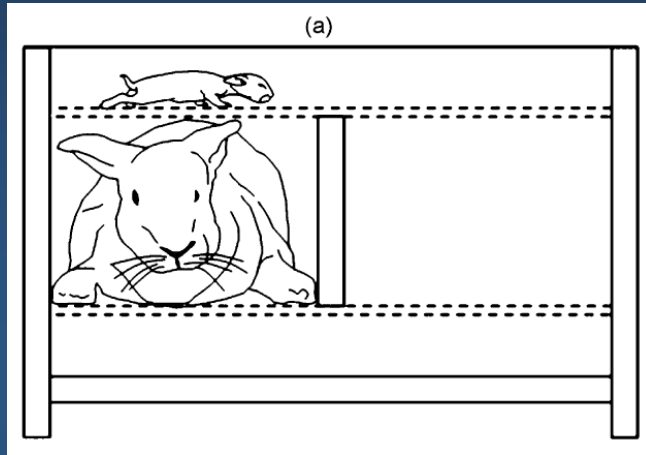
Individual recognition of young

Very clear maternal bond

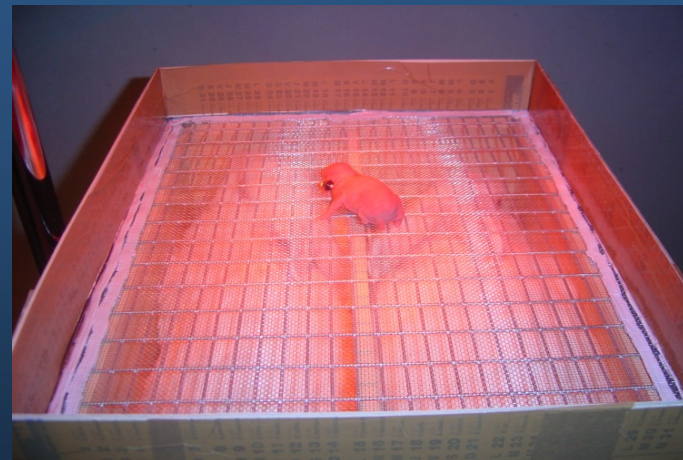
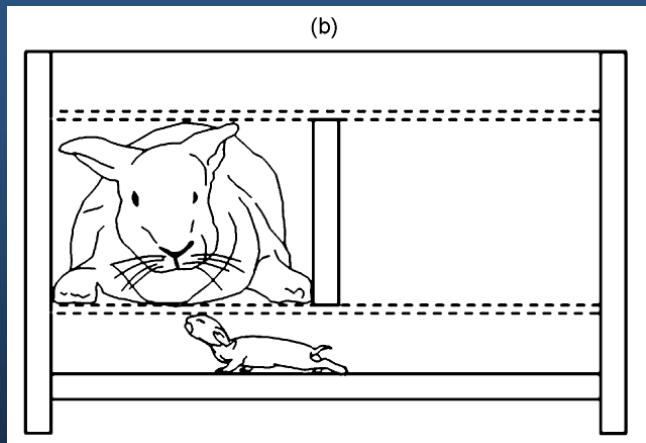
The RABBIT PUP

Preference for the mother (part 1)

Day 1



Day 7

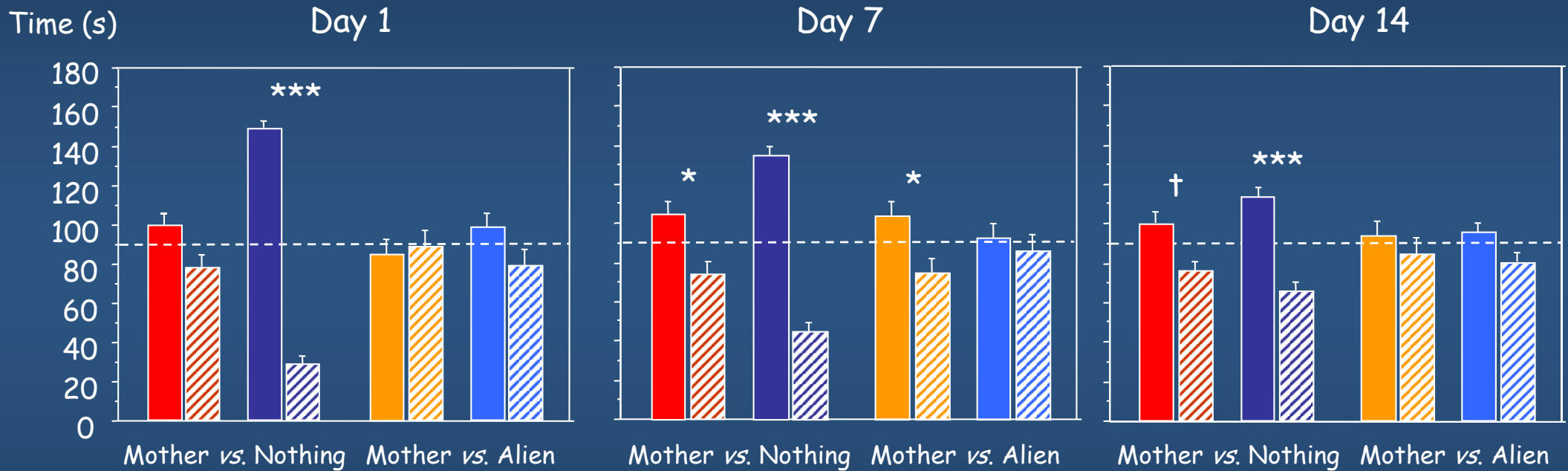


Day 14



The RABBIT PUP

Preference for the mother (part 1)



■ Ventral Nothing
■ Dorsal Nothing

■ Ventral Alien
■ Dorsal Alien

The RABBIT PUP

Preference for the mother (part 2)

