

**Research Article**

**MATERNAL BEHAVIOR OF MARES AND GENETIC PARAMETERS FEATURES  
SELECTION BASED ON MATERNAL INSTINCT**

**Nurushev Murat Zhusypbekovich<sup>1\*</sup> and Kerimbay Bakyt Nurzhankyzy<sup>2</sup>**

<sup>1</sup>Professor of ENU by L. N. Gumilyov, Doctor of Biological Sciences of the Russian Federation and RK, Academician of the Russian Federation, Russia

<sup>2</sup>Junior researcher, ENU by L. N. Gumilyov, Faculty of Natural Sciences, Department of Management and Engineering in Sphere of Nature Protection, Russia

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**ABSTRACT**

The role of maternal behavior, as biological feature of mares, in the course of reservation of a fruit, and for the first time days of its post-natal development is established. It is for the first time defined that foals at the birth, had, at least, three congenital food reflexes. I.e. unconditional and reflex (instinctive), developed in the course of evolution of the sort Eguus.

By long-term researches of authors there established that congenital reflexes (instincts) of foals, play more significant role, than the acquired (obligate) behavior, for the first time hours of post-natal development of an organism.

All observations made exactly during the first hours after the delivery specify that foals at the birth already had at least three congenital reflexes:

The first is that the power supply is in some part of a mothers' body at height of the extended head because first "pokes" forward nasal part of a muzzle in search of an udder, are carried out in the majority by directly extended head, or from below up.

Second, not less essential congenital reflex in the biological plan is that the newborn foal from first minutes of birth, searching a dairy nipples makes along the lower part of the case, from forward feet to back across. In this part of a trunk there were mammary glands of their far ancestors.

The third congenital reflex of a newborn foal is an ability of an organism to consume a significant amount of milk, in such a short time because for mares milk flow occurs in batches.

The newborn has no certain sequence searching most likely the smell of warm colostrum defines ways of search. If not to consider the efforts of mare caused by a maternal instinct in simplification of search of an udder the first two congenital reflexes are the most important in aspiration, and at times and independent finding of an udder.

The interrelation (correlation) is established between all four signs which characterize maternal instinct and growth rate and the developments of posterity promoting a survival (safety) of young growth.

The greatest correlation concerning behavioral signs is noted between a maternal instinct of a licking and behavior of a foal expressed in the general duration of sucking an udder. It is quite clear, the dependence of a milk yield of the mare with a live mass of foal points to rapid growth and development. Interdependence of signs is expressed in close interrelation, degree of correlation fluctuates within 0,534-0,711, at high degree of reliability ( $P \geq 0,99$ ), the exception makes only a link between duration of a sucking and a milkiness ( $0,382 \pm 0,288$ ).

The authors have established the feasibility of leading selection in the expression of the maternal instinct (behavior), to improve the survival of foals in pasture horse breeding. Efficiency of selection on the behavioral signs is that to achieve results, and they are positive with a high degree of reliability ( $P \geq 0,99$ ), does not require significant additional cost, but only need to integrate this feature when replenishing the production team.

**KEYWORDS:** German Saugentiere, Taxons, Ontogenesis, Parasitism, Carbohydrates

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**INTRODUCTION**

The parental care is widespread in fauna. It meets in the most different taxons of animals, is provided with various

mechanisms and takes the different forms. The ultimate goal is universal-to provide high survival and adaptation qualities of descendants. The maternal care is many-sided and isn't equally shown in different stages of ontogenesis of posterity.

Certainly, maternal care is one of the main forces which defined shape of a class of mammals. Under its influence our ontogenesis with a set of obligate and facultative support on parents was created. Parallel evolutionary changes in behavior, physiology, morphology of parents, cub-formation of parental care and correlative changes of the corresponding stages of early ontogenesis is a remarkable example of a coevolution. The name of a class to which we belong, underlines a key role of interactions between mother and cubs: mammals in Russian-nursing with milk; on the German Saugtiere-the sucking animals, on English / Mammals and in Mammalia Latin-animals having mammary glands (Anokhin, 1968).

In R.L. Trivers work the evolutionary reasons of parental care were considered (Barabash-Nikiforov II and Formozov, 1963). First, he emphasizes need to consider all ways and ways with which parents influence fitness of descendants, having combined them together and having called it "a parental contribution". The parental contribution is any investments given by parents to the individual descendant which raise his (descendant) chances of a survival and reproduction. Secondly, Trivers suggested measuring it concerning negative influence on other descendants—for example, the big contribution to one sharply reduces possibility of the parent to put in another (Chiang, 2002).

However exact knowledge of what reasons cause emergence of parental care in evolution doesn't presented, noticed that at invertebrates, fishes and amphibians it is often shown in severe, hostile environment at the high level of parasitism, predatoriness, at intensive inside and the interspecific competition (Clutton-Brosk, 1991).

The maternal behavior meets in many taxons, including at invertebrates and lowest vertebrates, but the maximum development it reaches at mammals and birds. However, 90% of bird species, both parents care for the young, and the absolute majority of mammals (more than 90% of the total number of species) only mother cares about cubs (Craig, 1918).

The maternal behavior usually begins at once after the delivery—the female shows interest in the newborn, cleans and licks it and usually eats afterbirth. Eating of afterbirth is widespread among mammals, except for completely water (cetacea) and semi-water forms (pinnipeds) (Anokhin, 1968).

At the majority of mammals of a female make the characteristic sounds addressed to newborns, they can inform alarm, caress, or attempt of fast search. The most important and general part of maternal behavior — feeding of cubs with milk—begins almost at once after the birth.

According to E. Kruchenkova (Anokhin, 1968), features of maternal care are defined by extent of development of newborns inherent to this type. It is known that cubs of mammals can be born as completely helpless (for example, at rodents), and quite independent (at the majority of hoofed animals). However, in the wide range between unripe and mature newborns the set of "intermediate" options settles down. So, for example, at pigs touch system of newborns quite mature, and thermoregulatory abilities are limited.

According to maturity degree since the birth to features of environment some options of the maternal and children's relations are allocated. Main of the mare following:

- Mother leaves a cub in a nest or in a secluded place;
- Carries a cub on itself;
- Mother leads cub by itself.

