Buffalo Sexual and Maternal Behaviour

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Introduction
The reproductive behaviour is the behaviour of animals plays an important role in reproduction, affecting both the success of mating and survival of the young (Hafez, 1992). Behavioural patterns associated with courtship and copulation, birth, maternal care, and suckling attempts of the newborn have a dramatic quality that has attracted students of mammalian behaviour (Phillips, 1993).

The world population of buffaloes is more than 150 million animals (Sajunja, 2000). In many countries, the domestic water buffalo (Bubalus bubalis), are important farm animals, since they are used for meat and milk production as well as a draught animal (Odyuo et al., 1995). Despite being fed low quality roughage and often housed in back-yard systems, the buffaloes yield rather high quantities of energy rich milk with high content of fat and protein. Milk production from buffaloes is of economic significant, especially in some of the developing countries (Qureshi et al., 2000a).

The domestic buffaloes (Bubalus bubalis), have been broadly classified into the swamp and river type. The swamp buffalo (2n= 48 chromosomes), is the draught animal in the rice fields of the eastern half of Asia. The river buffalo (2n= 50 chromosomes) is the dairy animal in countries extending from India and Pakistan and Egypt (Jainudeen and Hafez, 1992b). The African buffalo comes in two forms, different enough to be classified as separate species; they are the largely unstudied red buffalo (S.C. nanus) and the other, more familiar black buffalo (S.C. caffer,) is the savanna form (Estes, 1992).

To exploite the full production potential of the buffalo, emphasis to now being given to rearing this animal in organised farms under intensive conditions. This changes from tradional to intensive forms of management may cause behavioural problems (Odyuo et al., 1995). Although useful information on the behaviour of cattle in many conditions is available, such information is almost non-existent for buffaloes. It is only during the last few years that scientists have been studying reproductive physiology and pathology in buffalo. The progressive advancement in scientific research in buffalo reproduction seems promising in relation to quick improvement of the breed (Verma and Kherde, 1995).

1. Sexual behaviour
Sexual behviour of males and females, stimuli eliciting male sexual behaviours, sex drive (libido), patterns of female sexual behaviour and intensity of oestrous have been reviewed (Mloszewski, 1983; Estes, 1992; Hafez, 1992; Jainudeen and Hafez, 1992 a&b; Gordon, 1996; Albright...
Various patterns of courtship, display, motor activities and postures are directed to bring the male and female gametes together to ensure fertilization, pregnancy, and propagation of the species (Hafez, 1992). The encounter of sexual partner is the first step occurs largely under the influence of pre-existing social structure and the territorial or home range behaviour of males and females (Mloszewski, 1983).

The behavioral interactions leading to copulation can be divided into four major phases; identification of the physiologic state of these partners; the sequence of behavioural interaction resulting in the adoption of the mating posture by the female; and the mounting reaction of the male leading to copulation (Gordon, 1996).

I.1. Male sexual behaviour

Male sexual behaviour in buffaloes is similar to, but less intense than that in cattle bull. Libido is suppressed during the hotter period of the day, particularly in the swamp buffalo (Janudeen and Hafez, 1992b). Normal copulation encompasses sequence of the following behavioural elements, courtship, erection and protrusion, mounting, intromission, ejaculatory thrust and ejaculation, and dismounting. Each of the element in the sequence has certain unique characteristics (Hafez, 1992).

I.1.1. Pre copulatory behaviour (courtship):-

Courtship is more evident in open range rather than under the restricted conditions on smaller farms (Jainudeen, 1986). The experienced buffalo bull detects the pro-oestrous cow two days before oestrus and remains in her general vicinity. This activity is termed "Guarding behaviour" which is defined as, a cow coming into oestrus is closely guarded by a bull who attempts to keep other bulls (low in social rank) at a distance; but cows often prove evasive, thereby attracting the attention of other bulls and leading to a series of displacements by males successively high rank. The most dominant bull in the herd is usually in attendance (Estes, 1992). Nudging can be seen in courtship, it prompt the female to more forward (Vale et al., 1990), nudging by the male subjects and provides reciprocal stimulation and once mating has occurred, nudging will be stooped. Nosing the prenium and hind quarters of the females is a rather bull activity. Nudging and nosing activities called "prompting behaviour" (Gordon, 1996). Bull regularly monitor females in oestrus, and can prompts them to urinate by licking, nosing of the vulva and perineum; in response to prompting, cow in heat starts to urinate. At this time, the bull may take one or two sips of urine and may also lick the vulva (Pathak, 1992).simultaneously the bull starts some soft penile movements and protrudes few centimeters of penis.

Tending behaviour is a common sexual behaviour displayed by buffalo bull during precopulatory period (courtship). It means that, the bull maintains close bodily contact and associates with female in oestrus while being near her (Estes, 1992), and both sexes contribute to this temporary bond, thereby facilitating repeated mating and ensuring optimum condition of fertilization. If she does not bolt, he mounts and a receptive cow stands still with tail arched. Tending male may lose interest, other bulls that visually recognize the tending behaviour may come up and replace the first animal (Mloszewski, 1983). It is a behaviour often shown by the male while consorting with the female before and during oestrus.

Sniffing and licking the female's genitalia are the most frequent patterns, suggesting an important function of chemical communication through olfaction. The male smells the female's urine which contains phermones (Fraser and Broom, 1990). Also there is a tactile stimulation is made by
nuzzling and licking the perineal region of the female. Bull may sniff the grass on which the female may have lain or urinate. The early response of the bull to the oestrus scent is “Flehmen” which is widespread and prominent in ungulate, including buffaloes (Houpt et al., 1993). This behaviour consists of a forward extended neck and muzzle, the upper lip curled up exposing the gums and teeth (Hafez, 1992) with constricted nares (Gordon, 1996) or closed nasal apertures (Sule et al., 2001). The head is elevated (Jainudeen and Hafez, 1992b).

This noticeable flehmen behaviour appears to be related to chemo-sensory evaluation by the vomeronasal (Jacobason’s) organ which is an additional olfactory receiver and connected into the roof of the mouth and nasal cavity and is instrumental in eliciting a reflex act which is expressed in the flehmen phenomenon (Estes, 1992). Flehmen is also performed by males in response to urine from other males or to the male’s own urine; when bulls approach each other at pasture, they may threaten each other. Novel odours from inorganic compounds or clothing from handlers will occasionally elicit the flehmen response (Albright and Arave, 1997). Flehmen is rarely performed by female cows during sexual encounters with males, however, buffalo cows will perform flehmen when sniffing other cows that are either in oestrus or pro-oestrus. It may also be performed by females towards the birth fluids of newborn animals (Gordon, 1996). A tending bull tests the cow’s readiness to stand and be served by licking and sniffing, then when the female becomes well established as one approaching oestrus, the “chin-resting behaviour” becomes more frequent (Hill, 1990). Chin-resting behaviour often appears before mounting as the bull positions himself behind the cow and raises his head, so that his chin and throat are in contact with the cow’s rump. Oestrous cows respond to chin-resting pressure by standing to be mounted. The female either moves away from under his chin, which rests on her rump, or stands, but without leaning into the male (Mloszewski, 1983). Chin resting can also be observed between males as a form of dominance or appeasement gesture (Vale, 1990).

1.1.2. Copulatory behaviour

1.1.2.1. Mounting: In the presence of prooestrous female, the bull attempts several mounts (unsuccessful); the penis becomes partially erected and protrudes from the prepuce. During this activity, the bull excretes dribblings of accessory fluid, derived from the Cowper’s gland and differing from the seminal plasma emitted from the vesicular glands during ejaculation (Hafez, 1992). The female buffalo in oestrus becomes very scent and attracts the bull. The male tends the oestrous cow and rests his chin on the female “chinning behaviour”, and she in turn responds by “standing”. The buffalo bull mounts her as in bull; i.e. the withers above the female’s pelvis, fixes his forelegs around the female’s back, grasps her firmly and perform rhythmic pelvic thrusts (Mloszewski, 1983).