Day 1



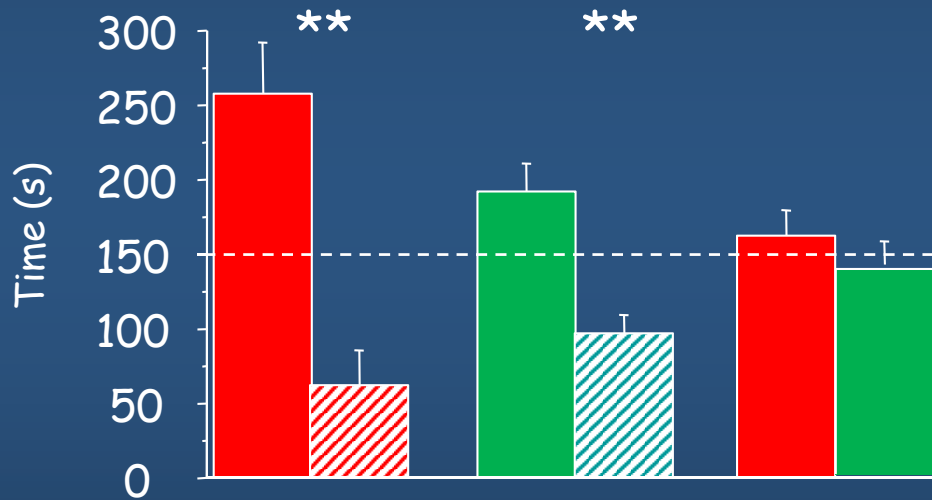
Day 7



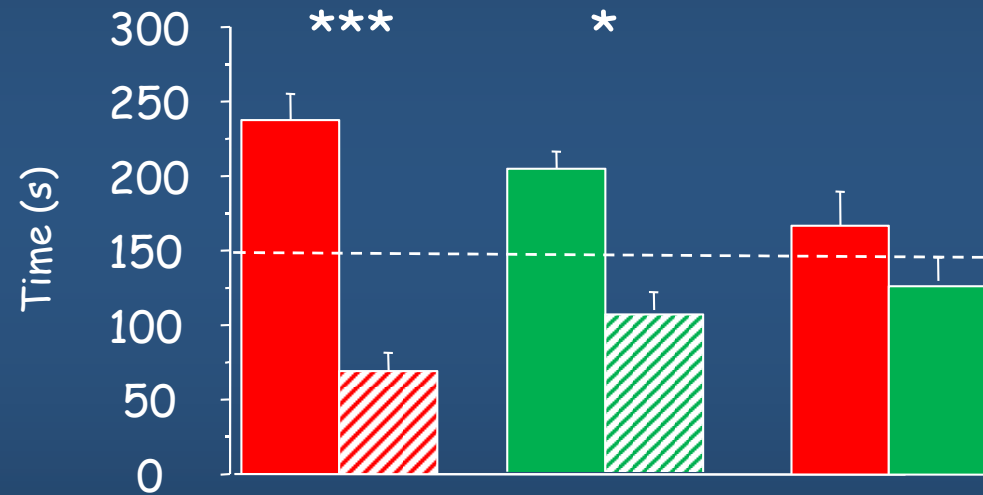
The RABBIT PUP

Preference for the mother (part 2)

