ANNALES UMCS
VOL. XXXIV(3) SECTIO EE ZOOTECHNICA 2016

Department of Ethology and Technological Basis of Animal Production
University of Life Sciences in Lublin, Akademicka 13, 20-950 Lublin
e-mail: wanda.krupa@up.lublin.pl

WANDA KRUPA, MARIA TIETZE, MONIKA BUDZYŃSKA,
LESZEK SOŁTYS, JAROSŁAW KAMIENIAK

Does a retained placenta influence the maternal behavior of mares 12-hours after foaling?

Czy zatrzymanie łożyska wpływa na zachowanie macierzyńskie klaczy w ciągu 12 godzin po porodzie?

Summary. The research was aimed at assessing whether postpartum complications (retained placenta) in mares affect the quality of their maternal behavior. The behavior of 15 multiparous mares aged 5 to 16 years during the first 12 hours after birth was analyzed. A retained placenta occurred in 7 mares. On the basis of the collected data, the average time budget and the percentage of time spent by mares of both groups in licking and sniffing the foal in the successive hours were calculated. Differences between the groups were assessed with the Mann-Whitney U test. Mares with symptoms of postpartum complications rested significantly longer in a standing position and devoted less time to eating and drinking, as well as licking and sniffing the foal, which is considered an indicator of maternal behavior.

Key words: mare, maternal behavior, retained placenta

INTRODUCTION

Care of the offspring and an appropriate course of the postnatal period play an important role in animal husbandry, as they often determine the reproductive success. The behavior of mares immediately after the parturition is hormonally stimulated and remarkably affects the connection with a foal. On the other hand, a proper protection of the foal by mare determines the demonstration of species-typical forms of behavior at optimum time, which can in turn, determine the early development of the foal [Crowell-Davis 1985, Fraser 1992, Estep *et al.* 1993, Barber and Crowell-Davis 1994, Łojek and Stojanowska 1999]. The mare's interest in the offspring immediately after foaling, manifests itself in licking, sniffing, and encouraging the foal to adopt the bridge position (sternal recumbency) and then to rise [Waring 1982, Crowell-Davis 1985, Fraser 1992]. The intensity of behavior based on sensory control is decisive for the development of emotional ties typical of the critical period, and has an effect on the manifestation of early motor behavior. Locomotive synchronization allows the foal to obtain colostrum, which

is extremely important for the acquisition of immunity [Andruskevich *et al.* 2013, Pluhaček *et al.* 2014]. The mare's maternal protective behavior can manifest as aggressive attitudes towards other intruders [Crowell-Davis 1986, Fraser 1992, Estep *et al.* 1993, Weeks *et al.* 2000]. Abnormalities in the mare's typical maternal behavior are usually attributed to the animal's lack of experience, which suggests that primiparous mares are less caring towards their foals [Estep *et al.* 1993, Łojek and Stojanowska 1999, Grogan and McDonnell 2005].

The impact of the course of parturition on the mare's behavior has rarely been the subject of research. Retained placenta after foaling is seen primarily as a problem associated with the subsequent risk for the mare's fertility, but it can also be a threat to her life [Dolente 2004, LeBlanc 2008]. This condition is defined as the failure to expel fetal membranes within 3 hours after delivery [Sevinga *et al.* 2004]. Many authors report, however, that perinatal complications can have a modifying impact on the mare's health parameters, and consequently on certain forms of her behavior [Fraser 1992, Dolente 2004, LeBlanc 2008].

The aim of the study was to determine whether a retained placenta in mares may affect their maternal behavior expressed as the interest in the foal.

MATERIAL AND METHODS

The study material consisted of 15 mares (7 Arabian and 8 Malopolska breed) aged 5–16. All mares were kept in individual stalls on straw bedding, they were normally fed and regularly used the paddock. All mares in studied group were multiparous. The retained placenta occurred in seven mares (2 Arabian and 5 Malopolska) after parturition, which were subsequently manually removed by a veterinarian. The behavior of mares during pre and post-foaling periods was monitored by a camera system (Panasonic WV BP 130) placed over the stall. The cameras were connected to video recorder (Panasonic VCR). All foalings happened between 7 p.m. and 5 a.m. On the basis of recorded material, the behavior of mares during 12 hours after foaling was analyzed. The following forms of behavior were analyzed: licking and sniffing the foal, feeding and drinking, standing, lying, motion and others (excretion of urine and feces, aggressive behavior, stereotypies). Based on the collected data, the average time budget was calculated (the percentage of analyzed forms of behavior). The share of time spent for licking and sniffing the foal in subsequent hours of observation was also calculated. Differences between the behavior of mares, at which parturition went without complications with the placenta being physiologically excreted (Group PP – physiological expulsion of placenta) and those experienced the retained placenta (Group RP – retained placenta), were estimated using the Mann-Whitney U test. Analyses were performed using Statistica 7.0 software.

