

MATERNAL BEHAVIOR IN ANIMALS

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SUMMARY

Maternal behavior is that behavior exhibited by mothers towards their young which is presumed to aid the young in their survival growth and development, both physically and behaviorally. Maternal behavior is a characteristic of mammals that the females suckle their young from specially developed mammary glands, which produce milk sufficiently nutrition to sustain the young during the early stage of life. It is therefore, appropriate to restrict the term "maternal behavior" to females and to use the general heading "parental behavior" when considering other animals (birds like pigeons) .Maternal behavior has two phases: 1) general motivation to approach and nurse a neonate and 2) specific identification of the neonate as one's own.

General maternal behavior is triggered by the events of parturition especially the fall in estrogen and progesterone and the appearance of a foal - like creature - small, wet, uncoordinated, with a foreshortened face and a high pitched neigh. Signaling a critical period during which the odor of the neonate encountered will be

learned . Subsequently all other neonates will be rejected. The sense she uses is probably not from the main olfactory system, but from the vomeronasal organ. In sheep, blockage of the entrance to the vomeronasal organ results in promiscuous ewes who will allow lambs other than their own to suckle . The same is probably true of horses .

CONTROL OF MATERNAL BEHAVIOUR

Genetic

Recently several genes have been identified as important in maternal behavior in mice. A null mutation of the prolactin receptor gene produces a defect in maternal behavior in mice as well as deficits in learning . The Mest gene , has been identified as important in maternal behavior because deletion of the gene in mice resulted in lack of maternal behavior and lack of placentophagia, a normal component of maternal behavior in the mouse. The paternally imprinted Peg3 gene also causes aberrant maternal behavior in the daughters . Deficiency of the normal estrogen receptor gene function led to poor

mouse pup retrieval and cannibalism . Examination of the canine and feline genomes and comparison of the genes of rejecting and non-rejecting dogs and cats might be worthwhile (LeFebvre et al., 1998).

Hormonal

The physiology of maternal behavior involves: Vaginal-cervical stimulation, as a result of the passage of the puppy through the birth canal, causes oxytocin release via spinal afferents with neural connections to the hypothalamus. oxytocin stimulates the release of monoamines which in turn initiates a sensitive period during which the bitch will identify the smell of the puppies as her own. The period during which a bitch will form a bond with a specific puppy is probably less than 24 hours. Apparently, a drop in estrogen and progesterone, an increase in oxytocin (and

possibly prolactin), cervical stimulation and the presence of a small creature with a foreshortened face and wet with amniotic fluid are all factors involved in maternal behavior (Afonso et al., 2009 and Todeschin et al.,2009).

Experiential

Puppy rejection usually occurs in primiparous bitches indicating that experience with being a mother at least once seems to be very important. Multiple rejection episodes are rare, possibly because owners do not breed a bitch a second time who has refused to nurse her puppies. Rejection of kittens is rare in either primi parous or multi-parous queens. Occasionally rejection can escalate to cannibalism (Barber and Crowell-Davis 1994).

COMPONENTS OF MATERNAL BEHAVIOUR

(1) Pre-parturient behaviour

In Mares and ewes: When the time of parturition is 24-48 hours away the female will often show signs of restlessness and as the time of parturition approaches, there are some sings of pains as evidence by the tendency of some females to kick at the flank or roll. Approaching lambing, ewes are more vigilant, more wary and graze less. The ground is pawed frequently with high vocalization. Pregnant females, attempt to find a quite, sheltered place to give birth away from other females and human disturbance. **In**

dogs , cats and rabbits Licking of the genital and abdominal areas; about 12-24 hour before labour starts. Scratching of the substation , alternating with squatting posture resembling the defecator crouch of normal females. Nest building is quite variable among individuals and usually is not very pronounced. Bedding for kitting or whelping are often provided by the owners (Deag et al., 1988) . Female rabbit plucks hair from her body (neck, thigh, abdomen and back) a few days before parturition to line a nest that has been previously constructed of grass or sticks. The parturient

females usually become restless increased amount of vocalization, respiratory rate and loss appetite.

(II) parturient maternal behaviour

The first stage of labour:

Contraction, is when the animal does a great deal of straining. This is sometimes accompanied by urination and defecation. Usually, the female will be lying down during most of parturition or may alternate between lying down and standing. At the end of this stage, water bag or allanto-chorion is ruptured, releasing a straw colored fluid.

The second stage of labour

The most intense straining occur, with intensive vocalization and arching of back. The delivery of fetus follows next (delivery phase). Cow and ewes normally get to their feet after the sever contraction which push the newborn's head and shoulders through the birth canal, when this happens the newborn drops to the ground. In canines, once the newborn has passed through the birth canal the mother rapidly consumes the fetal membranes and begins licking the newborn vigorously to stimulate respiration.

The third stage of labour

Eating placenta (Placentophagy): is almost, but not quite, universal among mammalian species. This behaviour is absent in all human cultures and it does not occur in aquatic mammals or

marsupials. In mares and she camels it is doubtful, if they eat placenta. In cow and ewe, the placenta is eaten soon after it is expelled. The function of placentophagia remains unknown (Virga and Houpt, 2000).

III. Post- parturient behaviour:

Dams normally stand within second of giving birth and turn to face the newborn. The parturient dam is physiologically and behaviorally ready to accept young. The newborn puppies, kittens and pups can't see hear or move about very well, but their olfactory and thermal receptive systems are well developed. By the end the first week after birth all young can find their way to the nest by olfaction.

