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A 17-YEAR SURVEY OF REPRODUCTIVE EFFICIENCY IN POLISH KONIK HORSES

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ABSTRACT

The Polish Konik Horse (PKH) is the only conservation breed of horses that descends directly from tarpans. Since 1949 the Research Station in Popielno houses one of the largest breeding PKH centers. Retrospective studies were carried out on a group of Polish Konik breeding mares from stable farming in the number of 14 to 22 mares, depending on the season (311 observations in total), aged 3–20 years and weighing 380–430 kg. The basic criteria for assessing breeding activities of stud farms were analysed, including conception, pregnancy and foaling rate. Over the period from 2000 to 2016, the conception rate was 94.21%; pregnancy rate was 93.24% and foaling rate at parturition was 86.17%. The 70.73% of mares became pregnant after the first course of mating, whereas 18.64% became pregnant after the second course of mating. The cases of early embryo resorption or twin pregnancies were sporadic (0.96% and 1.29%, respectively). The high conception, pregnancy and foaling rate is the evidence of a high reproductive potential of PKHs.

Key words: Polish Konik Horse; conservation breed; conception, pregnancy and foaling rate; breeding

INTRODUCTION

Polish Konik Horses (PKHs) are the only native breed of horses originating directly from wild tarpans (*Equus caballus gmelini* Ant.) [Pruski 1959, Pruski and Jaworowska 1963]. A sustainable and rationally conducted animal husbandry assumes maintaining biodiversity, and thus a diversified genetic pool, and the conservation of valuable phenotypic features. Breeding selection conducted to obtain and improve different breeds of horses has largely contributed to the genetic depletion of many breeds, which has led to a decline in horse health, lack of resistance to adverse environmental conditions, vulnerability to injuries and negative factors in the environment [Finno et al. 2009, Hasler et al. 2011, Nikolić 2009]. The widely-conducted natural selection in the case of PKH, i.e. with a very limited human intervention, resulted in the creation of a horse breed resistant to severe environmental conditions [Jaworski 2003]. On the PKH Stud Farm in Popielno, breeding has been continued up till now in two maintenance systems: the reserve and the stable ones. The PKHs are an excellent model for analysing the processes and behaviour patterns of their wild ancestors, and currently living wild horses. In PKH, the acceptable form of reproduction is natural mating.

This study analyses the course of breeding during 17 consecutive reproductive seasons (2000–2016) on the Popielno Farm. In addition, the study presents potential causes of infertility of mares whose analysis may be of practical importance for horse breeders.

MATERIAL AND METHODS

Animals

According to the Polish legislation, approval from the local ethics committee is not required to observe animals during routine zootechnical and veterinary activi-

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ties in a livestock herd. Breeding work consisting in the selection of partners to mate on the basis of genealogical data, carrying out the breeding process, performing basic breeding-related veterinary activities, i.e. a rectal ultrasound examination (USG) and possible administration of pharmaceuticals by a veterinary doctor in order to remove diagnosed genital organ disorders do not require the approval of the relevant ethics committee.

The research was carried out in a herd of PKH kept in a stable system (Polish Konik Horse Stud Farm in Popielno, 53° 45' 16.4" N, 21° 37' 42.1" E). The group of breeding mares consisted of 14–22 mares, depending on the reproductive season (311 observations in total), aged 3–20 years, weighing 380–430 kg. From November to the end of April the mares were kept in single boxes and released to pasture in one group for 6 h/day. During that period they were fed twice a day with oats in the amount of 1.0–1.5 kg of oats per horse per day and with mixed-grass hay in the amount of 8–10 kg per horse per day. They also ate straw from the bedding material and drank water in the stable twice a day, simultaneously having free access to water in the pasture. In order to supplement any vitamin-mineral deficiencies, licks with selenium were given to the mares. From May to the end of October the mares stayed for 24 hours in the pasture of a varied botanical composition which satisfied their dietary needs, providing constant access to water and mineral licks.

Analysed parameters

The analysis focused on the following parameters: conception rate, pregnancy rate and foaling rate. The conception rate of mares was expressed as a percentage of pregnant mares during the first ultrasound test, to the number of mated mares. The pregnancy rate of mares was expressed as a percentage of pregnant mares during the second ultrasound test to the number of mated mares. Foaling rate was expressed as a percentage of foals born alive to the mated mares. The first rectal and ultrasound (USG) examinations of pregnancies were performed between the 18th and 21st day, while the second – on the 45th day after the last mating. In the case of twin pregnancy, an additional test was performed on the 35th day after the last mating. The twin pregnancy rate was expressed as a percentage of twin pregnancy mares during the first ultrasound test, to the number of mated mares. The resorption rate was expressed as a percentage of mares that underwent the resorption, to the number of mated mares.