RESULT AND DISCUSSION

An appropriate mare's parturition and the period directly after that, significantly influences the condition of both the newborn as well as the mare's reproductive indices. Quick expulsion of placenta has a positive effect on the involution of uterus, which is

crucial due to the commonly used practice of mating the mare during the first postpartum estrus [Fraser 1992, LeBlanc 2008, Rapacz *et al.* 2012]. Retained placenta, which occurs in the case of 2 to 10% of foalings may also be a real threat to the health and even life of mares [Sevinga *et al.* 2002, 2004, Dolente 2004]. All observed mares foaled in the supine position, and parturitions had a physiological course not requiring any assistance; time for placenta self-removal did not exceed 90 minutes. In the seven mares that required the veterinary intervention, the placenta was removed about 240 minutes after foaling. Immediately after foaling, all mares showed positive interest in their offspring and immediately began sniffing and licking them. It is the result of a well-developed mare's maternal instinct, which is confirmed by other authors [Boy and Duncan 1979, Fraser 1992, Barber and Crowell-Davis 1994, van Dierendonck *et al.* 2004]. However, Łojek and Stojanowska [1999] in their studies in maternal behavior of Thoroughbred mares, indicate that one of the sixteen assessed mares showed a clear aggression in relation to the foal. Licking the foal by mare, which is often regarded as an indicator of maternal solicitude, is aimed not only at forming the correct emotional connection, but also provokes the foal to attempt getting up quickly and to improve motoric coordination. This obviously affects the first attempts of colostrum intake, and subsequently the frequency of intake [Waring 1982, Andruskevich *et al.* 2013]. Many authors believe that the first 12 hours of life is a critical period in terms of both the immunity development and initiation the behavior patterns typical for mother-following young [Waring 1982, Fraser 1992]. Maternal postpartum care of mares also manifests in other forms of behavior. Foal protection against potential dangers can generate some aggressive behavior of a mare, either in relation to other horses or to the service. In evaluated cases, the aggression occurred sporadically and was expressed most often in the form of head shaking towards mares from neighboring stalls. Similar behavior during post-parturition period was also reported by other authors [Crowell-Davis 1985, 1986, Łojek and Stojanowska 1999].

Table 1. Average time budgets of mares during 12-hours after foaling (percent of time; x ±SE)
Tabela 1. Procentowy udział czasu przeznaczany przez klacze na różne formy aktywności w ciągu 12 godzin po wyźrebieniu (x ±SE)

Activity/ Aktywność	Group/ Grupa PP (n = 8)	Group/ Grupa RP (n = 7)
Laying/ Leżenie	13.69 ±0.47	15.89 ±0.43
Standing/ Stanie	51.03 ±1.83 a	57.56 ±1.79 b
Feeding and drinking/ Pobieranie paszy i wody	16.21 ±1.32 a	13.53 ±1.12 b
Movement/ Ruch	10.42 ±0.77	9.17 ±0.82
Licking and sniffing/ Lizanie i obwąchiwanie	7.94 ±1.12 a	3.15 ±0.98 b
Other/ Inne	0.71 ±0.01	0.70 ±0.01

Means across the corresponding row with different letters (a, b) are significantly different ($P < 0.05$)
Średnie oznaczone różnymi literami (a, b) w wierszach różnią się istotnie ($P < 0,05$)