Mature-born types, as a rule, the herbivorous. For them in general it is characteristic that cubs are fed with milk the long period of time. To mature-born types the majority of hoofed animals, some rodents (in particular Caviidae family), hyrax and some other systematic groups belong.

At cubs of mature-born types two main strategy of behavior are observed—"to run" or "hide". At camels, reindeers, horses, donkeys, elephants the female comes back to herd very quickly, sometimes some hours later after the delivery, and the cub follows her. For example, at zebra the cub is trained to go in 30 minutes after birth, and to run and jump – within an hour (Dwuer and Lawrence, 1998).

For development of pilot studies of maternal behavior two prerequisites had major importance. The first consisted that time spent by the feeding females in contact with cubs insignificantly differs at the individuals belonging to one look that is makes the certain norm which is naturally changing in process of growth of cubs (Ernst, 1974). This phenomenon locates as the steady, species-specific characteristic that is basic parameter of maternal behavior. In this parameter it is possible to find distinctions between breeds of sheep (Hinde, 1975) and horses (Juarbe-Diaz, et al., 1998).

Ethologists established that the main forms of maternal behavior are shown in a complex that connected on time and frequency of manifestation. Researches showed existence of statistical communication between temporary (frequency) characteristics of key parameters. For example, time of maintenance of physical contact with a brood correlates with time spent on cleanings or aggressive reaction to the stranger (maternal aggression). Such interrelation gave justification to enter one variable – a complex of maternal behavior, and to estimate it on one (any) parameter (Kleiman and Malkolm, 1981, Klinqel, 1969), convenient for measurement.

It is established that there is a close interrelation between composition of milk of mother and frequency of feeding of a cub. So, the composition of milk at types which females constantly carry on themselves cubs, differs that leaves cubs for long time in holes. In milk there are more water and less fats and carbohydrates. For example, in milk of monkeys only 1,7% of fats and 6,8% of lactose that is interconnected with high frequency feedings of a cub. Often it simply hangs on a nipple, without making the sucking movements (Kruchenkova, 2009). At those species of semi-monkeys of Prosimia which leave cubs in nests, milk fatter, than at those who carry a cub (Lent, 1974).

Of course, interactions between mother and a cub aren't limited to that mother feeds a cub with milk. Between them there is a huge number of communications. From the point of view of the temporary organization it is difficult chains of

consecutive mutual regulation where each following phase of a cycle "is started" by one of them. In system there is a thin synchronism of the relations-on each phase of development of a cub all what he isn't able to do, carries out for it mother. During ontogenesis this balance continuously changes. What features of maternal behavior are inherent in our centuries-old partners in life-a horse in what difference and what characteristic biological differences a mare of purely pasturable contents interest many researchers and practicing of tabunny horse breeding.

Our researches of the last 30 years were devoted to studying of ethologic of a tabunny horse. Results of selection on food behavioral signs allowed removing new factory type of the Kazakh horses (Zhaytapovsk, 2012). Individuals of this type differ from other relatives in a massive constitution (a massiveness index=124,2), a pronounced index of food activity (114,2) and high adaptation features to purely pasturable year-round contents. We managed to approve three new factory lines of highly productive horses of the meat and dairy direction of efficiency in adayevsk ecotype of the Kazakh horses. Our researches are devoted to studying of the maternal and children's relations of horses of adayevsk ecotype of the Kazakh horses.

## MATERIAL AND METHODS

Observing the behavior of mares during childbirth and the postpartum period was carried out in bright moonlight nights in March-April, 2001-2014 years. Studies carried out in herds of breeding farm "Kulandy" (district Karagiya, Mangystuskaya region of Kazakhstan), located in the Aral-Caspian lowland.

Studying the behavior of herd horses carried out on horses of adayevsk ecological type of the Kazakh horse. The basis for the selection of individuals of ecotype Kazakh horse was the fact that they were bred for centuries only in year-round grazing with minimal human contact, actually staying "one on one" with the environment. In this regard, it is much closer to the wild populations. They are more fully preserved behavior instincts for survival in the harsh conditions of living, keeping young. The largest number of horses of adayevsk ecotype Kazakh horse in the Aral Caspian region (75 thousand heads).

Horses of factory species grown in the stables in our opinion, could "give" less full information, as daily contact with the man, of course, impacted on their behavior. We considered the prospect of further expansion of the range of local horses as the most adapted to sparse, strongly saline pasture vegetation.

During different seasons of year we applied a method of daily timings. For observation chose full moon time. We applied a timing method to fixings of actions of an animal, with a mark on a stopwatch. Supervision began and finished at 18 o'clock.

Practiced observation of horses with binoculars while on the jamb at a distance of 300-500 meters. Maternal behavior was studied in spring, summer, autumn and winter. Fixation actions determined two people alternately; observations were

recorded in a special log directly into the observation period. Studying the behavior of mares in prenatal hours, during and after delivery was performed by observing the individual mares. We were able to trace the process of "training" to birth. Childbirth and the first 36 hours after birth in 17 herd of mares, aged 4 years and older. Analysis of the results was performed by the behavior of horses "to describe the consequences" (R. Hinde, 1975) (Milligan LA, 2008).

Knowing pure time of pasturage within a day, number of pinches in unit of time and quantity of a skusyvyayemy grass (grams), we received the quantitative characteristic of a diet of an animal in days. Studying of physical activity was carried out with use of pedometers like "Dawn". Within 40 days it was recorded (etogramma) of a daily rhythm of life of a horse in the conditions of a pasture. The behavior of 17 newborn foals, since the first moment of their post-natal development is studied.

Knowing the time grazing during the day, the number of tweaks per unit time and the amount of grass consumed (g), we obtain a quantitative characterization of the diet of the animal per day. The study of motor activity was performed using pedometers type "Zarya". During the 40 days was carried out (etogramma) registration of the daily rhythm of life in a horse pasture. The behavior of 17 newborn foals from the first moment of their postnatal development. Processed materials on the fertility of mares the correlation of eating behavior and juvenile survival, causes waste of young by seasons of year.