In mounting, the bull quickly shifts his weight to the hind legs, lifts his shoulder and forelegs off the ground and straddles the cow near the middle of her back. The force of muscular contractions during mounting is so strong that the bull’s hind legs are often lifted completely off the ground (Albright and Arave, 1997). The sexual releaser for mounting may be the overall shape of the female and her immobility. The other visual, olfactory, or acoustic information from the oestrous female may be of minor but complementary importance (Gupta et al., 1994). The copulatory mounting lasts only some tens of seconds in buffaloes (Pathak, 1992).

1.1.2.2. Intromission. At mounting, the abdominal muscles of the bull, particularly the rectus abdominis muscles, contract suddenly. As a result, the pelvic region of the bull is quickly brought into direct apposition to the external genitalia of the cow (Hafez, 1992). Intromission is performed quickly, the ejaculatory thrust is given with maximum vigour and semen is ejaculated.
1.1.2.3. Ejaculation and dismounting:
After intromission, the ejaculatory thrust is quick, and semen is ejaculated as a single violent rush intra-vaginally near the os-cervix (Barkawi et al., 1993). In buffalo bulls, an intense generalized muscular contraction takes place at ejaculation (Albright and Arave, 1997). After ejaculation, the abdominal muscles then relax and the bull dismounts slowly; the penis is soon retracted into the prepuce (Hafez, 1992).

1.1.3. Post-copulatory behaviour.
This period called “refractory period”. Most animals show no sexual activity immediately following copulation. The duration of the refractory period is highly variable and increases gradually when several copulations are allowed successively with the same female (Houpt et al., 1993). Following ejaculation and dismounting, buffalo bulls show a refractory period, which is a state of sexual exhaustion. This state is not principally a physical one, however, it refers mainly to the loss of stimulus by the female. A quick return to mounting behaviour is shown by males when they are given an opportunity to mate a new oestrous female (Hafez, 1992).

In a study by Mloszewski (1983), noticed that, after the male has dismounted, he usually continues to tend the female buffalo and mounts her again, perhaps in 10 minutes or so but the interval and the number of mountings vary with the male. The frequency of copulation varies with the species, the breed, the ratio of males and females, available space, and nature of sexual stimuli (Albright and Arave, 1997). Some bulls have been observed to copulate over 80 times within 24 hours or 60 times within 6 hours with an average of 21 copulations before exhaustion was observed (Gordon, 1996).

General factors affecting male sexual behaviour.
1. Neural mechanism
Erection is under the influence of the parasympathetic system. The parasympathetic nerves in the bull which supply the external genitalia arise from the sacral segments of the spinal cord. The copulatory patterns of male are primarily governed by the neuromuscular anatomy and blood supply of the penis. The bull has a fibroelastic penis that is relatively small in diameter and rigid when non-erect while it becomes more rigid on rapid erection. Visual and tactile clues elicit sexual desire of bull. Intromission and ejaculation are elicited by tactile stimuli (Warmth of vagina and slipperiness of mucus) acting on the penile receptors. The penis of bull is sensitive to temperature.

2. Genetic factors:
Breed and strain differences in libido are frequently observed. Males of dairy breeds are more active than beef males. More differences in the patterns of sexual behavior occurs between pairs of identical twin bulls.

3. Environmental factors:
A- Effect of novelty of stimulus females (Collidgo effect):
Sexual activity of the male increases when new females in the herd becomes receptive. Changing the teaser cow is an effective way to increase sexual behaviour of a sluggish male.

B-Non-specific stimuli:
Non-specific external stimuli may lead to sexual activity in males of low libido. Changing the place of semen collection by moving the teaser animal or encouraging the bull are all effective in sluggish bulls.
C-Presence of other animals:
The presence of other animals while teasing a female or copulating improves sexual libido of the male. When several males compete for one receptive cow, the dominant male performs most of the copulations and restricts the sexual performance of the subordinates. When females are in excess, however, dominant male can not effectively control the activity of their inferiors.

3. Seasonal effect:
The intensity of sexual behaviour is reduced in hot climates. Any physical troubles may seriously affect sexual expression.

4. Effect of experience:
The efficiency of copulation of males and females is improved by experience. Social deprivation during infancy drastically impairs adult sexual behaviour. Individual contacts before puberty can have an organizing effect on subsequent sexual performance. Young, inexperienced males are usually awkward during their first contact with a receptive female; they approach hesitantly, spend a long time exploring the genitalia, mount with erection, and ejaculation is weak.

5. Watching another male copulate enhance sexual desire in the spectator when he is subsequently allowed to copulate.

1.2. Female sexual behaviour

1.2.1. Breeding season.
Buffaloes like cattle, are polyoestrous and breed throughout the year (El-Dessouky, 1992 and Jainudeen and Hafez, 1992a). However, seasonal calving patterns have been reported in many countries (Estes, 1992 and Gordon, 1996), which are attributable to ambient temperature, photoperiods, and food supplies (Qureshi et al., 1999a and b). High ambient temperature in the summer may depress the libido of the male buffalo and this may contribute to the seasonility patterns of the reproduction in female buffalo (Estes, 1992).

1.2.2. Puberty and Maturity.
The buffalo cows reach puberty at a later age than cattle. Bulls can complete establishment of spermatogenesis by 4 month of age in contrast to the 24 months in buffalo bulls (Gordon, 1996). It is believed that the male buffalo generally reaches puberty at 2-3 years of age (Fischer and Bodhipaksha, 1992), and found that puberty of swamp buffalo bull is likely to arrive at an earlier age (less than 24 months). The male puberty is hard to define whereas it is easy in the female, the first oestrus is precise. The river type of buffaloes exhibit first oestrus (puberty) earlier (15 to 18 months) than the swamp type (21 to 24 months) (Jainudeen and Hafez, 1992a). In Egypt, 80% of river buffalo heifers reach puberty at less than 17 month of age with a range in body weight between 260 and 290 kg (Barkawi et al., 1993). Most information indicates that the buffalo, both males and females, are sexually mature at the age of 3-4 years (Fischer and Bodhipaksha, 1992 and Gordon, 1996). Other study (Kazimi, 1983), revealed that, the female buffalo is first used for breeding at the average age of 3.76 years in Indonesia or occurs at an average body weight of 250 to 275 kg, which is usually attained at 24 to 36 months of age (Jainudeen and Hafez, 1992a). Female buffalo calves first about 5 years old (Estes, 1992).