The percentage of mares that were fertilized in the first course of mating was compared to that of the mares that became pregnant in the second, third or fourth course of mating after starting the breeding process and of the mares that became pregnant in the first oestrus after changing the stallion. The term "first course of mating" refers to the oestrus which occurred after starting the breeding process in the stud farm, which occurred in April.

During the analysed period (2000–2016), in the herd of PKHs, a preparation containing a synthetic $PGF_{2\alpha}$ analogue, alfaprostol (Gabbrostim 2 mg/mL in the dose of 3 mg/ animal in intramuscular injection) was used in mares in which the presence of corpus luteum sensitive to $PGF_{2\alpha}$ was confirmed (from the fifth day after ovulation). In the mares which received alfaprostol, the oestrus started 48–72 hours after injection. Any undesirable side effects were observed directly after administration. Mares were mated naturally, started 72 hours after injection. In the analysed period alfaprostol was used in 45 cases.

Statistics

Before testing the differences in the number of breeding mares to the number of pregnant ones on the 18th–21st day and 45th day after the last mating and the mares after foaling, the Agostino & Pearson normality omnibus test was used to check whether the data meet the normal distribution conditions. Next, one-way ANOVA analysis with Dunett's post-hoc test (GraphPad Prism v. 6.0, San Diego, CA, USA) was used to analyse the data, which meet the normal distribution. The results showing the number of mares entering the breeding process in the particular season and the percentage of twin pregnancies and early embryo resorptions were given as mean values $\pm$ standard deviation (SD) calculated in the GraphPad Prism v.6.0 statistical package.

RESULTS

Data on number of mares included in breeding, and following breeding rates, including conception, pregnancy and foaling rate, are presented in Table 1.

From 2000 to 2016, the breeding process engaged 18.29 ± 2.114 mares (mean $\pm$ SD) per year, i.e. 14 to 22 mares. The conception rate was 94.21%. The pregnancy rate was 93.24%. The foaling rate at parturition in the PKHs stud farm in Popielno was 86.17%.

Data showed the percentage of the resorptions, twin pregnancies, pregnancies after changing the stallion and mares that were not fertilized despite of matings or not showing of the oestrus signs are presented in Table 2.

Mares that were not fertilized in any of the four consecutive heats but became pregnant in the first subsequent oestrus after changing the stallion occurred in the percentage of 0.96%. The percentage of mares with embryo resorption in the analysed period was 0.96%, whilest the percentage of twin pregnancies was 1.29% in the examined period.

Table 1. Number of mares involved in mating and conception rate, pregnancy rate and foaling rate at parturition in breeding seasons of 2000–2016 altogether

Tabela 1. Liczba klaczy uczestniczących w stanówce w latach 2000–2016 oraz wskaźnik zaźrebień, płodności i wyźrebień

Year – Rok	Involved in mating, n Klacze w rozrodzie, n	Conception rate, % Wwskaźnik zaźrebień, %	Pregnancy rate, % Płodność, %	Foaling rate at parturition, % Wskaźnik urodzeń, %
2000	15	93.33	93.33	86.66
2001	16	100.00	93.75	93.75
2002	20	95.00	95.00	90.00
2003	18	100.00	100.00	94.44
2004	19	94.73	94.73	84.21
2005	16	100.00	100.00	93.75
2006	17	94.73	94.11	88.23
2007	19	100.00	100.00	94.73
2008	19	94.73	89.47	89.47
2009	19	94.73	94.73	84.21
2010	18	100.00	94.44	88.88
2011	19	94.73	94.73	78.94
2012	20	85.00	85.00	80.00
2013	19	89.47	89.47	84.21
2014	14	92.85	92.85	85.71
2015	22	95.45	95.45	76.19
2016	21	80.95	80.95	71.42
Average – Średnio	18.29	94.21	93.24	86.17