1. Maternal imprinting and grooming:

The parturient dam learns the smell, taste, voice and appearance of the young. So begins to reject alien's immediately after birth and accept her own young. This type of learning called " imprinting ". It is usually rapid, stable and irreversible, occur in definite and very brief critical period (immediately few hours after birth), in this period the dam maximally sensitive to the emanating from the young (odors, call, shape and taste). The dam's attachment to the newborn initiated during parturition and strengthened in the early hours after birth . If the period is passed without this bond is formed, imprinting not occurs and the dam reject her own young. At birth young are covered with birth fluids which elicit licking . In dogs and cats,

the mother spend the first three weeks of life in licking and grooming each newborn. Much of this grooming is directed toward the an genital region (**Rheingold 1963**), which evokes urination and defecation, urine and fecal material are consumed by the mother, in this way the nest is kept clean. .

2. Udder searching (nipple exploration):

All mammalian newborn have nipple exploratory movement (i.e. nuzzling patterns) which they exhibit immediately after birth. In precocial

3. Suckling of young:

Once the newborn has established contact with an underline, odour, texture and temperature probably serve to guide it. Contact with the face of the young stimulates it to push its head up and forward. Contact with the lips causes it to open its mouth and protrude the tongue. Contact with its tongue causes the young to curl the tongue into the suckling position. This series of innate responses brings the young to the mother, then to the udder, then to the teat and finally to suckle the teat. Cattle tend to nurse the least frequently of domestic animals and have prolonged episodes. Sheep, horses and swine tend to nurse hourly in episodes of a minute or less.

young, the nuzzling movement is usually up and down head butting against the udder. The mother often facilitates the approach of its young to the udder by her tendency lick it and adjust herself. Nipple exploratory movement, texture (tactile cues) as well as olfactory cues may help young locate their mother and their mammary glands. The newborn dogs and cats are dependent on olfactory cues for nipple location. Saliva appears to play in important role in this process because often a mother arouses young by licking their faces (**Rheingold 1963**). .

4. Retrieving behaviour:

Retrieving behaviour in polytocus species appears in response to the general stimulus of young located outside the nest. Female grapes each young usually with the incisors and at the madders region and transport them back to the nest. This behavior is at its peak about one week after parturition. Bitches usually retrieve the puppies not by picking them up, but by licking the pup's head. The pup will orient toward the bitch and in effect, follow her tongue (**Rheingold 1963**). Queens are much more likely to pick up their kittens by the scruff of the neck and carry them, but if the owner tries to move the queen and kittens from the site of parturition, the queen may carry each kitten back to the original place with its amniotic fluid odors.

Abnormal maternal behaviour

These cases indicate that there can be failure of maternal behavior if one or more of the genetic, hormonal or offspring related factors are missing. Conversely, maternal behavior can often be elicited by only one or two of those factors. Causes of abnormal maternal behavior in horses are unknown. Lack of experience, hormonal imbalance, stress during parturition or lack of contact with the foal during the sensitive period for bond formation may be factors (Houpt et al., 1993). The importance of the retained placenta in this case is unclear.

Foal Rejection

Foal rejection can take several forms. In the mildest form, the mare accepts and licks the foal, but will not allow it to nurse. In another form, the mare will have nothing to do with the foal and may kick it if it approaches too closely, Boyd L. (1986). The most severe form is the mare who attacks the foal, attempts to bite its neck and throws it. All of these forms of rejection are most likely to occur in primiparous mares, an indication that maternal experience is important. Of the 135 cases of foal rejection reported, 70 (52%) were Arabian, 24 were Quarterhorses, and 14 were Thoroughbreds. Most (101) of the mares were primiparous. Rejection occurred immediately after parturition by 95 mares, 12 hours after

parturition by 11, and 24 hours after parturition by 14. Ten foals were killed or died as a result of rejection (Houpt and Lieb, 1994).

Maternal Cannibalism

A Persian cat was donated after she had killed her last two litters. She was three years old and had had four litters. The first two litters were raised normally, but she had killed all of her last two litters. She was suspected of killing two kittens of her mother's latest litter. She delivered six kittens and appeared to be cleaning and nursing them normally. Eight hours later she delivered a seventh, live kitten that she killed. She then began to consume its head. Hereafter (Schneirla et al., 1963). Although the kittens suckled and she produced some milk, the kittens failed to thrive and died over the course of 10 days despite some supplemental feeding.

Maternal aggression

Some aggression by the queen toward her puppies is normal, especially after the second week when they begin to initiate contact with her. Aggression can take the form of growling, snapping, catching the kitten's head in her mouth and shaking it or pouncing on it. When her second litter was born she licked them and allowed them to suckle, but if a kitten crawled over her, she would bite it. She killed several kittens before the owner intervened. In this case the solution was to muzzle the cat so that she could not bite (Deag et al., 1988).

Excessive Maternal Behavior

The case involved a two-cat household. One cat had a litter of four kittens. Coincidentally, the second cat had just been spayed (within 24 h of the kittens' birth). The second cat had been the socially dominant one in the household. When the kittens were born, the spayed cat lured them

away. She would groom the kittens by licking them on the head until they would move from their mother's side to hers. She would allow them to suckle, but, of course, did not produce enough milk. Her teats were elongated and slightly hyperemic. The solution was simple: the queen and her kittens were kept in a separate room to which the spayed female did not have access

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