1.2.3. Oestrus and oestrus behaviour:

1.2.3.1. Duration of oestrus.
The length of oestrus cycle in buffaloes is about 21 days, with range of 18-26 days, while the duration of oestrus (heat) has usually been given as varying from 12 to 30 h (Gordon, 1996). The oestrus cycle was determined to have a duration of 22.1± 2.9 days by Kazimi (1983); 21.3 days by Ullah and Usmani (1985); 20 day by (Qureshi et al., 1999c); and 21.5 days by Vale (1990)
and oestrus (heat) was observed to last for 32 h by Kazimi (1983) and 41.6 by Vale (1990).
Ovulation as in cattle, occurs 15 to 18 h after the end of oestrus period or about 35 to 45 h after
the onset of oestrus (Jainudeen and Hafez, 1992a). Ovulation has been also recorded by some
authors (Swain and Bhatnagar, 1983 and Danell et al., 1984) as occurring at 11-17 h after the
end of oestrus in swamp buffaloes. Others have recorded ovulation occurring in Indian buffaloes
at 15 to 18 h after oestrus (Tailor et al., 1990 and Hill et al., 1992). Hafez (1992) concluded that,
the duration of oestrus and ovulation time are influenced by species, breed, climate, and
management and added that, oestrus is limited in buffalo cows to about a day.
1.2.3.2. Estrus pattern (time).
Oestrus commences toward late evening with peak sexual activity between 6.000 P.M. and 6.000
A.M (Jainudeen and Hafez, 1992a). Diurnal oestrus behaviour is common in buffalo and the
majority breeds in the cooler hours of morning and evening, and sometimes during night (Pathak,
1992). On the other hand, more animals have been reported to be in heat at daylight than at night.
However, this is still controversial and needs more definite proof (Fischer and Bodhipaksha,
1992). Mating continues until late morning in the river buffaloes but usually ceases during
daylight hours in the swamp buffaloes (Tailor et al., 1990). Other (Barkawi et al., 1993), proved
that, copulation many take place at any time throughout the day.
1.2.3.3. Behavioural changes during oestrus:
Overt signs of oestrus in buffaloes are less intense than in cattle (Jainudeen and Hafez, 1992a).
Acceptance of the bull is the most reliable sign of oestrus in the buffalo (Gordon, 1996). Less
than a third of buffaloes in oestrus is detected by homosexual behaviour (Vale et al., 1990). Cow
in oestrus may become restless and walk excessively (Hafez, 1992), so that eating and resting
behaviours are disrupted. Upon approaching standing heat, the cow may stand close to other cows
exhibiting chin-resting over the rumps of the other cows while trying to make mounting attempts
(Albright and Arave, 1997).
Mounting behaviour in oestrous cows means that, a tendency for female to mount those that are in
oestrus. Since cow-cow mounting is an accurate sign that, the time is right for taking the cow
being mounted to be bred, one hypothesis to explain cow-cow mounting (Hafez, 1992) is that it is
a signaling device attracting bulls to the estrous cow. Increasing the occurrence of this behaviour
stimulate sexual behaviour in bulls, however, in large herds with no bulls present. The cows them
selves are usually seen in small groups around the oestrous cows which stand to be ridden by the
others. Those groups are defined as sexually active group (SAGs).
In the presence of male, the female in oestrus sniffs at his perineum or scrotal region. Mutual
sniffing leads both animals to circling motions in a reverse parallel position. Buffalo cows when
approached and stimulated by the bull assumes a mating posture as the female stands immobile,
and the male mounts and ejaculates (Hafez, 1992). Cows tend to mount or to be mounted by other
females (El-Dessouky, 1992).
Mudgal (1992), stated that, frequent urination in oestrous buffaloes was the most reliable
symptoms of oestrus in river buffaloes. It is reliable, cheap, and practical method for use to detect
heat by the farmers as, (1) this occurs in all seasons during standing heat; (2) is easily detected by
farmers; (3) does not occur during the proestrus period; (4) helps to locate many cows in heat
during summer when all other symptoms are absent or feeble; (5) occurs even in very weak heat
when ovulation occurs very late; and (6) is also very handy to locate postpartum heat. He added
also that, mucous discharge is not reliable in buffaloes for the following reasons; (1) a thin glossy
and continuous flow of mucus also occurs at other periods; (2) it is seen during heat as well as
during pro-oestrus; and (3) consistency differs. Mucus discharge may be treated as a supporting
criterion to locate an animal in heat. Animals can be in heat without exhibiting mucous discharge or bellowing (Jainudeen and Hafez, 1992a). Controversial, Gordon (1996), reported that, symptoms such as swollen vulva, mucous discharge and increased frequency of urination are not regarded as reliable signs of oestrus in buffaloes. There may be mud on the side of oestrous cow and flanks, saliva on her back and a crystal clear mucus running from her vagina onto her tail or to the ground. Also hair is rubbed off or ruffled on the tailhead (Srivastav and Kharche, 1985). Heat symptoms in the swamp buffalo have rarely been observed. Ullah and Usmani (1985) noted that, the behaviour and characteristic of the female buffaloes in heat have been noticed to be similar to those of cattle but seem to be more difficult to detect. Gordon, (1996), stated that, in cases of doubt, rectal palpation was helpful for confirmation of heat. If the buffalo is in heat, the manual palpation will not only revealed the status of the ovaries and uterus, but at the same time will stimulate contraction of the uterus; consequently the heat mucus if present, is expressed and is visible at the vulva.

1.2.4. Gestation length. Buffaloes have a gestation period about one month longer than that of cattle (Hafez, 1992). According to Usmani et al. (1987), the gestation length in 92% of buffaloes ranged over a 30-day period more than in cattle. Fischer and Bodhipaksha (1992) reported that, the pregnancy period is varying from 305 to 320 days for the river buffalo and from 320 to 340 days for the swamp buffaloes. An average of 315 days for gestation length was quoted for Nili-Ravi buffaloes by Dutt et al. (1991). Gestation period was found to be significantly affected by sire of calf and the season of conception in a study by Chaudhry (1990) in Nili-Ravi buffaloes in pakistan. Twins are rare in buffaloes and their occurrence is less than 1 per 1000 births (Tulloch, 1992).

2. Abnormal sexual behaviour

2.1. Male.

2.1.1. Inability to copulate (Impotence). Physical disabilities may impede or prevent mating by causing failure in copulatory behaviour i.e., mounting, intromission, or ejaculation.

2.1.1.1. Impotence to mount: It is defined by Houpt (1991) as a loss of libido and consider as a clinical problem. Inability to mount is a common disorder encountered in older buffalo bulls. It is associated with locomotor dysfunction or musculo-skeletal diseases such as fractures, sprains, and oesteo-arthritis lesions of the hind limbs causing the bulls to become lame and hesitant to mount (Jainudeen and Hafez, 1992b). Obese bulls can be difficult to arouse sexually, so that the diet is closely controlled. Some bulls become unwilling to mount when placed on slippery floors, bulls trained to mount another males as practised in artificial insemination may lose interest and refuse to mount. This inhibition may be overcome by changing the sexual stimulus to a new steer or bull (Houpt et al., 1993) or restraining the bull from the teaser animal or allowing him to watch other bulls may sexually arouse him (Vale et al., 1990).

2.1.1.2. Failure to achieve intromission or ejaculation This is a condition in which the penis fails to enter the vagina. It may result from insufficient protrusion of the penis from the sheath or deviation of the penis. Another serious cause of inability to protrude the penis is haematoma of the penis as a result of rupture of the corpus cavernousum of the penis (Houpt et al., 1993). It commonly occurs in bulls during coitus when
the penis is thrust against the perineum of the cow. Abnormal venous drainage of the corpus cavernosum in the bull could result in a penis is too flaccid for intromission despite good libido (Fraser and Broom, 1990). Tumor of the glans penis may occasionally prevent protrusion of the penis. Affected bulls are reluctant to serve or are incapable of achieving intromission. A series of pelvic thrusts may occur after a rectal intromission, but the penis is most often withdrawn without ejaculation. Abortive ejaculations may occur if the female refuses the intromission or the penis fails to penetrate the vulva (Hafez, 1992).

2.1.2. Buller-steer syndrome:
Male cattle or buffaloes "riders" in intensive housing are prone to mount herdmates willing to stand to be mounted "bullers". It occurred mainly in fedlot herds. The buller may be ridden to the point of exhaustion or even death by the herdmates. Separating the buller from the group is the only corrective measure with a sure result (Badawey et al., 1972 and Houpt, 1991).

2.1.3. Homosexuality.
It refers to sexual behaviour among males, particularly at puberty and when young males are housed together. The stimuli eliciting the male's sexual response are essentially visual. The homo-sexual males in sex-aggregated groups become heterosexual when placed with females and again homosexual when segregated (Hafez, 1992).

2.1.4. Hyper-.and hypo-sexuality.
In males the hyper-sexuality consists of increased sexual excitement, increased frequency of copulation and attempted copulations with young males and females of the same or different species. While the hypo-sexuality is characterized by abnormalities in the ejaculatory pattern. Certain males may fail to ejaculate in spite of protrusion or erection of penis; whereas, others can not mount or exhibit no sexual desire for varying periods of time (Houpt et al., 1993).

2.1.5. Auto-.erotic behaviour.
It refers to self-aurosal of sexual response, which is called "masturbation (Houpt, 1991) in males and it is most common among bulls on high protein ration. All bulls masturbate, especially at the times of inactivity. Since all domestic animals have been observed to masturbate it would be difficult to consider this as abnormal behaviour. The bull performs pelvic thrusts, with arched back and a partially erected penis which moves in-and out of the sheath until ejaculation occurs.