Day 1



Day 7



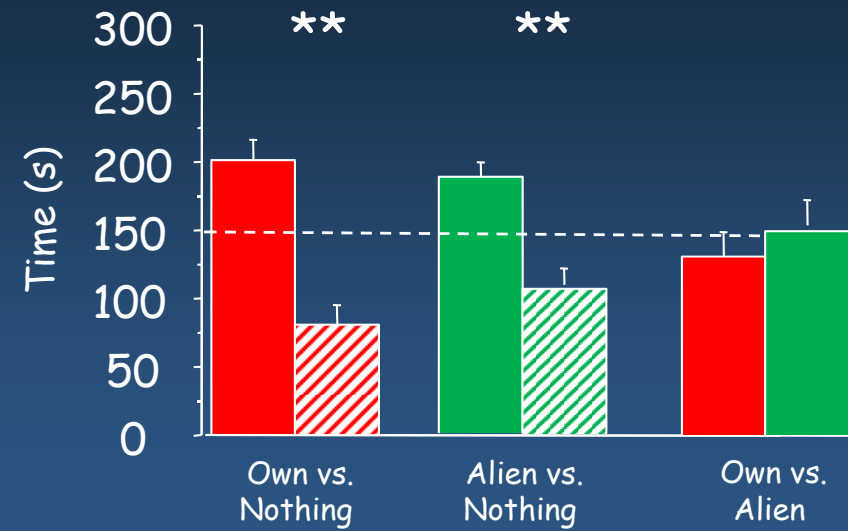
Own Mother
Alien Mother

Nothing
Nothing

Sibling Recognition



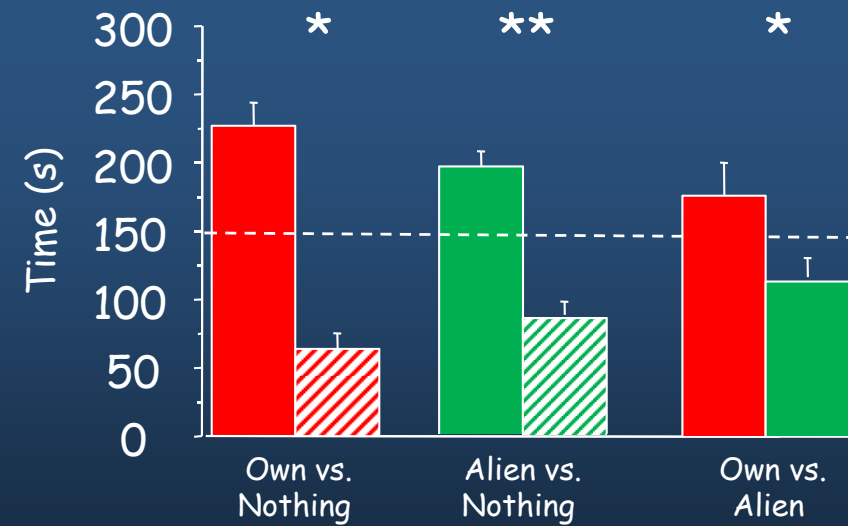
Own Alien



Nest Recognition

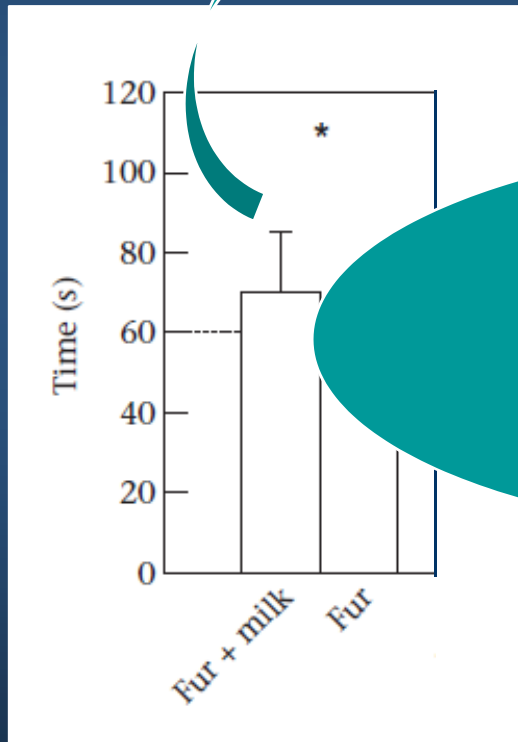


Own Alien

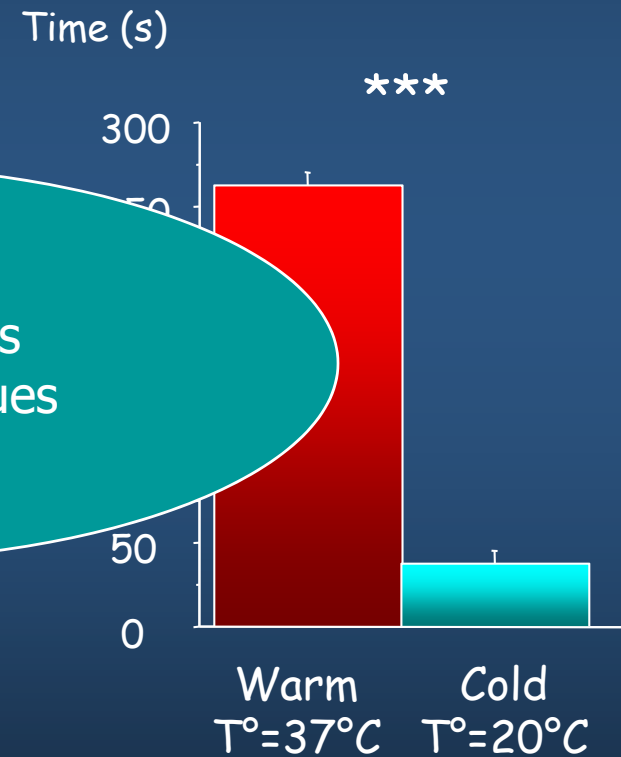


What maternal cues attract young rabbits ?

Mammary pheromone
(2 Methylbut-2-enal)



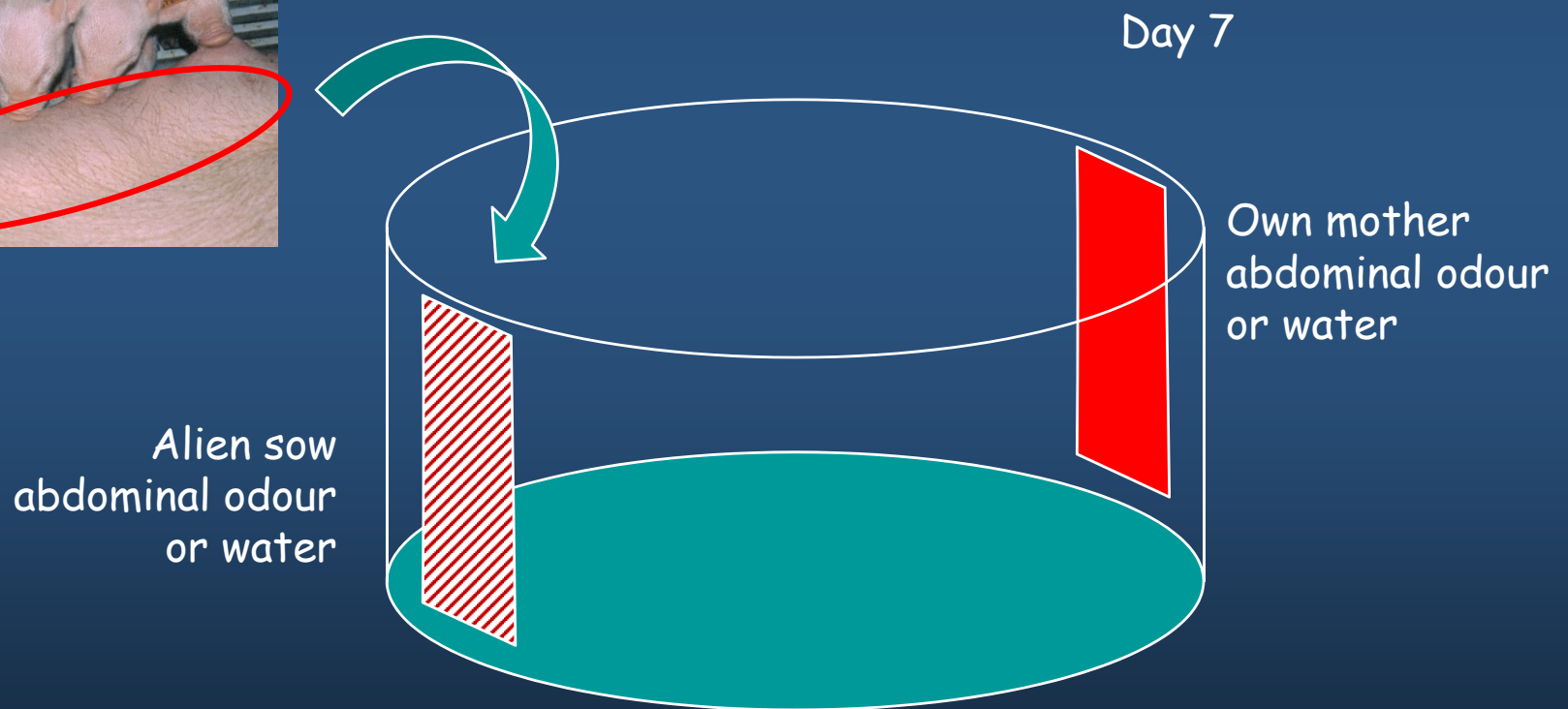
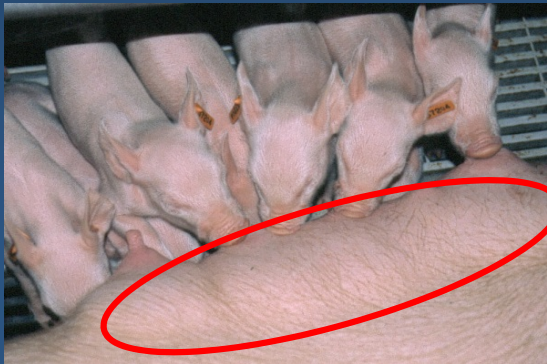
Warm vs. Cold compartment