Between mother and cub in all mammals usually exists a close relationship because milk is only young animals 'food.

The great interest represents maternal behavior of mares. By our observations established that in 30-40 days before the birth their behavior sharply changed. She moved slowly, tried to avoid dense groups, sharply increased her aggressive reactions towards others approaching her horses. And, such aggressive reaction expressed in attack (as a sting of the neighbor or blow hind legs), on the frequency of manifestation in the pregnancy closing stage (9-11 months) almost stopped (from 0 to 3 times per day).As for attack threats (threat of a sting or blow by hind legs) was reduced by 2-3 times from usual behavior of a mare in the first months of pregnancy and reached only from 3 to 7 times per day.

Undoubtedly, change of behavior of mares was connected with a different physiological condition of their organism, in this case with a different stage of pregnancy. Apparently, this feature of the behavior of the mares in the last month of pregnancy in can be classified as one of the reactions of parental behavior, because it is aimed at preserving the fetus.

Characteristic features of their behavior in 2-3 hours before to the birth are frequent urinations and anxiety. Mare stopped to graze, beat about the bush, laid down and didn't suffer approach of other horses. As a rule, some hours prior to the birth, the mare sought to depart from other groups of horses, and it wasn't interfered by a stallion and the mare wasn't followed by any of horses of her group. Distance on which the mare left, varied from several tens meters to 1.5-2 km, depending on a land relief, choosing thus, equal, mostly

dry place. In most genera pregnant mare did not lose contact (auditory, visual) with grazing at a distance of individuals its jamb. However, she did not make any sounds, and a heightened sense of hearing, gave her information about the environment.

Horse (according to the standard classification Orbeli, 1945) refers to the type of mature mammals that give birth, and mares belong to active type of mothers. Degree of care of the posterity, shown by individuals of this sort, has huge evolutionary value.

The reflexes connected with implementation of maternal activity, include elementary motive skills of a conditioned-reflex origin. Development of behavior, his identity and peculiar features began before childbirth and from first minutes of life of an organism. Therefore great value, in opinion (Slonim AD, 1967), has supervision just before childbirth and right after childbirth (Nechayev IN, 1983).

Harbingers of childbirth at mares was swelling, a softening and a relaxation of fabrics of a back half of a trunk of a mare, i.e. transformation of a pelvis in "patrimonial", the increase and edema of the vulvar lips which folds finished, and skin became smooth. Observed sagging abdomen, groin ceasing. From genital slit in 1-2 days prior to childbirth appeared hardly noticeable transparent slime. Along with this increased a breast, appeared its' swelling that expressed the size and shape of the udder. Around the sphincter of teat canal in the form of droplets of amber withered colostrums. In 1-2 days prior to the birth its yellowish shade on a white background and a dense consistence is noticeable.

Thus, approach of time of the birth is determined by the main three biological properties: to relaxation of linking of a basin, increase in an udder and emergence on tips of nipples of drops of colostrums.

Development in an embryogenesis has to go by the principle of the organization and maturing of system of the communications providing to the newborn the adaptation to conditions of its post-natal existence. Formation of the first functional systems happens according to (Anokhin PK, 1968) "towards to ecological factors" (Noskov NM, 1973). The behavior of newborn foals, in our opinion, considerably is defined by behavior of their mothers: before, in time and after birth.

## CHILDBIRTH

Childbirth mainly took place at night, and often before dawn in the most peaceful time of the day, i.e. from 2 o'clock until 6 o'clock in the morning. So, within 12 days, from 18 to 30 April, from 152 mares foaled: from 18 to 24 hours – 16,4%; further from 24 pm to 2 am - 18,2%. In the early morning hours of 2 to 6 am foaled – 56,5% of mares, and in the daytime from 6 to 18 hours, only 8,9%.

The greatest specific weight of the birth falls on early morning hours, with 2 to 6 o'clock in the morning. Process of childbirth is very difficult; we very seldom managed to observe that circumstance when childbirth overtook a uterus unawares, i.e. directly among being grazed horses. The distance on which the mare left, was very variously –

from 50 meters to 2 kilometers. Probably, this circumstance and childbirth in the quietest time of day, says that they can "regulate" process of childbirth, i.e. remove for a certain time. Process of childbirth to us managed to be observed generally in the period of a full moon.

(Treus, 1983) notes that if to approach to a female of an antelope of Cannes during the begun childbirth, she gets up, attempts thus stop, the animal with alarm watches the person (Petrishchev, 1976). About ability of animals to delay childbirth or to date it for night time, wrote in due time: G. D. Zamorin (According to N.M. Noskov, 1973), B. I. Petrishchev (1976) and others (Rosenblatt JS. Et al., 1963, Rosenblatt JS. Et al., 1980).

A.P. Studentsov (1961) specifies that childbirth at animals happens mainly at night (Slonim, 1973) At this particular time, bark and a brain subcortex, are more susceptible to the impulses going from the receptor device of a uterus. So, cows of 32,8% of childbirth have at night, 26,7% - in the morning, 22,7% - in the afternoon and 17,8% - in the evening. In the afternoon the uneasy situation and direct influence of light oppress patrimonial activity. On the contrary, at the night, not distracted by excitement from the outside, the cerebral cortex actively reacts to the irritations going from the sexual sphere, causing the normal course of patrimonial process (Studentsov, 1961).

The second period (patrimonial) was characterized by strengthening and increase of attempts and contractions, the appearance of the front hooves of a foal feet (one above the other); head elongated above the legs at a distance of 15-25 cm from the tip of the hoof. With each subsequent struggle the increasing part of a fetus was removed outside, there was a fetus "eruption".

It should be noted that in the course of childbirth of loud shouts of pain it was necessary to hear only in exclusively exceptional cases, only a few times. Possibly, this adaptation of an evolutionary order. The female of a wild animal shouldn't give out herself to predators, being in so helpless state. In behavior of a tabunny horse not only at childbirth and in many below the described cases the instincts inherent only in their wild relatives fully are looked through.