2.2. Female
2.2.1. Silent heat (Quiescent oestrus)
Silent heat is the failure to indicate the signs of oestrus even though the reproductive tract is at the height of influence by oestrogen and follicular stimulating hormone (FSH) and ovulation is imminent (Hafez, 1992). It is also called "silent ovulation" (Albright and Arave, 1997), or quiet ovulation (Jainudeen and Hafez, 1992a) and defined as the occurrence of ovulation without overt oestrus signs. Silent heat is the condition of suboestrus in buffaloes and occurs when corpus luteum is present in one of the ovaries in the absence of visible signs of oestrus (Gordon, 1996). It is a continuing reproductive problem in dairy buffalo herds, but another cow or bull may be able to detect this condition in cow assumed that she has had a silent heat. The problem is to determine whether it is truly ovulation without showing oestrus, a problem of inadequate human observation of the oestrous cow or the cow has not ovulated.

In a study of 500 oestrous dairy buffalo cows by Mudgal (1992), 19% were silent heats and 15% false heats (oestrus behaviour without ovulation or luteinization). The intensity of heat in river buffaloes has been classified as normal, medium, and weak. Almost half of the breeding buffaloes
show weak or silent oestrus and the incidence of silent heat is responsible for more than 80% of recorded long oestrus cycles (El-Kaschab, 1994). This problem occurs in all farm animals, particularly young animals and those on a submaintenance. ration (Madan, 1988).

It is suspected when the interval between two consecutive oestrus periods is double or triple the normal length (Jainudeen and Hafez, 1992a). Cows with luteal cysts typically react behaviourally as cows in the luteal phase of the oestrus cycle and are anoestrus (Pathak, 1992). Anoestrus of follicular or Luteal cystic cows is not silent oestrus. Silent heat may be attributed to several factors. Cows may be in oestrus outside the observation period of person assigned the task of oestrus detection. Cows confined to concrete, slats or generally places of unsure footing are reluctant to show oestrus.

The oestrus behaviour ceases during heavy rain or snowfalls. Extreme cold or heat will result in much diminished sexual activity. Submissive cows may avoid mounting dominant cows in oestrus (Pathak, 1992). A good number of buffaloes remain unbred during summer month because of silent heat. Poor expression of heat or even completely silent oestrus has been attributed to the low profile of gonadotrophic hormones or disturbance in the ratio of certain micro-minerals (Mudgal, 1992). Maximum concentration of FSH and lowest concentration of LH are indicative of the peak breeding period.

Proper heat detection is the key factor that influences post-partum conception and calving intervals. In buffaloes, improving oestrus detection method in problem herds is likely to identify cows previously evaluated as being in silent heat. A combination of methods is better than relying on an single approach to oestrus detection (Gordon, 1996). An evaluation of three methods of oestrus detection in water buffaloes is provided by Alonso et al. (1992), the most successful method involved exposure to a vasectomized bull and twice daily observation of the buffalo cows. There is significant confusion regarding methods to estimate the efficiency and accuracy of oestrus detection. Generally agreed that detection is about 50% in most dairy buffalo cows. As dairy herds increase in size, the problem of poor oestrus detection will be greater because the human input per cow will decrease.

Albright and Arave (1992) summerized the methods used for heat detection as, visual observations, uses of teaser or vasectomized bulls fitted with a marking harness; training dogs to sniff out cows in oestrus; progesterone levels in the milk (Qureshi et al; 2000a); painting the tail and rump each day and noting when the paint is scuffed off after riding, androgenized females i.e. cows treated with androgen (male hormone); pedometers to measure the distance walked which indicate that, the use of activity monitors may be effective in improving reproductive performance; and automatic detection can be added through three major approaches in this process; these approaches designed to monitor, 1- changes in the physical activity as walking distance (pedometery), 2- changes in the electrical resistance of the reproductive tract tissues (impedance monitoring); and 3- pressure to the tailhead region accompanying standing to be mounted. All may be electrically coupled to a personal computer for analysis. The efficiency of such oestrus detection aids may, however, be reduced because of wallowing habits of the buffalo.

2.2.2. Nymphomania
It is also called "bulling" (Albright and Arave, 1997). It is a follicular cystic ovary disease of cattle and buffaloes (Gordon, 1996). It is a condition characterized by female cows reacting like
males, the cause of the condition is usually an ovarian cyst that produces excessive estrogens for a prolonged period of time (Kreul, 1991). It has a higher occurrence in dairy than in beef herds probably due to the more intensive housing and management of dairy buffaloes. Milk production can drop noticeably because these cows are often high producers. Most cases occur within 3-8 weeks post-partum coinciding with development of the first follicle following calving. Ovulation fails and in the absence of adequate lutinizing hormone, several follicles may grow to form multiple cysts (Qiu Huai and Leo Jung, 1995). Affected cow acts like bulls, they become more like bulls vocally and in body confirmation. Each cow actively seeks out other cows and mounts them, but does not stand for other cows (Houpt, 1991).

Nymphomaniac cows show continuous intense oestrus behaviour for long times (Qureshi et al., 1998). Affected cow may show frequent, intermittent oestrus, stand for mounting, and aggressively pursue monosexual "bulling" behaviour as pawing the ground, bellowing, attempting to mount herd mates (Edwards, 1995). Masculinization of the head and neck and a prominent tailhead are characteristic of the chronically nymphomaniac cow. Manual rupture of the cyst is one of the oldest treatments, though it has risks of haemorrhage and scar tissue formation. Veterinary treatment using a source of leutinizing hormone such as pituitary extracts or chronic gonadotrophin (HCG) or gonadotrophic releasing hormone (GnRH) can be successful (Houpt, 1991).

2.2. 3. Post-partum anoestrus

The resumption of oestrus cyclicity after calving, an important factor in obtaining a satisfactory reproductive performance, remains an important problem for the buffalo (Gordon, 1996). It is a condition of ovarian inactivity occurs during lactation in many mammalian species, including the buffalo. It is reported as affecting 30-40% of lactating buffaloes and persist until the calves are weaned naturally or otherwise separated from their dams. For that reason, anoestrus is more common in suckled (Suthar and Kavani, 1992). Anoestrus in buffaloes has been classified as either "pre-service" or "post-service". Pre-service anoestrus refers to the absence of observed oestrus in the immediate postpartum period while the post-service anoestrus defined as the absence of observed oestrus after an unsuccessful insemination. Jainudeen (1984), attributed the anoestrus to the maintenance of the corpus luteum of the previous pregnancy or the persistence of the corpus luteum of the first postpartum oestrus cycle which may be non-ovulatory in some proportion (19%) of Mehsani buffaloes.

The possible underlying reasons for anoestrus may be physiopathological in origin or they may be due to management practices (Janakirman, 1988). Physiopathological factors include lactation, suckling, nutrition, infections, hormonal imbalance, parity, and breed of the animal. The managerial factors is mainly the in adequate oestrus detection. Barkawi et al., (1993) found that, oestrus behaviour was more pronounced in the cold season than in the hot season. As noted by several authors (Janakirman, 1987; Suthar and Kavani, 1992; and Gordon, 1996), an excessively long postpartum interval in this species (buffaloes) results in substantial economic losses, as well as, creating managerial problems.

2.2. 4. Mounting Humans

Sexually active cows may lose their inhibitions toward humans and attempt to mount other cows. Adult cow or heifers in oestrus and young bulls after puberty are most likely candidates for such
aberrant behaviour. Caution should be taken when walking among groups of loose-housed buffalo cows (El-Kaschab, 1994).

2.2.5. Delayed puberty
Delayed puberty is one of the reproductive problems in buffaloes. Even though the animals achieve the desired chronological age of puberty as well as the normal weight, oestrus does not occur. Gupta et al., (1994) reported that, in India, the average age at first calving was given as 45.8 months. The effect of cooling and concentrate feeding on the occurrence of puberty in heifer buffaloes in the tropics was found to be capable of reducing the age of first oestrus by up to 9 months (Hill, 1990). Provision of shade, water cooling or a wallow led to a decrease in body temperature which is beneficial effects on their fertility (Das and Roy, 1991 and Das et al., 2000).

3. Maternal behaviour
The behavioural events at birth and shortly afterward have an important influence on the survival of the newborn and hence on the successful outcome of reproductive processes. This is especially true when the initial suckling and development of a bond between mother and young occur in all conditions even in close confinement (Hafez, 1992).