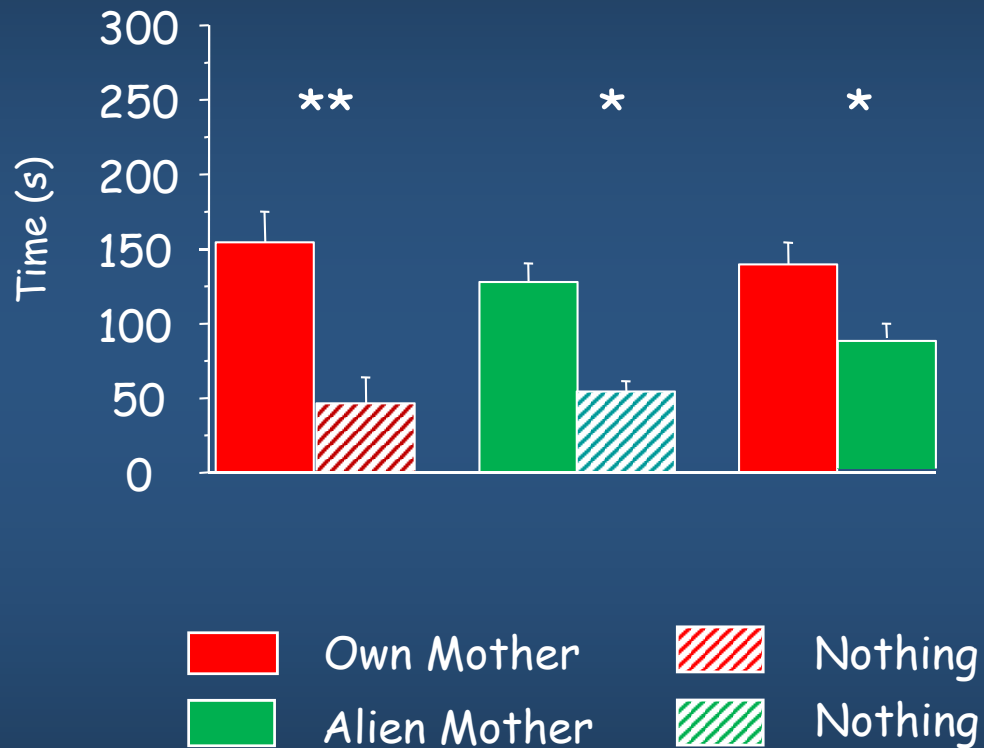
Attraction towards supra individual cues

The PIGLET

Preference for the mother



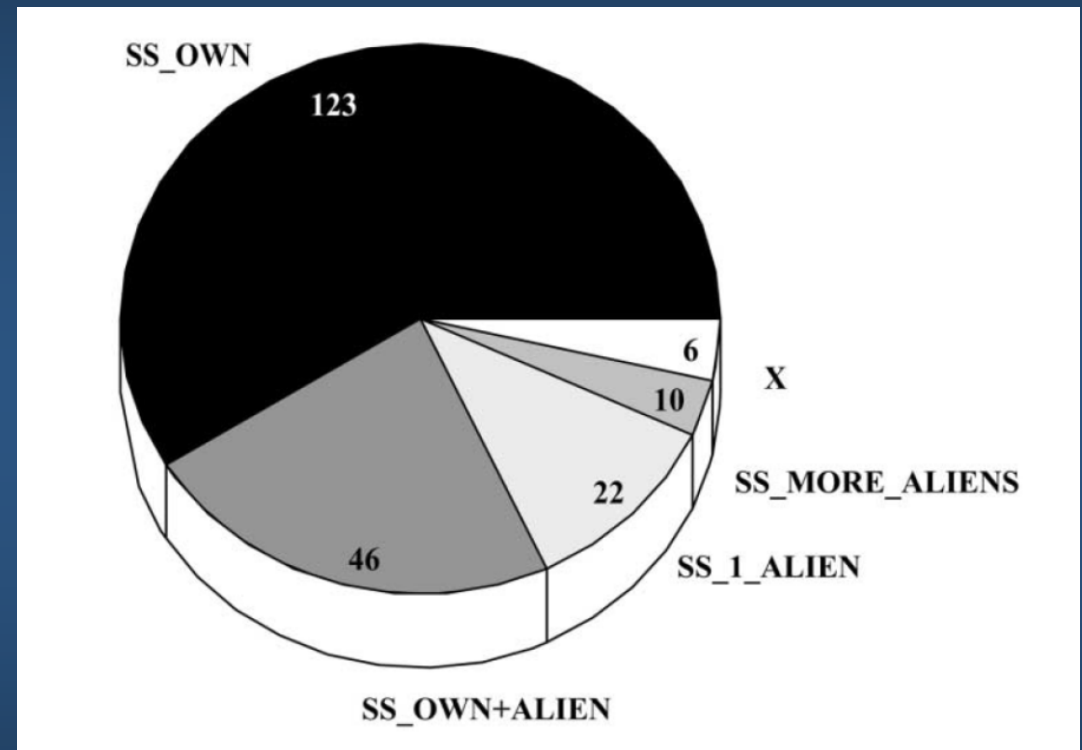
Day 7



- Recognition of sow's voice : Horrell & Hodgson (1984) ; Shillito-Walser (1986)
- Preference for home environment, own mother, own mother's faeces, but not siblings : Horrel & Eaton (1984)
- Fostering induces temporary distress : Horrel (1982) ; Horrell & Hodgson (1986)
- However, cross-suckling does exist : Olsen et al. (1998) ; Maletinska & Spinka (2001)