DISCUSSION

In recent years, the population of PKHs has been increasing steadily, but considering the fact that the work on reproducing the breed started with very limited breeding material, the changes in that breed should be constantly monitored. The analysis of the affiliation of stallions and mares to separate genealogical lines indicates their uneven representation [Jaworski 1997], which influences the insufficient diversity of genetic variability and even threatens its loss [Szwaczkowski et al. 2016]. The breeding is aimed at strengthening a variety of genetic characteristics, striving for a healthy offspring, and improving animal functional traits. If the selection were indeed carried out in accordance with the above objectives, it would exclude from reproduction some individuals which represent rare genealogical lines, but are less likely to reproduce and are less likely to get offspring. The unique nature of the breed and the limited amount of breeding material necessitate a strict reproductive control in PKHs. Therefore, the research results are important for the breeders. In the analysed period, 18.29 mares on average were involved in breeding; 17.24 of the mares became pregnant, which constituted 94.21% during the first ultrasound examination and 93.24% during the second one. It is believed that the proportion of pregnancies in a well-managed horse herd is about 85–90%. The pregnancy rate in Thoroughbred mares, dependently on the studies, reached 67.8% [Lane et al. 2016], 77% [Sulivan et al. 1975], 84% [Brück et al. 1993], 87% [McKinnon 1999] and 89% [Bosh et al. 2009], in Quarter mares 85% [Sulivan et al. 1975] and in the Standardbred 89% [McKinnon 1999]. For the PKHs the pregnancy rate is extra high, especially for those widly living in forest reserves. In the herd living under reservation conditions in Roztocze National Park during 1982–2016 it was even higher (94.9%) [Pluta 2017] than that calculated in the forest reserve breeding in Popielno (90.6%) [Jaworski et al. 1996]. In the case of PKHs stud farms, the mean values reached 83.3% in Sieraków, 85.6% in Dobrzyniewo and 76.1% in Kobylniki. The mean value calculated by Pluta and Pyrz [2016] for Roztocze National Park stud farm was 78.9%. The high pregnancy rate in the herd of PKHs in Popielno found in the study deserves attention. In the wildly living horses, in which a stallion accompanies its mares permanently, the reproductive efficiency is higher than in human regulated breeding [Jaworski et al. 1996].

In a standardized breeding of horses, there is a large rotation of breeding material and infertile mares are often removed. In the case of a conservation breed, where the number of individuals capable of breeding is limited, the removal of mares from the breeding stock before several attempts to fertilize them is impossible. Although mares may be able to reproduce at an advanced age, degenerative changes observed in the uterine endometrium of the mares, i.e. fibrosis (*endometritis fibrosis cystica*), which are irreversible and age-related [Hoffman et al. 2003], ne-

Table 2. Number of mares involved in mating as compared to the mares which became pregnant in subsequent heats (based on ultrasound examination) in breeding seasons of years 2000–2016, including the mares pregnant after the change of stallion, underwent resorption or with confirmed twin pregnancy, non pregnant despite matings and without signs of oestrus.

Tabela 2. Klacze uczestniczące w rozrodzie w kolejnych sezonach (2000–2016) w stosunku do klaczy źrebnych, które zaźrebiły się w wyniku krycia w kolejnych rujach (w oparciu o badanie USG), źrebne po zmianie ogiera, klacze u których stwierdzono resorpcję zarodka, ciążę bliźniaczą, nieźrebne mimo kryć i nie wykazujące objawów rui.

Number of mares, n/year Klacze, n/rok	Involved in mating, n Klacze będące w rozrodzie, n	Pregnant after mating in the first heat, % Klacze źrebne po kryciu w pierwszej rui od rozpoczęcia stanówki, %	Pregnant after mating in the second heat, % Klacze źrebne po kryciu w drugiej rui od rozpoczęcia stanówki, %	Pregnant after mating in the third heat, % Klacze źrebne po kryciu w trzeciej rui od rozpoczęcia stanówki, %	Pregnant after the fourth heat, % Klacze źrebne po kryciu w czwartej rui od rozpoczęcia stanówki, %	Pregnant after the change of stallion, % Klacze źrebne po zmianie ogiera, %	Resorption, % Resorpcja, %	Twin pregnancy, % Ciąża bliźniacza, %	Not pregnant despite matings, % Nieźrebne mimo kryć, %	Without signs of oestrus, % Klacze nie wykazujące objawów rui, %
2000	15	80.00	13.33	–	–	–	–	–	6.66	–
2001	16	62.50	31.25	–	6.25	–	6.25	–	–	–
2002	20	50.00	35.00	10.00	–	–	–	–	–	5.00
2003	18	77.77	16.66	5.55	–	–	–	–	–	–
2004	19	73.68	15.78	5.26	–	–	–	5.26^	5.26	–
2005	16	75.00	25.00	–	–	–	–	6.25^	–	–
2006	17	70.58	23.52	5.88	–	–	5.88*	5.88^	–	–
2007	19	68.42	31.57	–	–	–	–	–	–	–
2008	19	47.36	36.84	5.26	–	5.26	5.26	15.78/10.52^	5.26	–
2009	19	73.68	21.05	–	–	–	–	–	–	5.26
2010	18	72.22	16.66	11.11	–	–	–	–	–	–
2011	19	63.15	21.05	10.52	–	–	–	–	–	5.26
2012	20	75.00	5.00	–	5.00	–	–	–	–	15.00
2013	19	89.47	–	–	–	5.26	–	–	5.26	5.26
2014	14	71.42	7.14	7.14	7.14	–	–	–	–	7.14
2015	22	77.27	13.63	–	–	4.54	–	–	–	4.54
2016	21	76.19	4.76	–	–	–	–	–	14.28	4.76
Total:	18.29	70.73	18.64	3.53	0.96	0.96	0.96	1.29	2.25	2.93