Some standard practices interfere with the formation of the maternal bond between dam and offspring. Early separation of newlyborn young from the mother induces modifications in the behaviour of young animals (Houwing et al., 1990 and Illmann and Spinka, 1993).

3.1. pre-parturient behaviour
The external signs of approaching parturition in buffaloes are similar to those in cattle (Gordon, 1996). Certain changes in the morphology and behaviour of pregnant buffalo cow approaching parturition provide sufficient ground for isolating it in a calving pen and observing calving (Pathak, 1992 and Gordon, 1996). A day or two before calving, the cow may become restless and keep to a small isolated area, which she defends against other cows (Hafez, 1992). Restlessness is the most frequently observed behavioural change when parturition is imminent in buffalo cows, and it has been described as increased walking, increased mobility, getting up and lying down, pawing the ground (Lidfors et al., 1994), Licking flanks and switching the tail (Jainudeen and Hafez, 1992 a).

Pathak (1992) found that, the percentage of time resting in semi-lateral recumbancy increased and standing and ruminating decreased during the last 12 h before parturition. Also increase the frequency of vocalization is an obvious sign of approaching parturition in buffalo cow (Alam and Ghosh, 1993). Enlargement of the udder begins about 30 days before calving. Studies on the calving behaviour in buffaloes have been reported by Andрабi and Gill (1993), udder and teats distension occurred 2.4 and 1.8 days before calving, respectively.

Visible preparturient changes of the vulva (Hyperaemia and oedematous swelling) starts on average 22 days (range 7-80 days) before parturition in swamp buffaloes (Hafez, 1992). Cervical discharge is only visible for 14 days pre-partum, its consistency is viscous and of a white muddy colour in the beginning, but immediately before birth, the mucus increases and becomes clear and stringy with a thread-like viscous consistency (Fischer and Bodhipaksha, 1992). The animal
becomes restless and anxious with dilated pupils at the onset of parturition (Pandey et al., 1984).

Between several hours and two days before calving, a loosening of the sacro-sciatic ligament is to be clearly perceived, resulting in raising the root of the tail and the appearance of flank hollow with a tense and hanging abdomen (Shalash and Tulloch, 1990). The cow becomes slow and sluggish and the hind limbs are spread due to this relaxation of ligament (Houwing et al., 1990). A staggering gait is observed in some buffalo cows of heavy body size and voluminous udder (Swain and Bhatnagar, 1983). The time from the first signs of calving until parturition is variable and was varied from 14h to 45 min. before birth of the calf (Pathak, 1992).

3.2. Parturient (calving) behaviour
The onset of labour in the standing buffalo cow is marked by extending of the tail of the animal, bending of the hip joint and straddling of the hind legs. In lying position, there is also stretching of the neck and limbs (Fischer and Bodhipashka, 1992). Parturition is completed in Buffalo through the following three stages:-

1. Preparatory (dilation) stage:-
The first stage of calving starts with irregular, intermittent, and uncoordinated contractions of uterine muscles (Tulloch, 1992). When the uterine contraction become intense and regular, the animal attempts to push the foetus out of the uterus. The water bag appears at the vulval lips and subsequently, ruptures and the allantoic fluids flow from the vulva. The foetus and amniotic fluids flow through the cervix and vagina (Hafez, 1992). This stage takes 5-255 min. (Tulloch, 1988) or 20-355 min. (Andrabi and Gill, 1993). Jainudeen and Hafez (1992a) reported that the first stage of labour lasts 1 to 2 hours, being longer in primiparous than in pluriparous buffaloes.

2. Expulsion of foetus stage:
Anterior presentation of the foetus is common (El-kaschab, 1994). After a short period, intensive contractions start and continue in quick succession until the extremities of the fore limbs are pushed out. This is quickly followed by the appearance of muzzle and head of the foetus (Gordon, 1996). In most cases, calving takes place in recumbancy (Pandey et al., 1984). Buffalos rise quickly after the expulsion of the foetus and become restless and anxious until they approach the calf. this stage may take 10-213 min in a normal delivery (Jainudeen, 1984).

3. Expulsion of the placenta (after birth):-
The third stage of calving is completed with the expulsion of the placenta. This may takes from 30 min to more than 8h. in a normal delivery, and should not be allowed to hang for more than 18h (Jainudeen and Hafez, 1992a). Mloszewski (1983) stated that, foetal membranes are expelled normally 4 to 5 hours after delivery of foetus. The placenta is expelled after about 3h 50 min. the average weight of the foetal fluid amounts to 3.5 kg (Fischer and Bodhipaksha, 1992).

The total time required for complete delivery is highly variable and it is affected by breed, health, intensity of labour pain, parity and the environment. Average duration of calving in Murrah and Nili – Ravi buffaloes is about 515 and 276 min, respectively (Pandey et al., 1984). Normal calving is about 65% of buffalo occurs either in sternal or lateral recumbancy, while 35% of delivery while standing (Ahmed et al., 1984). Most births take place in the small hours of the morning, but some occur at other time (Mloszewski, 1983). All calves are born in anterior presentation, dorsal position and posture of full extension of the fore limbs (EL-Kaschab, 1994). In 80% of the observed cases of calving, the buffalo remains in the standing position during the whole parturient phase. In others (Lidfors et al., 1994), birth commences with appearance of the first body parts of the foetus while the cow is in a lying position, However, towards the end of the expulsion stage, the dam rises to a standing position where by the calf drops to the ground. The majority of buffaloes like seclusion for calving and the presence of strangers may cause serious
disturbance and lead to calving problems.

3.3. Post-parturient behaviour

3.3.1. Cow-calf interaction:
Recognition of the young calves is established in buffaloes soon after parturition, and other young may be adopted at that time which termed “critical period” (Gordon, 1996). Continuous contact is important and female may reject her own calf if separated from the dam for more than a few hours immediately after parturition (Houwing et al., 1990). The recognition of calves occurs through the maternal grooming “Licking” (Fraser and Broom, 1990).

The critical period is the time of the animal’s life during which an important behavioural development are be facilitated. Critical period have also been termed “Sensitive Period” (Kent, 1987). During this period, the animal is particularly susceptible to fast learning involving specific cognitive ability. The best example of learning in the critical period is imprinting which is the rapid formation of a permanent close attachment between an animal and a salient environmental objects, such as its mother forming mother – offspring bond. During the critical period, a reciprocal recognition between buffalo cows and their own calves (Usmani et al., 1990).

The critical period is variable in duration, but it is measurable in hours in ruminant species At this period, the mother quickly acquires, or learns the identity of her own calf and thereafter, relates to it like a partially vulnerable extension of hereself (Weary and Chuo, 2000). In contrast, other young’s, even if evidently similar, are rejected, hostile behaviour is exhibited to the alien (Lidfors, 1994).

3.3.2. Behaviour of buffalo cow:-

3.3.2.1. Licking behaviour (Maternal grooming):
Immediately after parturition all buffalo cows stand up and turn to lick their calves taking a particular care to avoid “stepping” on the calf (Hafez, 1992). The cow normally licks her newlyborn calf vigorously begins licking at head and neck, then concentrates on the back, abdomen, tail, and perineal region (Sato et al., 1991). Licking of the calf after birth seems to be important in strengthening the maternal bond between cow and calf (Fraser and Broom, 1990). The mother may “label” her offspring by maternal grooming at this time, thus providing a mechanism for offspring discrimination or recognition (Hafez, 1992). Later, as the newborn mature, the licking is gradually directed to social functions relating to the establishment and maintenance of social bond between mother and young (Gordon, 1996).

Estes (1992) stated that , social grooming or licking is a behaviour trait. That presumably promotes maternal-offspring bonds and social bond among herd members. It should not be confused with the maternal licking that is designed to stimulate hider calves to eliminate wastes as bovine social licking directed mainly to the head and neck (Olsson and keeling, 1998). While maternal licking directed to perineal region of the calf (Qureshi et al., 2000b).