Cross-suckling in 3-5 week-old piglets



The LAMB

Preference for the mother

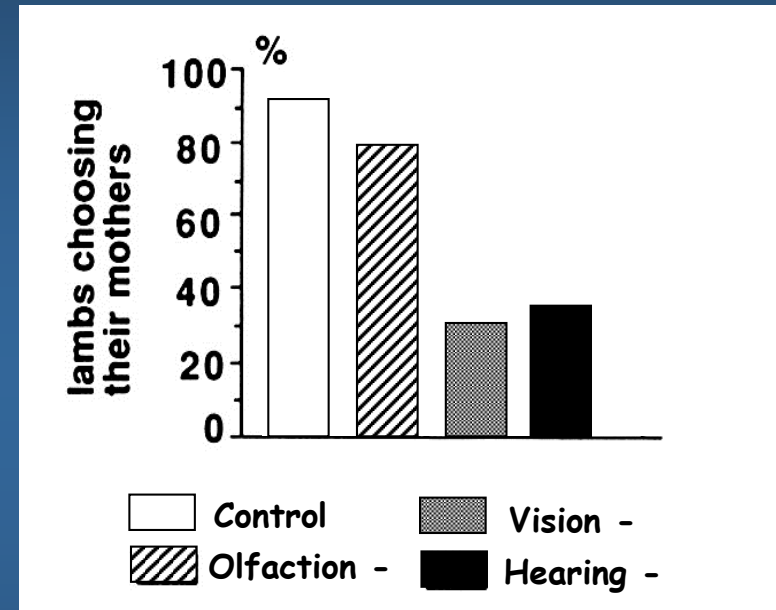
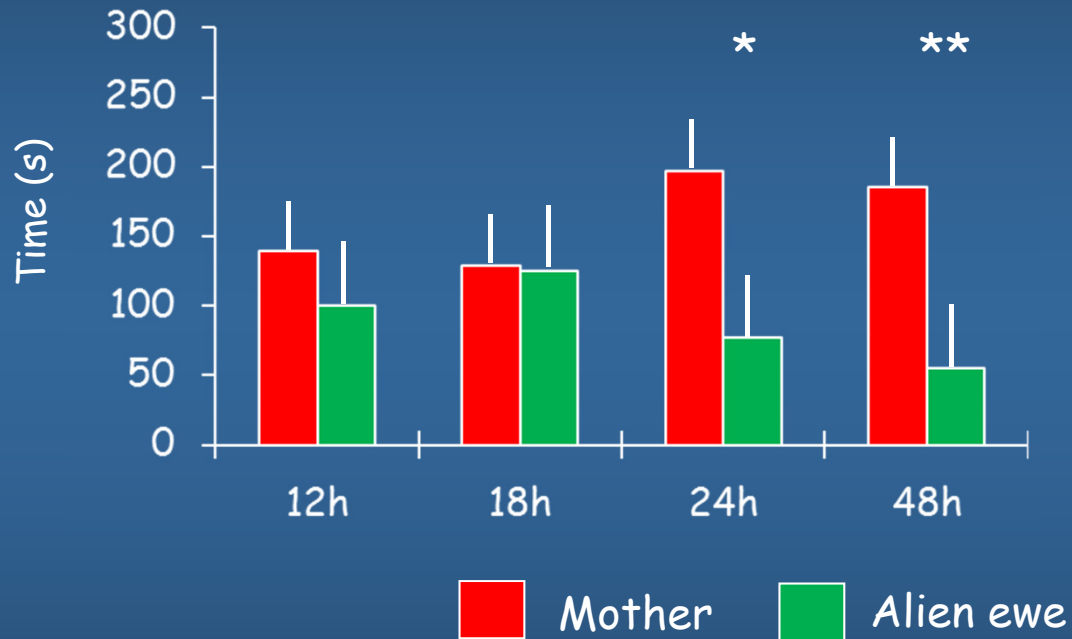