All muscles of a mare which lay on one side with the extended extremities took active part in the act of childbirth, the tail is set aside on 90 degrees. As soon as there was a head of a foal, in full, the mare did a short-term break. The second stage of childbirth usually ends with pushing the fetus. If childbirth was heavy, the mare had a rest some minutes, trying lying to reach a foal, at these movements the umbilical cord broke if this process didn't happen in this way, the mare itself teeth gnawed through an umbilical cord because it, apparently, renders pain in sexual area. Duration of childbirth made 15-35 minutes. Depending on severity of childbirth process of a rising of mares on feet was very various (5-32 min). The mare sometimes didn't get up at all, and started sniffing and licking at first first-born slime from a mouth and nostrils, then a body of a foal, since a neck and a breast. The frequent licking of the newborn is very important procedure raising a tone of muscles thanks to what the foal in

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25-60 minutes can already start sucking mother. The first sigh (hoarse from slime in a nasal cavity), the foal did as soon as it was released from patrimonial ways his thorax.

If for some reason the mother does not lick her newborn, muscle tone he has remained weak, he got up on its feet after a long delay, in 1-1.5 hours. Sucking reflex of foals was usually is relatively weak.

From the moment of emergence of hoofs and before the end of childbirth I passed on the average 18-20 minutes (from 10 to 33 minutes).

In the postpartum period are allocated remains of fetal waters. Attempts at last began after 15-43 minutes, some mares went as placenta separation mechanism was similar to the birth of the fetus. His office took an average of 30 minutes. As soon as the latter, attention switched mare with foal at him. She ate it with great care, not uttering a single sound that, unlike licking the foal. Ustiurt herdsmen believe that eating of the placenta stimulates the activity of the mother, increases the secretion of colostrum.

However, in our opinion, it is not absolutely so. As we managed to establish, mare - primipara, sometimes refused to feed the foal, but diligently ate a placenta. To take away a placenta from a mare happens not easy, they, as well as a foal, actively protect a placenta.

Older mares are more persistent in the manifestations of maternal behavior. If the foal was born in "shirt", they tear it with his teeth, weak kids pushing a soft bow of the head, causing energetic repeat attempts to stand, find the udder, while sometimes throwing young filly foals born weak.

Removing mucus with foal, carefully licking the ear, mare ate fetal membranes, fetal fluid and mucus. Mother at the same time massaging the whole body of foal with tongue that contributed to the establishment of normal breathing and blood circulation while strengthening the muscles of the limbs. Later licks focuses on the anal region and umbilical cord, which helps get rid of the original foal feces, feces and urine.

Ernst, *et al.*, 1974 established that the muscular tone at the licked calves is four times higher - they get on feet earlier, stand on them stronger, their sucking reflex is more pronounced, and they consume colostrum in the first feeding more, than not licked calves (Tilden and Oftedal, 1997). Beneficial influence of saliva of mother which increases resistance to diseases at calves is described.

Process of a licking happens long enough that at the same time promotes drying of a foal. At a licking of a foal the mare accompanies the beginning of each series of this process quiet, and sometimes silent "m-m-m". As Nechayev, 1983 on the example of the Kazakh horses notes, the smell felt when licking of the kid, - the first thread connecting it with mother (Treus, 1983).

Entirely agreeing with opinion of professor, it is necessary to tell that process of a sniffing and licking of a foal mother at the first hours of the postnatal period is essential biological feature characteristic to females of the sort *Equus caballus*.

The careful licking and the long sniffing accompanied by warming of a foal at early morning hours, favors to strengthening of a muscular tone, after an inactive way of life in a womb of mother, promotes a fast rising on feet, to finding of an udder as first power source. That is, this biological feature characteristic to a sort, in this case an adayevsk horse, is that necessary attribute for establishment and orientation development in postnatal activity of a foal.

In other words, the first hours of the postnatal period at mares are that basis of the homeostasis, directed on preservation and a fetus survival. It is quite possible that this feature of a maternal instinct is directed on a reproduction that is quite justified and developed in the course of evolution, i.e. spanning several centuries.

The visual observations made by us on Ustyurt, showed that normally developed foal in 25-55 minutes after the birth did the first attempts to rise, and in 70-110 minutes stands and reaches for an udder of mother. Between mother and a foal from the first hours of life very close relationship is established. The signal to the act of a licking follows from both of the parties. Mother and foal call up each other with voice then the visual recognition is coming and ends with sniffing. In the first days of life the foal doesn't recognize at once the mother among other animals, and not to get to a conflict situation, he comes nearer to a mare carefully, with the extended head and a neck, watching closely its movements, from the frontal party to avoid aggressive actions, in case of their manifestation.

Undoubtedly, change of behavior of mares is connected with a different physiological condition of their organism, in this case with a different stage of a pregnancy. Probably, this feature of mare at last month of pregnancy can be qualified as one of reactions of parental behavior because it is aimed on fetus preservation.

Characteristic features of their behavior in 2-3 hours prior to the birth are frequent urinations, concern the mare ceases to be grazed, beats about the bush, lays down and doesn't suffer approach of other horses. Then the uterus departs from a slip-up, chooses equal, mostly dry place. At approach of fights the mare lays down and to a full exit of a fetus is in this position. After the foal appears on the earth, the mare gets up, sniffs him and licks a muzzle of a foal. The placenta, as a rule, separates not at once, and in 16-40 minutes. Normally developed foal in 20-35 minutes after the birth does attempts to rise, and in 55-65 minutes costs and reaches for an udder of mother (Table 2).

Apparently from this table, the first attempt to rise to the feet was observed on the average in 27 minutes after birth, and in 56 minutes this attempt was successful. Approximately in an hour (60.1 min.) after birth foals started looking for an udder of mother and the first successful sucking came in 5-6 minutes on the average, i.e. in 1 hour 5 minutes.