Several functions have been suggested for licking in buffaloes, removal of the foetal fluids , especially from nostrils and mouth of newlyborn calf stimulating respiratory center and breathing (Hafez, 1992). Drying of the coat leading to reduction in bhat loss and chill diseases (Sato et al., 1991). Licking has a hygienic function leading to reduced risk of infection and predation as well as increasing the muscular tone. Licking also activates the lymph and blood circulation of calf as well as stimulate the first standing, urination and defecation of the newlyborn calf through
perineal (no-genital) licking (Krohn, 1994).

2.3.2.2. Eating placenta (placentophagia)
If not prevented, the buffalo cows usually lick the placental fluid of the calf, the bedding materials contaminated with foetal fluids and eats the placenta (Fischer and Bodhipaksha, 1992). This behaviour occurs more frequently in group calved cows (Illmann and Spinka, 1993). The importance of eating placenta is unknown but, it may be recycling of nutrients (Minerals and proteins) or a form of defense against predators by removing odor, or a form of hygiene, when placenta is removed will protect the foetus from secondary infection (Tulloch, 1988), or the placenta is rich in hormones. The farmers often remove the placenta after shedding for fear of digestive troubles.

3.3.3. Behaviour of calf (neonatal behaviour):
3.3.3.1. 1st standing
The calf stood for the first time 15 minutes after birth and started to walk one hour after birth, this is although newborn buffaloes are not as agile as some other domestic bovids (Mloszewski, 1983).

Estes (1992) stated that, birth weight of the buffalo calves average 45 kg and calves have been known to gain their feet within 10 minutes after birth. Yet buffalo calves are too feeble to follow for several hours and remain poorly coordinated and slow runners for several weeks. On the other hand, Hafez (1992). Reported that, most newlyborn calves take at least 45 minutes to stand and may take upward of 4 h to suckle for the first time. Fischer and Bodhipaksha, (1992), stated that, the first attempts to stand up begin about 9.5 ± 8.0 min after birth. The calf is able to stand steady after about 22.0 ± 13 min. Mothers of high maternity help their calves to stand earlier by vigorous licking around the perineum of the calves (Hafez and Jainudeen, 1992a).

3.3.3.2. Teat – seeking (udder searching) behaviour.
Within a few hours after parturition, the buffalo calves begin to show hunger by exploring the mother’s body with muzzle and tongue until a teat is located, the calf readily mouths and sucks any protuberance on the mother’s body (Hafez, 1992). The search for the udder usually starts by buffalo cow from the side but later, calf reaches the udder from behind between the thighs of the dam (Fischer and Bodhipaksha, 1992). The young buffalo calf after standing turns to its mother and first touches the face and dewlap of the mother, it then immediately moves to the udder and starts suckling (Pathak, 1992).

The calf in the lst attempts of suckling was frequently directed to the wrong parts of the dam’s body especially any protuberance as axilla, belly, neck, and groins and few calves misdirected teat-seeking to the underside of the feeding trough (Fraser, and Broom, 1990). The calf may be guided to the udder by its tending to follow the line of underbelly of the cow towards its highest point which is usually the region of the udder. The guides of the calf to find teat. Ware summarized by Fraser and Broom (1990) as follow: 1- The pendulus shape of the udder; 2- The udder tilting (movement of udder), and 3- Thigmotaxis effect, i.e. the slightly high temperature between thighs. The mother seems to help the calf find a teat by positioning her body appropriately that facilitate teat-seeking (maternal postural changes) (Hafez, 1992), and the
includes; 1) rotating her body; 2) abduction of the hind legs or moving forward bringing the udder closer to the calf; and 3) licking, nuzzling and nudging the calf.

As the buffalo calf presses and nudges the mother’s flank and legs with its muzzle, more or less at random, the mother gradually walks forward until the calf is left slightly behind, then halts and allows calf to catch up with her rump. The calf becomes increasingly more aggressive and exploratory in the pursuit of its mother’s rump until it finds a teat. This method of initial presentation of the mammea may explain why young buffalo calf tend to suckle from the rear, between the mother’s hind legs, while domestic calves of genus Bos (cow) suckle mainly from the side (Mloszewski, 1983 and Estes, 1992).

3.3.3. suckling behaviour:
Nursing in buffaloes involves both mother and calf. Reciprocal stimulation (reciprocal nursing), during suckling as the buffalo cow initially helps the calf locate her teats. Sucking by the neonate in turn, likely has a stimulating influence on the mother in that it reduces tension in the udder and enhance milk let down, while the calf suckle, the cow licks the perineal and preputial areas of the calf, stimulating its sucking, first urination, and/or first defecation (Day et al., 19897).

Pathak (1992) stated that, almost all dams, except a few aggressive ones, stand quietly at the time of suckling and caress (nurse) their calves by licking. They may also attempt to stimulate their calves to urinate. Nervous and aggressive buffaloes are restless during sucking and take little interest in caressing the calves. Most of the nervous and aggressive buffaloes also resist the handling of their calves and don’t allow strangers in the vicinity of their calves.

Typically, the buffalo calf stands alongside the mother facing caudally, and this is the normal sucking posture, but occasionally, a calf’s body will be at right angle to teat of the dam (Hafez, 1992). Unlike cattle, buffalo calves nurse between the mother’s hind legs (Estes, 1992). Tail wagging is a behaviour occurs in case of the peaceful suckling which is accompanied frequently by wagging of the tail both of calf and its mother (Gordon, 1996).

The nursing calf assumes a crouched stance with spread legs and shoulders lowered allowing it to bunt upwards at the udder of mother (Packer et al., 1992). This udder bunting behaviour functions in the stimulation of milk let down. Newborn calves normally suckle five to ten times a day with each nursing session lasting up to ten minutes (Nordin and Jaimudeen, 1992). The number of nursing bouts usually decreases with age, but this may vary depending on the rate of growth of the calf and the milk yield of the buffalo cows (Tulloch, 1979).

Suckling occurs most frequently, at dawn, dusk and at the start of grazing. Buffalo cows suckle the single calves about 4 – 6 times daily, while suckle twins more frequently (6 - 8 times daily). The rate of suckling is related to age and size of calf, breed (beef or dairy), method of suckling (nature, nipple or bucket feeding); and persistence of the calf during suckling. Calves with their dams suckle 8-10 min/feeding with a total of 37-56 min/day (Packer et al., 1992). New by born calf begins to suckle within 2 to 5 hours of birth. Paranhos da Costs et al., (1994) suggested the factor affecting 1st suckling in calves, the udder configuration, poor calf vigour especially after difficult calving, the parity of the dam, calving season, abnormal maternal behaviour especially in heifers, group or individual calving, and the success of teat seeking behaviour.
4. Abnormal Maternal behaviour

4.1. Cross-Sucking behaviour in calves
Cross-sucking (Lidfors, 1991 and 1993); inter-sucking (Mloszewski, 1983); non-nutritive sucking (De Passille and Rushen, 1997); Mutual sucking (Wiepkema, 1985) is abnormal maternal behaviour in buffalo calves. When young buffalo calves are raised in groups separated from their mothers in obvious behavioural problem is the cross-sucking (Lidfors et al., 1994). This behaviour is described as a calf sucks the ear, mouth, scrotum, prepuce, penis, tail, udder, and other body parts of the penmates (Lidfors, 1993). Self sucking is rare in buffalo calves (Lidfors, 1991). Calves raised in isolation spent much time licking fittings and this might expressed as a need for exploration and termed as "non-nutritive. Sucking" (De passille et al., 1992). It has not been reported to occur in systems where the buffalo cows and calf were kept together (Hafez, 1992). It is most frequent in bucket-fed calves (De passille et al., 1993), which may indicate that an unsatisfied requirement for sucking activity could be responsible for the cross- sucking behaviour.

Cross-sucking is most frequent shortly after meal and stops once the calves are weaned off milk (Lidfors, 1993). When calves fed milk ad-labium from a bucket, they will suck a dry teat during the meal period (Rushen and De passille, 1995), and will continue to suck of the teat once the milk is finished. It has been demonstrated that, the ingestion of milk plays an important role in stimulating sucking on a dry teat in calves (Rushen and De Passille, 1995), demonstrating that the ingestion of food can stimulate feeding motivation. It has also been suggested that cross-sucking between calves may be stimulated in an analogous way by milk ingestion. Also some stimuli from the calf itself could stimulate the sucking by another calf (De Passille et al., 1997).