Isolation - Reunion - Separation



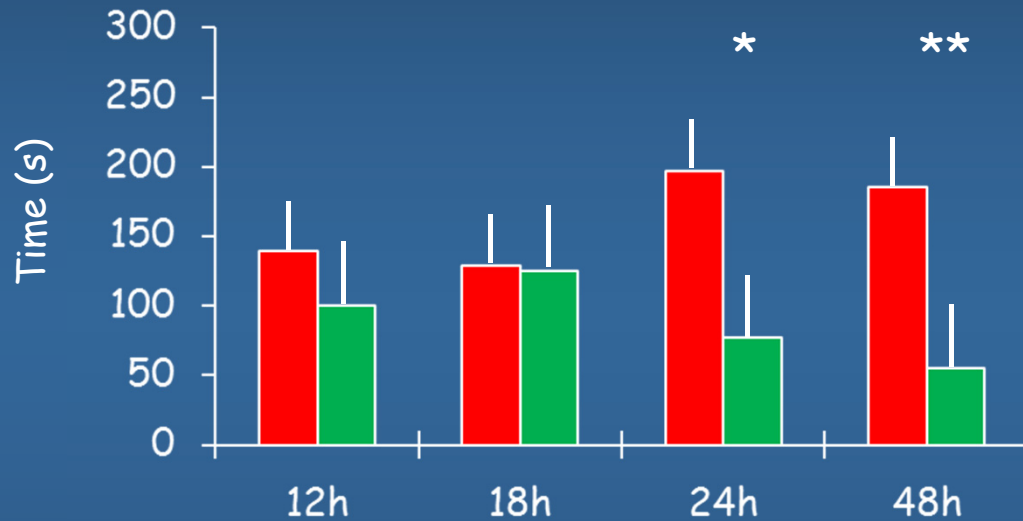
THE LAMB

Preference for the mother



THE LAMB

Preference for the mother



■ Mother ■ Alien ewe ■ Familiar ewe

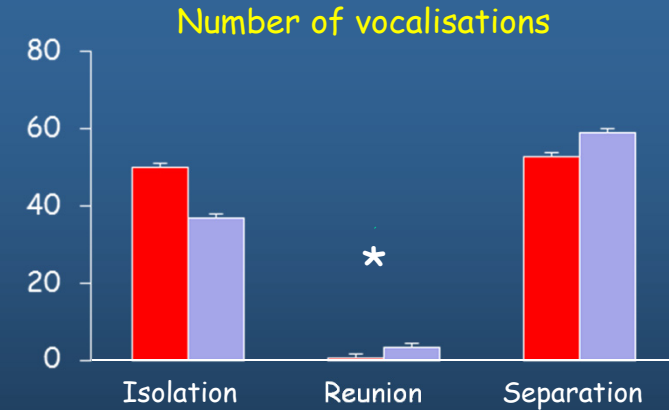
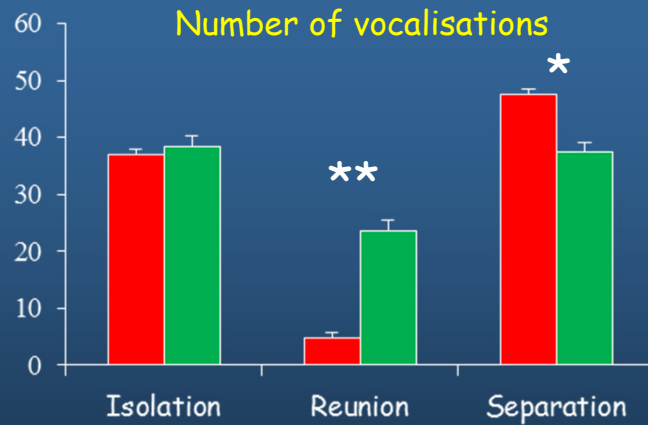
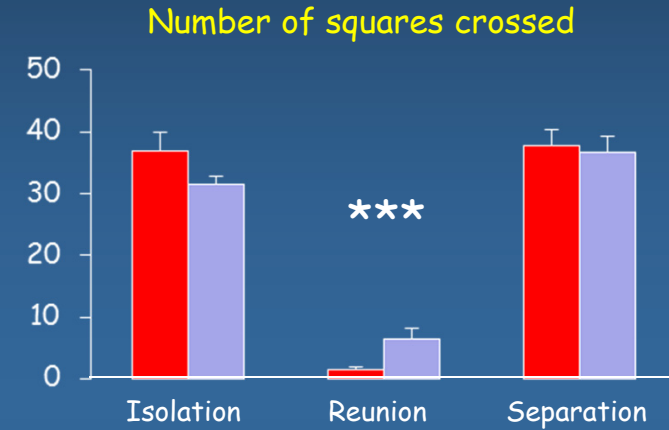
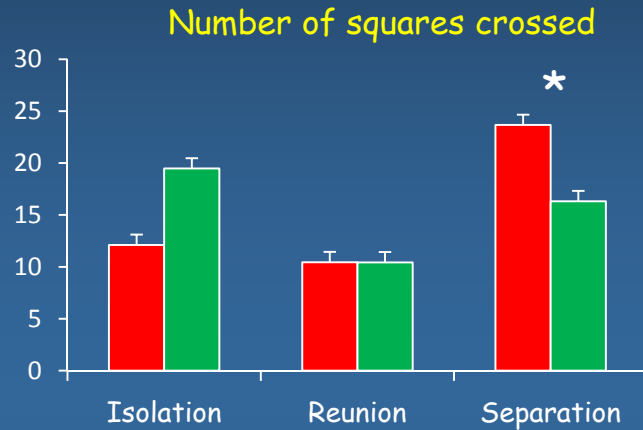
Recognition of the mother