The considerable size ( $\sigma$ ) of sigma and coefficient of a variation (CV) are connected with specific features of development of foals, to consider which it isn't possible. Certainly, process of childbirth takes away many forces and energy, as from a mare, and a newborn foal. Especially it is

**Table 1:** Time of manifestation of the first reactions by a foal from the moment of the birth, min. (quantity supervision - 9).

| Manifestation of reactions                | M ± m       | $\bar{b}$ | CV   |
|---|-------------|-----------|------|
| Independent urination                     | 16,7 ± 3,6  | 13,2      | 20,3 |
| The first attempt to stand up             | 27,4 ± 3,3  | 11,6      | 40,4 |
| Independent excrement                     | 38,0 ± 4,5  | 16        | 59,5 |
| Head raising at blackout from above       | 46,2 ± 2,1  | 9,4       | 9,4  |
| The foal got on feet                      | 56,0 ± 3,0  | 10,6      | 21,4 |
| The first attempt to sniff                | 57,2 ± 3,5  | 14,0      | 24,6 |
| The first attempt to find an udder        | 60,1 ± 3,8  | 13,0      | 22,5 |
| First sucking                             | 65,5 ± 3,6  | 13,2      | 20,1 |
| Reaction to a voice of mother drives ears | 99,5 ± 3,5  | 13,5      | 24,8 |
| Finds the udder at once                   | 106,8 ± 4,3 | 12,6      | 48,7 |

| Mare of skilled group and control groups                    | n | Number of observations | Average time of drying, the foal (min) | The average number of attempts sucking foal (times) | Quantity of a sucking of foal | General time of consumption of colostrum by foal, (min.) |
|---|---|------------------------|--|---|-------------------------------|--|
| I. Skilled group: a) mare Aidarly, 18-82                    | 1 | 2                      | 246                                    | 82  | 63                            | 180  |
| б) daughters  | 3 | 2                      | 222                                    | 75  | 72                            | 163  |
| в) granddaughters   | 4 | 2                      | 208                                    | 77  | 65                            | 151  |
| II. Control groups, III. Mares aged from 5 to 12 years old. | 4 | 3                      | 170                                    | 62  | 56                            | 128  |

**Table 2:** Duration of manifestation of a maternal instinct at mares during the first postnatal periods (per day)

noticeable, in the first attempts to stand when, without being valid and sufficient coordination, the foal falls. Nevertheless, as in our supervision all foals occurred from thoroughbred Kazakh mares of adayeysk ecotype and stallions, and their mothers were full-age, it is possible to claim, in our opinion, that on the average in an hour after the birth the tabunny foal sucks mother.

All observations made during the hours after birth, indicate that foals at birth, there were already at least three innate reflexes.

First - this is what the power source is in some part of the mother's body at the height of the head or extended above the head, for the first "butting" front nose section faces in finding the udder, held in most straight elongated head, or from the bottom up.

Second, no less important in terms of biological innate reflex, is that the newborn foal from the first minutes of the birth, looks for a source of food, especially dairy nipples horizontally along the bottom of the housing from the front feet before the rear.

Third innate reflex of a newborn foal is the body's ability to consume a significant amount of milk in such a short time, because the milk of mares occurs in portions.

The newborn has no certain sequence searching most likely the smell of warm colostrum defines search ways. However, search of a source of food in a smell, and furthermore visual perception, - in any way a congenital reflex. Nevertheless, if not to consider the considerable efforts of mother caused by a maternal instinct in simplification of search of an udder, the first two congenital reflexes appear the most important in aspiration, and at times and independent finding of an udder.

The third unconditioned reflex of a newborn foal is the ability of his organism to consume a significant amount of milk in a short period because the milk flow at mares occurs in batches. Besides trough-type tongue, a form and size which is ideally corresponds to a cone-shaped mare's nipple, considerably promote this process.

The newborn has no certain sequence in searching; most likely the smell of the mare and the following warm colostrum defines the ways of search. However, searching of a source of food by smell and furthermore visual perception are not a congenital reflex, but conditioned-reflex (reasonable) reaction. Nevertheless, if not to consider the considerable efforts of mother caused by a maternal instinct in simplification of searching an udder, the first two congenital reflexes are the most important in aspiration, sometimes even an independent finding an udder. Therefore, on congenital reflexes of the newborn we will stop in more detail as it has not only theoretical, but also certain practical interest.

We have noted that the area of preferential searching an udder (uber) of a newborn foal is horizontally along the linea alba (white line) of abdomen on the ventral surface of the chest and abdomen, i. e. in our opinion, the lower part of the body is caused first of all by characteristic of a class of mammals, to be exact location of their mammary glands (qlandulae lactiferae), in the past. Mammary glands of mares, as well as other species of mammals, reach full development only before the foal birth. At mammals they have an unequal form, location and structure of the allocated secret is milk. In the form of one couple hills in a breast - mammae (elephants, cetacea, primacies and the human), in inguinal area between hips (ruminant and a horse), different number of couples of hills (2-6) is also called as an udder (uber). At omnivorous

and the rodents mammary glands are located on both sides of the white line of an abdomen, forming a multiple udder - ubera.

Thus, in our opinion, the long process of evolution which altered location of mammary glands at mares causes at a newborn foal searching of dairy nipples along the white line of abdomen on a ventral surface of a thorax and abdomen. Although location and the sizes of an udder of mares - as object of search of a newborn foal, has undergone considerable anatomic changes, all of them equally look for it in that area as their far ancestors did it.

In many respects, the positive search result, is caused by biological property of an udder, it will be overflowed during the first hours after the delivery, it is enough to touch only, sometimes even casual contacts, pursue spontaneous emission of streams of the concentrated colostrum. Milk consumption by a foal for the first time is peculiar. We don't know, why, or from bigger excitability of the received first doses, or from high concentration of colostrum with prevalence of glucose, and it is possible and a sliding surface of nipples, it right there loses it. However, on the second attempt of search of an udder at the newborn much less time, rather previous attempts leaves.

In more detail, investigated this problem (Klinqel, 1969), observing the birth of a zebra, he notes that its first attempts to get on feet were observed in two minutes, and he rose in 14 minutes, for the first time sucked in 1 hour (Trivers, 1972). Especially valuable materials are stated on these questions by Treus (1983) in the monograph "Behavior of an Antelope of Cannes in Askanii-nova". She writes: "It is characteristic that all mothers who in previous year had calf's males, start licking the newborn female as licked males." Having repeated an error of 5-6 times, they correct it. Attempts of a calf to rise become frequent, and after 24 min. life each 2-3 sec. repeats. After 27 min. it rises, but only on hind legs and doesn't fall any more, and lays down, selecting feet under itself and choosing more convenient pose. By this time his head already dry. In  $33,4 \pm 2,01$  min. rises as well by forward feet and for the first time starts sniffing. The first licking is noted in  $97,1 \pm 10,7$  min., and later 2 hours 41 min. there are hiding elements. This indicator hiding is the most variable -  $566 \pm 166$  min; - 600; variation coefficient -  $105,9$ " (Petrishchev, 1976).