The incidence of inter-sucking was significantly less for calves housed in bedded stalls than for those on slatted floors (Lidfors, 1993). The frequency of inter-sucking decreases with time after milk feeding. De passille et al. (1992) showed that, the sucking motivation lasted for less than 10 minutes after drinking milk from a bucket. Another study (Lidfors et al., 1994), revealed that calves fed from nipple pails drank more slowly than those drinking from open-buckets but the incidence of inter-sucking was lower in calves fed from nipple pails. Hafez (1992) reported that, non-nutritional sucking markedly increase in calves fed low-energy, low-protein diets suggesting that it is related to the diet.

Most cross-sucking was directed towards the mouth and ears of other calves; this might be that the mouth and ears were the closest object at hand after the calf had drunk the milk, or that ears and mouth may have had milk on them. Another explanation is that the buffalo calves before purchase were kept in individual crates and they then could have learned to suck mouth and ears of neighboring calves (Lidfors, 1993). Although the non-nutritive sucking is likely to aid the secretion of digestive hormones (De passille et al., 1993), and some non-nutritive sucking is considered as a normal component of nursing by beef buffaloes (Lidfors et al., 1994).

It has been suggested that cross-sucking behaviour can be detrimental to the health of the calves (Lidfors, 1991), since persistent preputial sucking resulted in the loss of hair around the muzzle and cases of poor growth among the sucking calves whereas hair loss of the prepuce occurred among the calves which were sucked (Albright and Arave, 1997); such inter-sucking can occur
very frequently and cause skin irritation. Prolonged sucking of ears resulted in a wet ear which may have then frozen in extremely cold weather (Wiepkema, 1985). Some calves in group-reared systems habitually drink urine from other-calves resulting in liver disorders (Mloszewski, 1983).

Non-nutritive sucking has important consequences, particularly if it continues into adult life. Such activity markedly decrease the dry matter consumption of calves and retard growth. Hair balls commonly occur in the rumen of buffalo calves that exhibit this behaviour (Hafez, 1992), this may attain a size of 3788 g and may be fatal if they block the entrance of the rumen and prevent eructation.

Calves should be taken from their dam as soon as possible after birth and give access to milk or milk replacer via nipple dispenser to help avoid inter-sucking (Albright and Arave, 1997), who also suggested making the calf works harder and longer for his milk, tie up calves for 10 minutes after feeding or separate them after feeding, apply muzzle, put a repellent on ears, teat, and navels of herdmates; or give them access to dry feed following milk feeding to reduce the problem of inter-sucking.

Delaying mixing of calves for at least 4 weeks and offering concentrate feed ad-libitum could lead to reduced cross-sucking (De Passille et al., 1992). Housing calves individually until weaning as practised on many dairy units will essentially eliminate most inter-sucking problems in buffalo calves. Providing calves with a water teat after each milk feed was found to reduce the level of cross-sucking behaviour (Daolio, 2000).

### 4.2. Communal Suckling

Communal suckling (Murphey et al., 1991); Allo-suckling (Paranhos da Costa et al., 2000); cross-suckling (Albright and Arave, 1997); non-offspring nursing (Packer et al., 1992), or allo-nursing (Murphey et al., 1995), is a common abnormal maternal behaviour in buffaloes. If we assume that the mother is the sole source of milk for her own offspring. This is a common assumption for cattle resulting in a partial assessment of the maternal effects on calf performance. In buffaloes, this is not an adequate mean to appraise maternal effects on calf performance (Paranhos da Costa, et al., 2000), because it is common to see the calves, sometimes in group, suckling cows other than their own mother (Tulloch, 1979, and 1988; Murphey et al., 1991; Paranhos da Costa et al., 1994; Murphey et al., 1995 and Paranhos da Costa and Andriolo, 1998).

This behaviour is identified as communal nursing (Murphey et al., 1991), and was described as one adult buffalo cow nursing groups of calves from other females (alien calves. It seems a very costly pattern of allo-parental care, since milk could be subtracted from her own calf and distributed to other calves. Cross-nursing is apparently a behaviour that most calves participate if given the opportunity. This behaviour occurs mainly in group housed buffaloes (Paranhos da Costa et al., 2000). In a study of Murphey et al., (1993), Noted that in 42 cow-calf pairs observed after calving, 93% of the calves cross nursed and 83% of the buffalo cows allowed themselves to be suckled by alien buffalo calves. Communal care and ease of adoption are of an importance in raising farm animals, especially under conditions of substantial loss of young or their parents. It is common knowledge that, water buffalo (Bubalus bubalis) often engage in communal nursing, and that they frequently adopt orphans under free- ranging conditions
This behaviour is defined also as allo-parenting (Bigersson et al., 1991), since it is a contribution to the rearing of another individual's progeny by a conspecific. When allo-nursing does not depend on kinship (Murphey et al., 1993), other proximate factors such as familiarity and proximity, which are often so confounded with kinship as to be indistinguishable from it. Allo-nursing that is unrelated to kinship and occurs without reciprocity among donors suggesting that the behaviour does not depend on individual relationships among the participants except for their being together in the same place, and ordinarily being conspecifics.

The behaviour is described as fostering in mammals (Paranhos da Costa et al., 2000). Increasing attention is now being given to numbers of calves being fostered on nurse cows to feed naturally. When cross-fostering is attempted, the normal procedure has been to present a buffalo cow already in milk, with several young calves, perhaps newlyborn. Recent research on fostering has shown much higher degree of success when the young calves to be fostered are presented to the nurse cow immediately following her parturition, before she has adopted her own calf; but while she is still in the critical period of maternal awareness. At this time such cows readily adopt numbers of fostered calves and continue to facilitate their nursing subsequently, so that these calves grow better.

4.3. Inter-suckling (milk-sucking) in buffalo cows

This behaviour is described as a buffalo cow or bull sucks milk from the udder of lactating cow (Daolio, 2000). The sucking includes withdrawal of milk from the udder, and it is more common in group penned buffaloes, especially in open husbandry system, (Albright and Arave, 1997). Self sucking, although rare, is a vice that occurs in buffaloes (Archarya, 1992). Significant losses in milk yield of the problem cow can result if not corrected. This behaviour negatively affects the social structure of a herd and impacts the health of the mammary gland through pathological changes and deformation of teats and udder (Fischer and Bodhipaksha, 1992). First lactation cows had a much higher incidence of inter-suckling (25.2 vs 4.3%) than multiparous cows (Singh et al., 1985).

Commercial available weaners may help to control inter-suckling and self suckling in buffalo cows. A weaning ring (anti-sucking bit was used, when the cow attempts to suckle another, the appendages on the ring poke udder, causing the victim to kick and avoid the cows would be nurser. Surgical excision of a portion of the ventral lingual mucosa, with or without underlying muscle was judged to be the best of four surgical procedures tried to solve the problem of milk sucking (McCool, 1992). Provision of roughage in the diet is recommended to prevent the inter-suckling between buffalo cows. A final and ultimate solution to this behavioural problem is to cull the offending cow(s) from the herd but this represents, a serious economic problems. Some dairy farmers prevent the problem by penning the buffalo cows in stalls.

4.4. Calf does not suckle

Calves refuse to nurse or suckle from own or alein mothers just after birth. Calves that have gone through the trauma of a difficult birth (dystocia) are more likely than those from a normal birth to refuse sucking (Jainudeen, 1990). Calves of first calf heifers took 5.5 h to nurse following birth while calves of multiparous cows first nursed at 3.3h after birth. Calves who delay nursing are at risk of receiving inadequate colostral antibody protection (McFarland, 1989). Genetic make-up
of the calf may influence nursing ability in buffalo calves (Sule et al., 2001). The head-to-tail alignment of the dam to its newbon, licking off the placental membranes and fluids, are essential components of mother-offspring recognition. Failure by the dam to recognize the calf as her own causes rejection of any advances by the newborn.