→ 24 h after birth: behavioural cues

→ 48-72 h after birth: vocal cues

THE LAMB

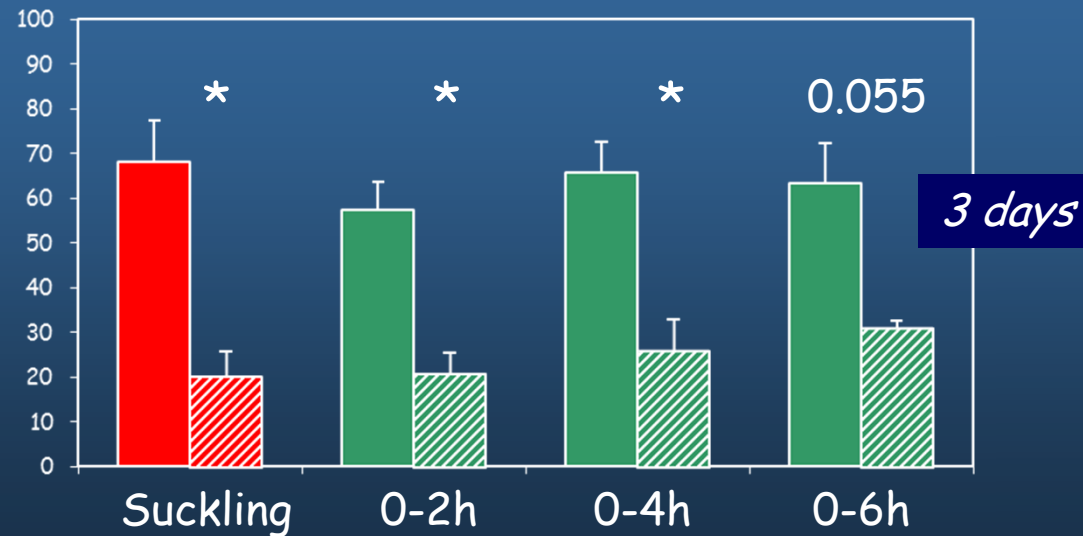
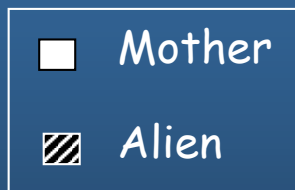
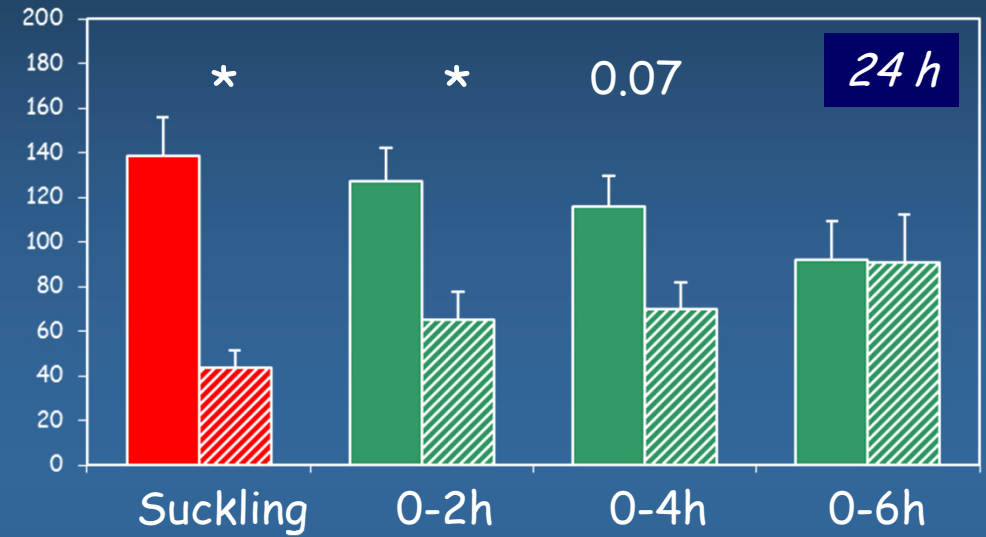
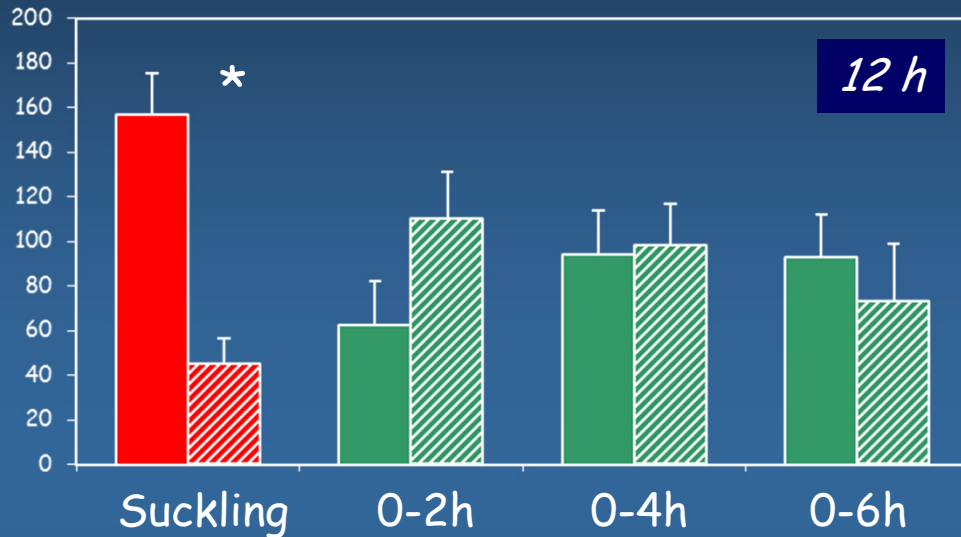
Behaviour during isolation-reunion-separation



Own Mother Alien Mother Familiar Mother

Preference for the mother : importance of suckling

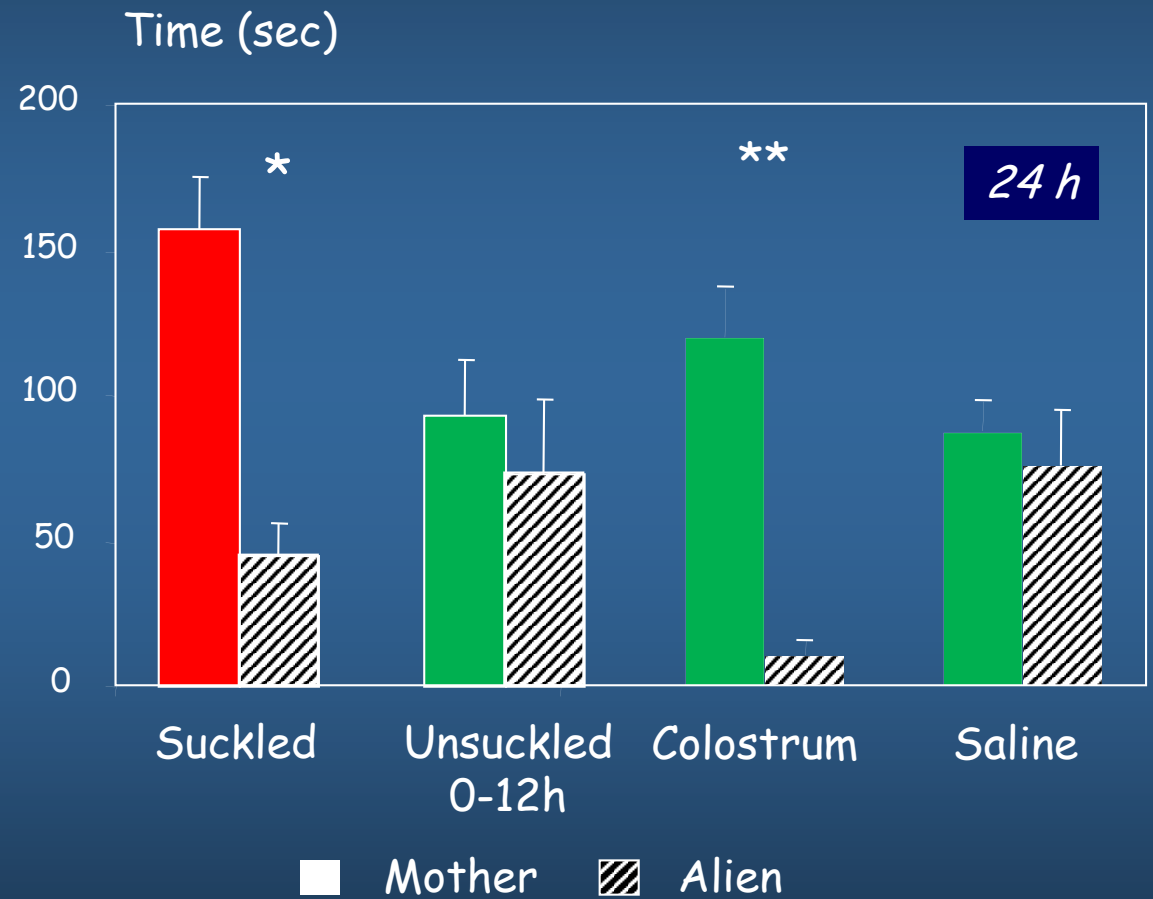
Time (sec)