At the heart of behavior of the herd mares before the birth congenital reflexes lie, probably. Even for the first time the foaled mares aspire to privacy. What do animals reach with it? It would seem an instinct of stateliness conflicts to behavior of the mare preparing to deliver. And it is valid, certain animals can easily fall prey of predators, especially at time of delivering. "Sense" of behavior of mares during this period consists in "remembering" a foal - fix his smells, to allow it to get used to itself.

Later, when the foal knows mother well, he, without being afraid, runs up to her from any party. Mother accepts a characteristic pose for a licking. During the licking act the foal settles down along a body of mother, sucks usually from the same party. Milk is swallowed with a speed up to 100-120 drinks per minute, foals of advanced age swallow quicker.

Adult animals in compare with young mares very clearly recognize their children, which is one of the causes of the difficulties with nurses in growing foals orphaned.

It should be noted that with the finding of supply the foal after only a short time (30-55 min), finds an another not less vital task is a disposal from first-born a calla, so-called in zoo technical literature - meconium, connected with big efforts. It represents, from itself viscous, sticky, smeared feces, formed in pre-natal life of a foal, with the concentrated stench. Most likely, its concentration is distributed in a rectum (intestine rectum), obstructive closer to sphincters of back pass anus. Thereof the newborn's organism often removes by his big efforts of several times step by step perhaps somewhat it is promoted by the colostrum consumption operating as laxative. As well as at adult horses and at foals the anus at a tension tends to protrude into the sleeve-like caudal direction. Big tension at foals followed by convexity of a back quite long time. The bad discharge of meconium at newborns causes in certain cases to Mangystau's herdsmen to practice an enema though in the first days mares are very aggressive.

Deleting slime from a foal, carefully licking an auricle, mare removed and ate a fetal cover, fetal liquid and slime. Mother thus at the same time was massaging with tongue all body of a foal that promoted establishment of normal breath and blood circulation, at the same time strengthening muscles of extremities. Further the licking concentrates on anal area and an umbilical which helps to get rid of the first-born foal feces and urine.

The careful licking and long sniffing accompanied with warming of a foal favors to strengthening of a muscular tone, after an inactive way of life in mother's womb, promotes a fast rising on feet, to finding of an udder as first power source. That is, this biological characteristic to a sort, in this case an adayeusk's horse, is necessary attribute for establishment and development of orientation in postnatal activity of a foal.

Mares of adayeusk ecotype are capable to nurse only one foal because the disposable watering often practices. In desert purely pasturable conditions of the Aral-Caspian zone milk secreted by the minimum quantity witch is necessary for feeding of the foal as only the third part of his attempts to suck is satisfied. Therefore, the foal is early accustomed to eating of a pasture. Exceptional cases of a simultaneous sucking of two foals have always ended in failure, and the stranger was constantly driven away from an udder. Thus it should be noted that the mare can "adopt" foreign foal only if he was given previously a smell, characteristic for this female, by a smearing foal with her milk.

The strongest communication of mare and foal is noted by us in the first 65 days. It is expressed in a frequent sucking, a mutual grooming, and secretion of the most productive part of milk from all seasonal yield of milk. Further communication of mother and a foal weakens.

Thus, by our researches established a role of maternal behavior, as biological feature of mares, in the course of preservation of a foal, and in the first days of its post-natal development. Developed in the course of evolution of the sort *Equus caballus* - such biological feature as a maternal



instinct (the newborn's licking, first-aid treatment in finding of an udder, etc.), it that composed which are inherent also in an adayeysk horse.

Feature of rest of the adayeysk mares, especially during the summer when air temperature exceeded 40°C, characteristic (perhaps peculiar only to them) instinct is a creation of a "live" shadow by own case for the foal. Direct sunshine of the scorching southern sun knocks down not only weak young growth, but often and adult horses. In the exhausting heat of the Aral-Caspian desert, there is no such maternal behavior in relation to a foal, considerable part of newborns could not survive.

We didn't manage to find the description of similar supervision over tabunny horses in literature though we noted the similar phenomena and among the Karakul ewes.

Perhaps further for improvement of technology of the contents in summer pastures constructions of shadow canopies will be necessary.

Analyzing etogramma of the made observations and research of foreign scientists, we conclude the following. A mare privacy just before childbirth is undoubtedly a congenital reflex, i.e. typical for the type (in this case a tabunny horse of the sort *Equus caballus*), appetent search behavior.

Sniffing and licking of the newborn is caused the finishing act that brings an animal (in this case a mare after the delivery) into a condition of relative rest. The finishing act (consummator act) in the true sense of the word is instinctive (congenital behavior). For the implementation of the instinctive act (in this example sniffing, remembering smells) spent some (not precisely known, perhaps - nervous) energy (Trivers and Willard, 1973).

All behavior of an animal consists of appetent behavior and the finishing act (consummatory act). The last and instinctive. Appetent behavior has the plasticity, but not finishing act i.e. not the instincts (Trivers and Willard, 1973).

In the same days of experiences we made special observations, studying process of an identification of the posterity. In experiment there were 10 mares with the posterity. Foals were located to the certain shelters which are in sight of mares, then the free access to foals, after 3-hour isolation was provided to mares. The behavior of each mare at presence as the, and foreign foals was studied.

The results of the supervision which have been carried out within 5 hours, showed that near an own foal each mare saw off on the average on  $252,0 \pm 16,5$  seconds, near strangers - 48,0 We found that the duration of maternal behavior

exhibited by which includes the time taken for drying of the foal, in particular lick, number of attempts to feed colostrum, and the process of feeding them was significantly longer than that of their mothers, peers (Table 3) . The difference in the manifestation of maternal behavior mares family ancestors Aidarly 18-82 compared with the control (n=4), a high fidelity. The control group was selected mares who were close by, which is basically the same date of birth (up to 3 days). Moreover, integration was carried out similarly as the initial time frame were taken first hours postpartum second period.