Restraining the cow, helping the calf to standing position and to find a teat, squiring a taste of milk into the calf's mouth may get the calf to take the colostrum. If the calf is to be artificially reared, guiding its head to the nipple or assisting it to drink from a bucket by allowing it to sucking fingers while guiding the head downward the milk. Most calves will eventually suckle when assisted in a helpful but persistent way (Hafez, 1992).

4.5. Retained placenta
Retained placenta, or a failure of the foetal membranes to be expelled during the third stage of labour is a common post-part complication in ruminants, particularly in cattle. Retention of placenta in buffalo is less common than in cattle (Shalash and Tulloch, 1990). Retention of the placenta beyond 12 hours in buffalo is considered pathologic and is primarily due to either uterine inertia or an inflammation of the placenta, which in turn results a failure of the foetal villi to detach themselves from the maternal crypts (Rawal and Singh, 1991). The placenta of the buffalo is of the cotyledonary type; convex maternal caruncles fuse with foetal cotyledons to form some 60-90 placentomes which are distributed throughout the gravid and non-gravid uterine horns (Gordon, 1996).

Retained placenta occurs more frequently in dairy than beef breeds (Shalash and Tulloch, 1990). The placental retention rate for 2595 buffaloes in Indian village herds were reported by Rawal and Singh (1991), the incidence of retained placenta was found to be significantly higher in the rainy season (4.35%) than at other times. Andrabi and Gill (1993) showed that, the incidence of retained placenta was much higher in buffaloes in which the young were not allowed to suckle, 22.7 % than when the young were allowed to suckle, 4.9%. it is well known that suckling stimulates the release of oxytocin hormone from the pituitary gland which is essential for expulsion of placenta.

Early parturition, twin pregnancy or a shortened gestation period have frequently been observed associated with retained placenta in buffaloes (Gordon, 1996). Also the lack of progesterone hormone during the last month or so of pregnancy resulted in the occurrence of early calving with a high incidence of retained placenta. Factors such as poor hygiene or the stresses affecting the dairy cows at time of calving, particularly "loose" type of housing, have been implicated. Since retained placenta leads to an infection of the uterus "metritis" and a delay in the involution of the uterus, the future-fertility of the animal could be adversely affected (Jainudeen and Hafez, 1992a). Manual removal of the retained placenta also prolonged the interval from calving to first functional corpus leutum by 20 days (Rawal and Singh, 1991).

4.6. Aberrant behaviours related to group housing
Calving in a group may lead to behavioural problems in buffaloes, which can depress the neonatal sucking of colostrum these seems to be least four such problems (Lidfors, 1994). First, newborn calves may attract maternal licking of a cow other than its dam (cross- licking behaviour); second, calves may fail to suckle during the first few hours after birth for other reasons. Third, the
occurrence of cross-sucking could depress consumption of colostrum in two ways, either the calf sucks from another dam first and sucking from its own mother is postponed, or the mother is sucked by alien calves shortly after parturition and first colostrum is ingested by the calf before the mother’s own calf starts suckling. Fourth, the sucking may be too short for adequate colostrum ingestion due to disturbance caused by conspecifics.

Illmann and spinka (1993) stated that, the occurrence of the mis-mothering in a group calving situations could be resulted in delayed suckling, and hence impaired calf immunity levels, and in misidentification of calves for pedigree recording. Frequently, female buffaloes may give birth in the close company of pregnant conspecifics and mothers with newborn calves (group-housed buffaloes). This may increase patterns of aberrant maternal behaviours i.e., abandonment of "young calf stealing" and "cross-licking" (Hafez, 1992). Calf stealing is a common and deleterious consequence of housing pregnant buffalo cows together in groups and defined as, cows have been found to show maternal responsiveness (interest) prior to parturition and in some cases they have adopted alien calves, which has caused the mothers to reject their own calves after calving (Lidfors et al., 1994).

During intensive calving periods, interest in alien calves might be frequent and possible disturb the formation of a mother- calf bond. Illmann and spinka (1993) observed licking of alien calves (cross-licking) in primiparous cattle kept in group housing during calving, but this did not cause cows to reject their own calf as occurred in buffaloes. As the water buffalo cows seem to exhibit only, slight isolations at calving from the herd; maternal isolations at calving has been suggested to lower the risk of predation on the calf and to facilitate imprinting between cow and calf (Lidfors, 1994), and in case of isolation in calving pen, the bond between mother and calf may be formed without the disturbance caused by the interactions from other members (Mloszewski, 1983).

4.7. Other aberrant maternal behaviours.
1. Buffalo cows may slow to stand after a recumbant calving and usually stimulated to get up by the movement and vocalization of the calf.

2. Delayed first standing by newly born calves which must be helped to stand.

3. Delayed grooming (licking) of the calf.
   4. Delayed 1st suckling by the calf.
5. Some cows of low maternal care back or sidle away from the calf during suckling and sometimes inexperienced mothers show a fear response by butting or kicking when the newborn mores but this phenomenon is transient.

6. Difficult let down of milk
   Let down of milk in buffaloes becomes difficult after the death or removal of calves (separation of calf). In such cases, the straw-stuffed skin of the calf (dummy) is kept in front of the buffalo at milking time to stimulate the let down of milk. This treatment is very successful and popular among those urban dairy farmers where calves are starved to death in early life (Pathak, 1992).
5- Conclusion

It can be concluded that, the lower reproductive performance in buffaloes may be due to:
1- Group housing of buffalo cows and rearing calves in groups after birth, especially in loose housing system may lead to serious behavioural problems as communal suckling, inter-suckling among calves; or even inter-suckling or milk-suckling among adult cows resulting in economic losses.
2- Irrgular conception which may be due to:
   A- Poor detection of oestrus, since the oestrus in buffaloes is mostly weak or silent heat.
   B- Long calving intervals as a result of poor detection of heat or due to post-partum anoestrus.
   C- Continuel confinement of buffalo cows on concrete surfaces may lead to poor heat detection.
3- Early separation of calf from his mother just after birth may cause:
   A- Disruption of the formation of the maternal bond (cow-calf bond), difficult recognition of calf by mother and vice versa, and consequently rejection of own calves.
   B- Decreasing or preventing clostoral ingestion leading to impairment of passive immunity of the calf.
   C- Appearance of behavioural problems among the separated calves as non-nutitive or cross-suckling.
In order to improve the reproductive efficiency of buffaloes, it can be recommended that:
1) Knowledge about the behaviour of domestic buffaloes of different age groups under various agro-climatic conditions is required for the development of suitable management practices and obtain the optimum exploitation of the production traits of buffalo for milk, meat and draught power.
2) Alert caretakers are preceptive and have the ability to read the sign language of animals through daily observation of them. It is essential not only to watch what the animal does, but also how and when it occurs.
3) Heat detection using the reliable methods and service at the right times are the foremost requirements in achieving regularity of oestrus cycles and conception.
4) Seclusion (isolation) of buffalo cows about 2 weeks before parturition in calving pen is of importance as the presence of conspecifics or strangers may cause serious disturbances and calving problems, as well as, maternal problems.
5) Penning buffalo cows tied in stalls with regular dirt exercise twice daily for a minimum of an hour each time to prevent the behavioural problems during and after parturition and improve heat detection.
6) Leaving the newlyborn calves with their mothers in calving pens for 2-3 days after birth to enhance the formation of maternal bond and the reciprocal recognition between mother and her calf.
7) Housing buffalo calves individually in a calf pen until weaning will essentially eliminate the most maternal problems especially non-nutitive or cross-sucking behaviour.
8) Good selection of buffalo bulls is required and the bull must be matured and free from venerial diseases, also isolation of bulls is essential to improve the sexual desire and prevent competition during mating.
9) The ultimate success in reproductive improvement of the buffalo depends very much on regional and international cooperation and coordination of all concerned, especially by those working in the field, exchange of knowledge among scientists is essential to success.
References


Rushen, J. and De Passille, A.M. (1995): The motivation of non-nutritive sucking in calves,
Bostaurus. Anim Behav. 49: 1503-1510.

**Sajunja, L. O. (2000):** The buffalo is important for milk production. Integrated business development of sweden,


Separation at 6 h, 1 day and 4 day after birth appl. Anim. Behav.Sci: 69: 177-188.