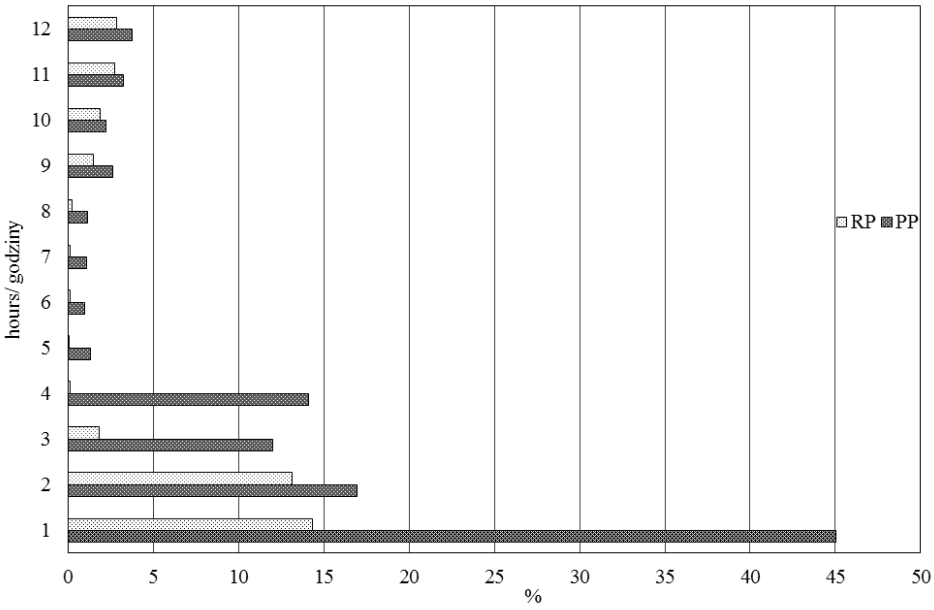

Fig. 1. Percentage of maternal behavior (licking and sniffing the foal) manifested by mares from both groups in the subsequent hours after parturition
Rys. 1. Procent czasu przeznaczany na lizanie i obwąchiwanie źrebięcia przez klacze z obu grup w kolejnych godzinach po wyźrebieniu

The average percentage of all analyzed activities observed during 12 hours after foaling was summarized in Table 1. In the case of mares, in which the placenta was physiologically expelled, larger proportion of time spent for licking and sniffing the foal as well as for feed and water intake, can be clearly seen. The first form of behavior is important in relation to undertaking early actions by a foal, and the uptake of water gives the opportunity to complement any deficit that may arise in the course of parturition [Mariella *et al.* 2014] and stimulates the colostrum production [Andruskevich *et al.* 2013]. Mares that experienced perinatal disturbances in the form of retained placenta, rested for a longer time. Rest in an upright position took them significantly more time, they also laid slightly longer. Moreover, it is interesting that mares from both groups showed positive interest in their foal immediately after parturition, but the share of time spent for licking and sniffing in the first hour considerably differed (Fig. 1). Mares, at which placenta was physiologically expelled, spent more than three times more time to implement maternal behavior. In the next three hours, their interest in the foal remained stable and varied between 12.02% (third hour) and 16.97% (second hour after foaling). Mares, that experienced the retained placenta, spent significantly smaller percentage of time for maternal behavior. Licking and sniffing the foal took them less than 15% in the first and the second, with the decline to less than 2% in the third hour. In the following hours, their interest in the foal was sporadic. It should be noted that in all mares, placenta

was removed during the fourth or early fifth hour after parturition. However, mares, in which the retained placenta occurred, were far less interested in the foal than those which did not experienced the postpartum complications. Therefore, it seems that retained placenta and the resulting changes altered the time budget. As shown by LeBlanc [2008] and Fraser [1992], mare's health disorders resulting from the parturition and perinatal period course, can modify her level of interest in foal, which in turn affects its ability to adapt in the first hours of life. Increase in the interest in foal in both mare groups was observed in the last four hours of observation, but this is most likely caused by routine service works in the stables. As indicated by Barber and Crowell-Davis [1994], Estep *et al.* [1993], Fraser [1992] and many other authors, the postpartum behavioral changes also relate to the increase in the level of interest in the foal in a situation of potential danger. This phenomenon is also accompanied by increased aggressiveness in situations that beyond the postpartum period do not cause such reactions at mares [Crowell-Davis 1985, 1986].

Achieved results suggest that retained placenta significantly reduces the time share for pursuing the different forms of behavior relevant to the species pattern. It seems that the time spent by mares with postpartum complications for maternal behavior was sufficient to develop a proper connection between mare and foal, as there was no resentment or aggression towards the offspring, which is considered as typical disorder during this period [Łojek and Stojanowska 1999, Weeks *et al.* 2000]. However, all foals, mothers of which experienced the retained placenta, showed less favorable indications of normal postnatal adaptation. They undertook their first attempts to stand up and suck later, and in the case of two foals, there was no physiological secretion of the first faeces.

CONCLUSION

Achieved results concerned a relatively small group, but they suggest that it would be advisable to precisely monitor the postnatal period in mares exhibiting a tendency to retain placenta, not only from the point of view of their current health and potential reproductive ability, but also the postnatal development of the foal.

REFERENCES

Andruskevich S.M., Perry P., Houpt K., Houpt T.R., 2013. The relation of maternal fluid balance to offspring passive immunity. Physiol. Behav. 122, 155–158.