Apparently from table materials, number of made 2, attempts slightly more than a total of the made act of a sucking, i.e. colostrum consumption 10,5 seconds.

At different color of foals of a mare contacted at once to the foal in 86,0% cases if color of the stranger and the foal was close, contact with the was noted at once only in 52,2% (a difference insignificant). Visual and acoustical analyzers, at recognition of posterity played the role, however defining value played sense of smell: only after sniffing of a mare started showing aggression in relation to foreign foals.

On our supervision at the adayeysk of mares, in the first month of life the foal sucks mother from 50 to 82 times per day. Thus on this process spends from 105 to 202 minutes (from 1,0 to 3,8 minutes for one act). At each act of a sucking the foal absorbs from 40 to 150 g of milk. The similar researches conducted at the same age at foals of mugalzarsk breed (The Aktyubinsk area) showed that they suck 1,5 times less often (40-44 times per day). Nevertheless, they drink milk (according to timing on a stop watch behind sucking duration) more. In our opinion, the behavior of foals in the first month of life is defined not only factors of environment of dwelling, but also pedigree and productive qualities of a uterus, and also the evolutionary features of behavior developed throughout centuries.

On the 4-5th month of life when the grown-up foals already got used to other sterns, the number of acts of a sucking is reduced on the average till 50-42 time, and duration of a sucking makes 80-85 minutes per day, one act lasts 1,5-1,6 minutes, and milk in each sucking is drunk to 180-220 g.

The maternal behavior of mares, as well as other biological features of an organism inherent in this sort and, certainly, are to some extent descended. We carried out the analysis of relationship "mother foal" at family of a mare of Aydarly 18-82, in a breeding farm "Karagantubek" as at her, and her 3 daughters and 4 granddaughters. The basis for studying of maternal behavior of family of a mare of Aydarly

| Mare of skilled group and control groups                    | n | Number of observations | Average time of drying, the foal (min) | General time of consumption of colostrum by foal, (min.) | The live mass of a foal for the 65th day |
|---|---|------------------------|--|--|--|
| I. Skilled group: a) mare Aidarly, 18-82                    | 1 | 2                      | 246                                    | 180  | 100,2                                    |
| б) daughters  | 3 | 2                      | 222                                    | 163  | 91,0                                     |
| в) granddaughters   | 4 | 2                      | 208                                    | 151  | 93,7                                     |
| II. Control groups, III. Mares aged from 5 to 12 years old. | 5 | 3                      | 170                                    | 128  | 88,5                                     |

**Table 3:** Duration of maternal-child relationship during the first days of life in comparative aspect with their efficiency.



No. 18-82 was that circumstance that she in poor conditions of spring 1989 and 1990 when the exit of foals to hundred uterus fluctuated within 58-60%, it could provide safety of the foals.

We found that the duration of maternal behavior exhibited by which includes the time taken for drying of the foal, in particular lick, number of attempts to feed colostrum, and the process of feeding them was significantly longer than that of their mothers, peers (Table 3). The difference in the manifestation of maternal behavior mares family ancestors Aidarly 18-82 compared with the control (n=4), a high fidelity. The control group was selected mares who were close by, which is basically the same date of birth (up to 3 days). Moreover, integration was carried out similarly as the initial time frame were taken first hours postpartum second period.

Apparently from table materials, number of made 2, attempts slightly more than a total of the made act of a sucking, i.e. colostrum consumption

If, the first 1-2 days, unsuccessful attempts of a sucking of a foal are caused by weakness of musculoskeletal system, bad coordination in space and "studying" of biological feature of a structure of an udder, further failures are caused by secretion of milk of a mare and fullness of an udder. Probably, the excessive sucking of nipples of an udder when there is no liquid in it, hurts a mare who in turn tries to avoid, waiting for milk secretion. At the beginning of the 3rd month of a lactation of a mare only in 30-35% cases satisfy attempts to suck an udder, and for the rest (65-70%), avoid them.

Mares of adayevsk ecotype are capable to bring up only one foal. In desert purely pasturable conditions of the Aral-kaspi zone of milk secreted the minimum quantity (950-1450 kg), necessary for feeding of the foal as only the third part of his attempts of a sucking is satisfied. Therefore, the foal is early accustomed to pasture eating. Exceptional cases of a simultaneous sucking of two foals came to an end always failure and the stranger were constantly driven away from an udder. Thus it should be noted that the mare can adopt foreign foal only if he was given previously a smell, characteristic for this female, by smearing of a foal by her milk.

The strongest communication of a mare and foal is noted by us, in the first, 65 days. It is expressed in a frequent sucking, a mutual grooming, and secretion of the most productive part of milk from all seasonal yield of milk. And, if to consider the colostric period it reaches to 60-65%. Further communication of mother and a foal weakens. In case of death of mother, the foal in the first days shows the increased concern. After a certain period (5-12 days) the orphan foal survives with some lag in growth and development from contemporaries.

### Variability of the interfaced signs (correlation)

Since the selection and breeding herd horses have not yet taken into account the behavior of mares, we set out to explore some of the features of the maternal instinct as breeding and genetic parameters. The main signs of selection include an expression of the maternal instinct, we have included: duration licking mother foal in the day of delivery, the total duration of suckling udder (including unsuccessful attempts) foal on the 5th day, milking mares, foal live weight at the 65th day after childbirth.

The maternal instinct is closely connected with a dairy of a mare, and consequently growth and development of a foal the survival providing it called in zootechnical practice safety or a business exit of young growth (Table 3).

Since the selection herd horses are the main features of the live weight, growth and development of the body in length, width, development of skeleton, and they are almost well studied, we just tried to find out the connection between the main features of the maternal instinct, as a possible sign of selection in the future. The basis for choosing mares maternal behavior was justified by the fact that these instincts are still linked to breast, and hence the growth and survival of offspring.