* Successfully fertilized after embryo resorption.
^ Twin pregnancy, which underwent spontaneous reduction to a single pregnancy.
* Źrebne mimo wcześniejszej resorpcji zarodka.
^ Ciąża bliźniacza, która uległa spontanicznej redukcji do ciąży pojedynczej.

gatively affect fertility by disorders of the uterine mucosal secretion and the change in the intrauterine microenvironment. In Thoroughbred horses of over 13 years of age, changes related to the aging of the reproductive organs are a major factor limiting reproduction [Hemberg et al. 2004; Morris and Allen 2002]. However, in the case of PKHs, mares are used in breeding for many years, usually up to the age of 20 years, and in the reserve breeding often even longer, up to 30 years of age [Jaworski 2003, Jezierski and Jaworski 1999]. Certainly, the reproductive period is not that long in all the mares, but considering the fact that the first fertilization in stable breeding conditions occurs in 3-year-old mares and in reserve conditions in 2-year-old mares [Jaworski 2003, Jezierski and Jaworski 1999] and usually mares are mated every year, the percentage of pregnant mares amounting to 94% can be considered as highly satisfactory. Especially since the percentage is higher than in years 1956–1995, when it amounted to 86.8% for the stable breeding herd of mares in Popielno [Jaworski et al. 1996]. As there is no research on the development of degenerative changes in the uterine endometrium along with the age of PKHs, it is not possible to draw firm conclusions about the causes of infertility in older mares. Nevertheless, studies conducted on free living ponies, based on endometrial biopsies, showed that the percentage of mares in Kenney categories I or IIA was very high, regardless of age. Mares with endometrium of Kenney category IIB were sparse, and no mare had degenerative lesions identified as Kenney category III [McDonell et al. 2014].

The high proportion of pregnancies in the herd of PKHs in Popielno may also result from the organization of mating and the fact that the mares are mated with selected stallions for several consecutive heats if they do not become pregnant during the first oestrus after starting the breeding process. Multiple matings during the breeding season usually result in pregnancy, however are not satisfactorying from economical and logistic point of view.

The analysis of data indicates that the overwhelming majority of mares, 70.73%, became pregnant during the initial breeding course. We observed that a part of mares did not manifest any symptoms characteristic of the oestrous phase 7–9 days after foaling, i.e. during the period when the oestrus should physiologically occur [Nagy et al. 1998; Sharma et al. 2010]. Even though, postpartum involution of the uterus in mares occurs very smoothly, compared to other species of the livestock [Okano and Tomizuka 1987, Shrestha et al. 2004, Jischa et al. 2008, McKinnon et al. 2010]. Quick involution of the uterus together with the absence of negative feedback caused by high concentration of prolactin in the secretion of gonadotropin from the pituitary enable early occurrence of foaling oestrus [Nagy et al. 1998, Sharma et al. 2010]. However, most of the mares were subjected to breeding in the second oestrus after foaling. The potential time of breeding was assessed based on the reproductive history and date of foaling and confirmed by USG examination as well as the acceptance of the stallion by the mare and her readiness to mate. The first ultrasound examination to confirm pregnancy was performed between the 18th and 21st day after the last mating. During that examination, attention was paid to the presence or absence of embryonic follicle, potential twin pregnancy or presence of fluid in the uterine lumen. The second ultrasound examination was performed on the 45th day after the last mating.