Barber J.A., Crowell-Davis S.L., 1994. Maternal behaviour of Belgian (*Equus caballus*) mares. Appl. Anim. Behav. Sci. 41 (3–4), 161–189.

Boy V., Duncan P., 1979. Time-budgets of Camargue horses. I. Developmental changes in the time-budgets of foals. Behaviour 71, 187–202.

Crowell-Davis S.L., 1985. Nursing behaviour and maternal aggression among Welsh ponies (*Equus caballus*). Appl. Anim. Behav. Sci. 14 (1), 11–25.

Crowell-Davis S.L., 1986. Mares and foals: normal aggression. Equine Pract. 8, 30–31.

van Dierendonck M.C., Sigurjónsdóttir H., Colenbrander B., Thorhallsdóttir A.G., 2004. Differences in social behaviour between late pregnant, post-partum and barren mares in a herd of Icelandic horses. Appl. Anim. Behav. Sci. 89, 283–297.

Dolente B.A., 2004. Critical peripartum discase in the mare. Vet. Clin. North. Am. Equine Pract. 20, 151–165.

Estep D.Q., Crowell-Davis S.L., Earl-Costello S.A., Beatey S.A., 1993. Changes in the social-behaviour of draft horse (*Equus caballus*) mares coincident with foaling. Appl. Anim. Behav. Sci. 35 (3), 199–213.

Fraser A.F., 1992. The behaviour of the horse. CAB International, Wallingford.

Grogan E.H., McDonnell S.M., 2005. Mare and foal bonding and problems. Clin. Tech. Equine Pract. 4, 228–237.

LeBlanc M.M., 2008. Common peripartum problems in the mare. J. Equine Vet. Sci. 28 (11), 709–715.

Łojek J., Stojanowska A., 1999. Results of observations on maternal behaviour of thoroughbred mares during 6 hours after parturition. International Symposium: Current Directions in Breeding and Utilisation of Horses in Europe. Cracow, Poland, 480–489.

Mariella J., Pirrone A., Gentilini F., Castagnetti C., 2014. Hematologic and biochemical profiles in Standardbred mares during peripartum. Theriogenology 81, 526–534.

Pluhaček J., Olleova M., Bartoš L., Bartošova J., 2014. Time spend suckling is affected by different social organization in three zebra species. J. Zool. 292 (1), 10–17.

Rapacz A., Paździor K., Raś A., Rotkiewicz T., Janowski T.E., 2012. Retained fetal membranes in heavy draft mares associated with histological abnormalities. J. Equine Vet. Sci. 32, 38–44.

Sevinga M., Hasselink J.W., Barkema H.W., 2002. Reproductive performance of Fresian mares after retained placenta and manual removal of the placenta. Theriogenology 57, 923–930.

Sevinga M., Barkema H.W., Stryhn H., Hasselink J.W., 2004. Retained placenta in Fresian mares: incidence and potential risk factors with special emphasis on gestational length. Theriogenology 61, 851–859.

Waring G.H., 1982. Onset of behaviour patterns in the newborn foal. Equine Pract. 4, 28–34.

Weeks J.W., Crowell-Davis S.L., Caudle A.B., Heusner G.L., 2000. Aggression and social spacing in light horse (*Equus caballus*) mares and foals. Appl. Anim. Behav. Sci. 68 (4), 319–337.

Streszczenie. Celem badań była próba oceny wpływu komplikacji poporodowych (zatrzymania łożyska) na jakość troskliwości macierzyńskiej u klaczy. Analizowano zachowanie się 15 klaczy (wieloródek) w wieku od 5 do 16 lat w ciągu pierwszych 12 godzin po wyźrebieniu. Zatrzymanie łożyska wystąpiło u 7 klaczy. Na podstawie zgromadzonych danych obliczono czas przeznaczany przez klacze na różne kategorie behawioru i procent czasu przeznaczany przez klacze z obu grup na lizanie i obwąchiwanie źrebięcia w kolejnych godzinach. Różnice pomiędzy grupami oszacowano za pomocą testu U Mann-Whitneya. Klacze z komplikacjami poporodowymi istotnie dłużej odpoczywały w pozycji stojącej oraz przeznaczały mniej czasu na jedzenie i pobieranie wody, a także na okazywanie troskliwości macierzyńskiej w formie obwąchiwania i lizania źrebięcia.

Słowa kluczowe: klacz, zachowanie macierzyńskie, zatrzymanie łożyska