Positive correlation took place between all four signs, characterizing maternal instincts and the productive qualities of an animal promoting a survival (safety) of young growth (Table 4).

The highest correlation concerning behavioral traits noted between maternal instinct and licking behavior foal expressed in the total duration of suckling the udder. Understandably, most milk yield dependence mare with foal body weight indicates the rapid growth and development. These features of the relationship between mare and foal are not only interdependent, but very significant, provide safety for young animals, even in the "jute" years. And, interconditionality of signs is expressed in close interrelation. Degree of correlation fluctuates within 0,534-0,711, at high degree of reliability ( $P \geq 0,99$ ). The exception makes only communication between duration of a sucking and milkiness ( $0,382 \pm 0,288$ ).

Thus, our researches conducted in purely pasturable conditions, show the possibility, I will dare even to tell, about expediency to conduct selection on expressiveness of a maternal instinct (behavior), for improvement of a business exit of foals in herd horse breeding of Kazakhstan. Efficiency of selection on this behavioral sign is that achievement of results, and they positive at high degree of reliability ( $P \geq 0,99$ ), doesn't require essential additional expenses, and only need of the accounting of this sign at replenishment of production group.

| 1 <sup>st</sup> - behavioral trait | 2 <sup>nd</sup> - behavioral traits | Correlation, $M \pm m$ |
|------------------------------------|-------------------------------------|------------------------|
| the duration of licking            | the total duration of- sucking the  | $0,627 \pm 0,122$      |
| Duration of licks                  | live weight of the foal             | $0,534 \pm 0,130$      |
| live weight of the foal            | business output                     | $0,650 \pm 0,159$      |
| duration of suckling the udder     | milk productivity of mares          | $0,382 \pm 0,288$      |
| milk productivity of mares         | live weight of foal                 | $0,711 \pm 0,141$      |

**Table 4:** Correlation concerning behavioral traits.

Our researches established a role of maternal behavior, as biological feature of mares, in the course of fetus preservation, and in the first days of its post-natal development. Developed in the course of sort *Eguuscaballus* evolution – such biological feature as a maternal instinct (a licking of the newborn, preservation of temperature balance, first-aid treatment in finding of an udder, etc.), it that composed which are inherent also in adayevsk horse. And, in life and dwelling the adayevsk of horses a maternal instinct, plays one of the main biological features in the course of a survival, in poor conditions of the Aralokaspiysky desert. The expressed maternal instinct has essential impact on a survival in the first days of post-natal development. It is in turn reflected in a business exit of foals in the herd contents conditions.

If to consider that with development of an oil and gas complex in this region the considerable territory of pastures is exposed to human impact, the number of the brought-down and bald-headed soils, a role and value of pasturable animal husbandry, almost only source in production of an environmentally friendly food product in this zone increases, everything increases. In this regard livestock replenishment by own reproduction as the most adapted in this zone, has incomparable advantage. However, the death of young animal in the first days of life significantly slows down livestock growth. As for reproduction problems in herd horse breeding of the Aralokaspiysk desert zone, the role of a maternal instinct at mares as the behavioral sign promoting a survival of posterity, helpless young organism, is invaluablely high.

At the same time, here it is necessary not to deny and that circumstance that is complete, the maternal behavior described above is transferred to posterity completely and is characteristic of this sort. A number of young mares, often is primiparas, leave the foals to the mercy of fate which majority in purely postural conditions perish. Judge for yourself, if case more than a half among newborns to fall to the share of foals who are left by mothers, in most cases it is mare with poorly developed maternal behavior.

By us was established that in purely postural conditions, when the newborn foal for one reason or another (most often when the young mare doesn't recognize the foal) leaves alone with environment, he perishes in the first day, and first of all from overcooling. The left lonely foals often perish, also from a lack of food, lack of milky food in the first day harmful influences to survival and a further survival. But nevertheless the specific weight of withdrawal from the overcooling, connected with leaving of the newborn occupies the considerable majority. That is why, in the course of a survival of a foal in the first days of its birth, a role of the expressed maternal instinct of a mare, undoubtedly high.

## SUMMARY

1. The horse is a type of maturely giving birth mammals, and a mare to active type of mothers. Communication of a mare and foal is strongest in first 2-3 months. It is expressed in a frequent sucking, a mutual grumming and secretion of the most part of milk from all seasonal yield of milk.
2. The maternal instinct is closely connected with a

milkiness of a mare. The mare is capable to nurse only one foal. At a disposable watering within a day at the adayevsk mares milk secreted with the minimum quantity which is necessary for feeding of the foal as only the third part of his attempts to suck is satisfied (29-36,6%) therefore the foal is early accustomed to eating of a pasture.

3. It is established that foals at the birth, had at least three congenital food reflexes, i.e. unconditional and reflex (instinctive), developed in the course of evolution of the sort *Equus*.

The first is that the power supply is in some part of a body of mother at height of the extended head because first "pokes" forward nasal part of a muzzle in search of an udder, are carried out in the majority by directly extended head, or bottom-up.

Second, not less essential congenital reflex in the biological plan, is that the newborn foal from first minutes of birth, search of the power supply (dairy nipples), makes along the white line of a abdomen on a ventral surface of a chest and abdomen, i.e. the lower part of the case, from forward feet to rear.

The third unconditioned reflex of a newborn foal, ability of his organism to consume a significant amount of milk in a short period because the milk yield at mares occurs in batches. Besides trough tongue, a form and size which is ideally corresponds to a cone-shaped mare's nipple, considerably promote this process.

Forth, a mare privacy just before childbirth is undoubtedly a congenital reflex, i.e. typical for the type (in this case a tabunny horse of the sort *Equus caballus*), appetent search behavior. All behavior of an animal consists of appetent behavior and the finishing act (consummatory act). The last and instinctive. Appetent behavior has the plasticity, but not finishing act, i.e. not the instincts.

4. Process of a licking and sniffing of a foal can't be considered as aspiration to storing of a smell of a foal, and as the finishing act (consummatory act) being instinctive after the delivery, caused by continuous accumulation of energy in the nervous centers coordinating certain physiological processes (in our example preparation of an organism for childbirth).

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