During the analysed period, 6 cases of twin pregnancies (1.29%) were reported. In 2004, 2005 and 2006, twin pregnancies were found in Bryza mare, and in 2008 again in Bryza and two other mares. Multiple ovulation in all the six cases was spontaneous. In ponies and horses of primitive breeds, the occurrence of multiple ovulations is reported relatively rarely [Wesson and Ginther 1981]. The percentage of spontaneously occurring multiple ovulations amounts to 6.5%, whereas the pharmacological substances used in horse reproduction, mainly for follicular maturation and synchronization of the oestrus, can increase this percentage to 16.6% [Veronesi et al. 2003]. According to the same authors, the highest frequency of multiple ovulation is achieved by using the prostaglandin $F_{2\alpha}$ ($PGF_{2\alpha}$) analogue (cloprostenol in the dose of 0.5 mg) with human chorionic gonadotropin (hCG) in the dose of 5000 IU. All twin pregnancies in the analysed herd were unicornuate twin pregnancies and were spontaneously reduced before the 35th day of gestation. In the case of Bryza mare, the control study confirmed that the pregnancy continues to develop as a normal single pregnancy. In 2008 the presence of twin pregnancy in Bryza mare was confirmed again. Then, a spontaneous resorption of one embryo occurred again, and the pregnancy developed further as a single pregnancy, as in the case of the second mare. However, in the third mare the resorption of both embryos took place.

If mating proved to be ineffective, and no abnormality (i.e. fluid in the lumen of the uterus) was found in the ultrasound examination, then the mare was mated in the following oestrus. Unfortunately, based on retrospective data from 2000–2016, it is not possible to clearly identify the reasons why some mares did not become pregnant in following matings. It cannot be excluded that some mares in that group had been fertilized, but spontaneous resorption of the embryo occurred very quickly. Based on the available data, only three resorptions were reported in the herd of PKHs in the analysed period: between the first ultrasound examination performed between day 18 and day 21 after last mating and the second examination performed on day 45 after the last mating. Thus, it cannot be denied that in single mares there was resorption of the embryo even before the first ultrasound examina-

tion, which could explain the absence of pregnancy after mating in the first possible oestrus. During the examination between day 18 and day 21 after mating, a sporadic presence of a small amount of uterine fluid was reported in the lumen of the uterus, which could also result from a delayed reaction of inflammatory suppression after mating. Shortly after mating, bacteria and dead spermatozoa are opsonized in the lumen of the mare's uterus, and the presence of bacteria and sperm causes the onset of proinflammatory cytokine release and neutrophil recruitment [Woodward et al. 2013, Woodward and Troedsson 2015]. Migration of neutrophils is accompanied by the release of $PGF_{2\alpha}$, which causes myometrial contractions. Uterine contractions are responsible for cleaning the inside of the uterus of dead sperm, bacteria and impurities. About 6 hours after mating, the inflammatory response is the most intense, but after 12 hours since mating, the inflammatory process and uterine contraction activity begin to weaken [Woodward et al. 2013, Woodward and Troedsson 2015]. In mares resistant to post-mating-induced endometritis (PMIE), the end of the uterine purification process is completed in about 24 hours after mating. On the other hand, in sensitive mares, the process is prolonged and the most important role in the pathogenesis of PMIE is attributed to the disorders of uterine contractility and physical cleaning of impurities from the uterus [Woodward and Troedsson 2015]. In some mares, the proinflammatory response is excessive and is not suppressed in due time, leading to a clinical or subclinical form of endometritis [Fumoso et al. 2003, LeBlanc 2010, Woodward et al. 2013]. Endometritis causes immune-endocrine changes in the mucous membrane and disorders of the uterine microenvironment [Gajos et al. 2015, Siemieniuch et al. 2016], which may consequently lead to early embryonic losses [LeBlanc and Causey 2009].

In the controlled reproduction of horses, in order to shorten the luteal phase or to restore ovarian activity, $PGF_{2\alpha}$ is used, which exhibits the strongest luteolytic activity in mares [Ginther 2009]. Alfaprostol causes a rapid decrease in the peripheral progesterone concentration as a result of functional luteolysis [Johnson et al. 1988]. In this study, alfaprostol was administered to 45 PKH' mares. Some of them showed a positive response and the return of cyclic ovarian activity, which allowed 22 mares to become pregnant. In the other cases, the expected response to alfaprostol was not achieved, which eventually made the mares unable to become pregnant.