Preference for the mother : importance of colostrum



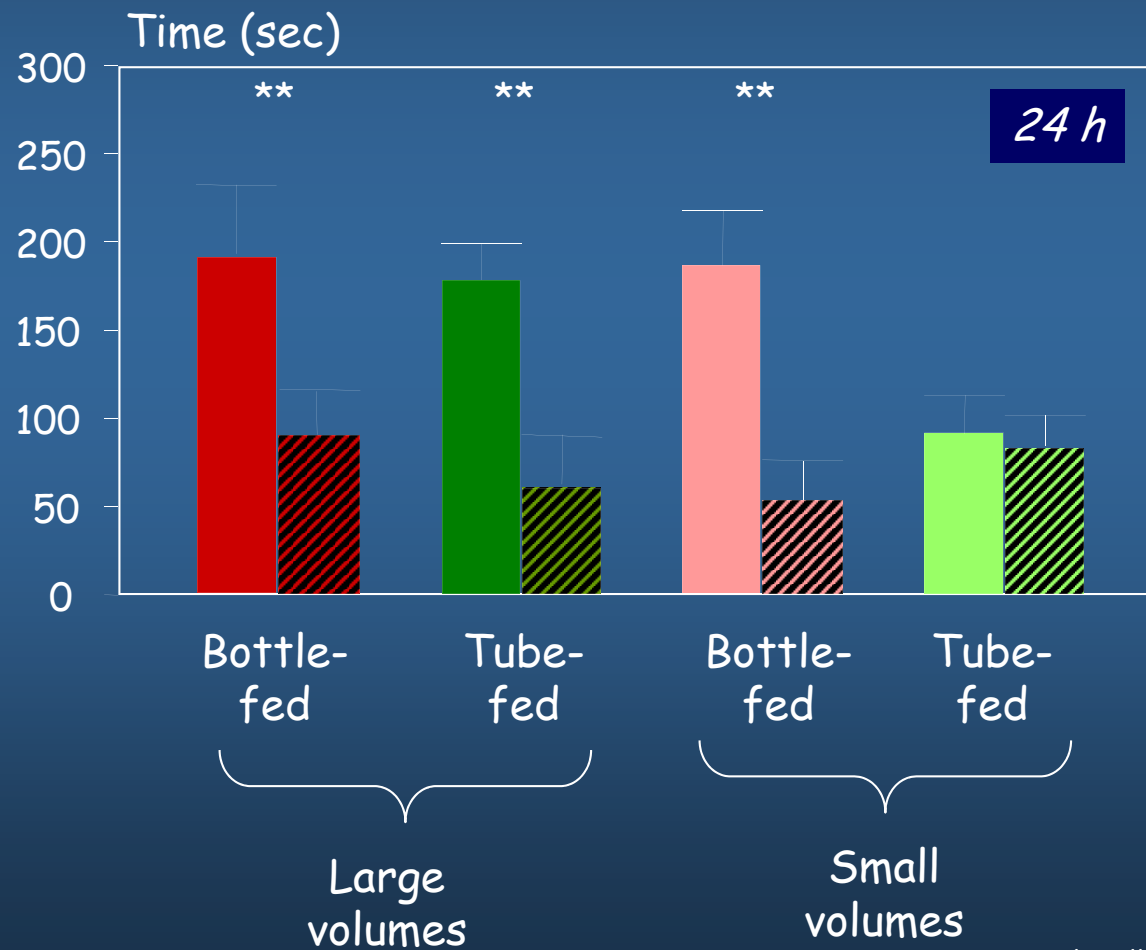
Infusion
of colostrum



Preference for the mother : importance of non nutritive factors



■ Mother ▨ Alien



- Non-nutritive sucking facilitates the development of a preference for the mother
- as well as colostrum and gastric distension



MAIN CONCLUSIONS

Altricial



- Mother : no discrimination of own litter while in the nest
- Pups : attraction to supra individual cues
- Out of the nest: colony odours but no individual recognition

Semi-Altricial



- Mother : recognition of own nest/litter odours while in the nest
- Piglets : recognition of mother but cross-suckling possible
- Out of the nest: mutual recognition but no selective bond

Precocial



- Mother : selective nursing within hours after parturition
- Lambs : preference for the mother within the first day after birth
- Rapid mutual recognition and long lasting mother-young bond



Giving birth in an **isolated** nest to a **numerous litter** of **altricial** or **semi-altricial neonates** : no selective care but recognition of nest location and defence of nest, no preferential relationship between mother and young, opportunistic young



Gregariousness, **synchronised parturition** in a flock, **precocial neonates** and the possibility of **mixing young** :
Selective maternal care and strong infant-mother bond

Applied Ethology

Altricial



- Finding milk (1 nursing episode/day) :
Cross-fostering possible on farm

Semi-Altricial



- Finding milk (teat-order, competition at udder) :
Cross-fostering and opportunistic cross-suckling possible on farm

Precocial



- Finding the right mother (selective maternal care) :
Cross-fostering impossible except at parturition,
development of artificial-feeding systems
- Under extensive conditions, losing the mother = death



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Thank you for your attention



Many thanks to :

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... and more