The choice of parenting pairs for breeding is the essential and most important stage in the breeding work on horse improvement, responsible for the final breeding effects in the form of a new generation of offspring [Giontella et al. 2018, Polish Horse Breeders Association 2018]. In the case of five mares, despite mating with a proven stallion in four consecutive oestruses, no pregnancy was confirmed in the ultrasound examination. Unfortunately, based on the collected data, it is impossible to answer the question whether these mares got pregnant and then experienced early death of the embryo or did not get pregnant at all. Because ultrasound examinations did not show any changes or abnormalities in the endometrium or the lumen of the uterus, it can be suspected that the mares were not fertilized by stallions chosen on the basis of a genealogical analysis. This hypothesis may be confirmed by the fact that after the change of the stallion, the mares were fertilized in the first oestrus. Earlier reports indicate that the choice of a stallion to mate with a mare may not be accidental but linked to major histocompatibility complex (MHC). The relationship between partner selection and MHC was observed in humans and mice [Penn and Potts 1998], where partners favour individuals different from themselves with respect to MHC [Wedekind et al. 1995]. Spontaneous selection of MHC diversified partners results in a desirable increase in heterozygosity in the offspring and prevents the growth of inbreeding. Studies carried out on a group of 19 mares of different breeds which were in contact with 6 stallions showed a tendency in oestrus mares to select partners with a different set of alleles within the MHC [Burger et al. 2010]. It can be assumed that the genes of the MHC or the genes related with them affect the choice of partners, and in the absence of choice, problems with fertilization or early embryonic death may be a consequence of the natural mechanism of protection against the growth of inbreeding and/or the delivery of offspring with lethal or sublethal defects.

CONCLUSION

The fertility rates in the herd of PKHs were higher than in the other reviewed breeds and similar to results obtained for PKHs in other studs in Poland. Mares of the PKHs usually got pregnant easily in the first course of mating. The majority of mares did not need reapiting mating in the following oestrus. Twin pregnancies or embryo resorptions occured occasionally. High conception rate, pregnancy rate and foaling rate at parturition obtained in this study confirmed a high reproductive potential of PKHs.

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OCENA AKTYWNOŚCI HODOWLANEJ KLACZY KONIKA POLSKIEGO NA PODSTAWIE OBSERWACJI PROWADZONYCH PODCZAS 17 SEZONÓW

STRESZCZENIE

Koniki polskie są jedyną zachowawczą rasą koni wywodzącą się bezpośrednio od dzikich tarpanów. Od roku 1949 Stacja Badawcza w Popielnie prowadzi jeden z największych ośrodków hodowli koników polskich w kraju. Badania retrospektywne przeprowadzono na grupie klaczy hodowlanych konika polskiego z hodowli stajennej, liczącej w zależności od sezonu, 14–22 klacze (w sumie 311 „klaczosezonów"), w wieku 3–20 lat, o masie ciała 380–430 kg. Analizie poddano podstawowe kryteria oceny działalności hodowlanej stadnin, do których należą: źrebność i płodność klaczy oraz liczba urodzonych źrebiąt. W latach 2000–2016 do stanówki przystąpiło średnio 18,29 klaczy. Wskaźnik źrebności był na poziomie 94,21%, wskaźnik płodności 93,24%, natomiast wskaźnik wyźrebień wyniósł 86,17%. 70,73% klaczy zaźrebiało się podczas pierwszego cyklu kryć, natomiast w kolejnej rui zaźrebiało się 18,64% klaczy. W stadzie hodowlanym w grupie stajennej koników polskich w Popielnie resorpcja zarodków oraz ciąża bliźniacza występowały sporadycznie sporadycznie (odpowiednio: 0,96% i 1,29%). Pojedyncze klacze zaźrebiały się jedynie po zmianie ogiera (0,96%). Zanotowano również przypadki klaczy, które nie zaźrebiły się, mimo krycia sprawdzonym ogierem (2,25%), jak również klacze nie wykazujące objawów rui (2,93%). Wysokie wskaźniki hodowlane świadczą o dobrej organizacji hodowli i wysokim potencjale rozrodczym koników polskich.

Słowa kluczowe: konik polski, rasa zachowawcza, wskaźnik zaźrebień, płodność, wskaźnik urodzeń, hodowla