FACTORS AFFECTING SPERM SURVIVAL IN CERVICAL MUCUS AND PREGNANCY RATES OF OVSYNCH-TREATED HOLSTEIN COWS*

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The objective of this study was to determine effect of insemination year, insemination season, parity, number of AI, days in milk, fat corrected milk production in the 1st 100 lactation days, disease occurrence (retained placenta, endometritis, or cysts) and their influence on sperm motility (SM) during 30, 60 and 90 minutes of the cervical mucus survival test ($n = 381$) or pregnancy rates (PR) in Ovsynch-treated Holstein cows ($n = 314$). Insemination year had a significant effect on sperm motility ($P < 0.0001$). Significant differences related to the insemination season were determined during the entire test time ($P < 0.05$ to $P < 0.001$). Cows inseminated from 15th May to 14th September demonstrated the lowest SM and PR, too. Highest sperm survival ability in primiparous cows ($P < 0.05$–0.01) was not confirmed by significantly better conception. No statistical significance was detected for the effect of the number of inseminations. Differences in SM in relation to number of lactation days were statisticaly non-significant and very low, and the highest PR was detected in cows inseminated from 144 to 168 days of lactation. The lowest fat corrected milk production during the first 100 lactation days significantly related to the lowest SM at the beginning of the survival test. Cows with retained placenta after calving had lower SM ($P < 0.05$) and worse PR by 5.86%. Cyst occurrence had significant influence to decline of 13.61% in PR ($P < 0.05$) and multiple cyst frequency during lactation influenced decreasing pregnancy by 20.53% ($P < 0.05$). The best SM after 30 minutes signified the highest motility in the 60th or 90th minute as well ($P < 0.01$ – $P < 0.001$). Significantly higher PR ($P < 0.05$) was determined in cows with higher SM after 30 and 60 minutes of test.

Holstein cows; reproduction; milk production; health; sperm motility; cervical mucus

INTRODUCTION

It has been reported that increased milk production had been associated with a decrease in fertility in Holstein population, from 65 to 40%, during the last 40 years (Lucy, 2001). Chebel et al. (2004) described reduced conception rate in cows exposed to heat stress in summer months. Jamrozik et al. (2005) included effect of parity and number of services to their estimates of genetic parameters of reproduction traits. One of the major factors contributing to poor fertility of a dairy herd is ineffective detection of oestrus (Van Eerdenburg et al., 2006). According to Schonkypl and Aurich (2003), fertility management in cattle includes the use of hormones or the Ovsynch programme and timed AI. Tsiligiani et al. (2001) found significantly higher sperm penetration in cervical mucus and differences in the physical properties in normal and synchronized heat. Taş et al. (2006) found an individual effect among bulls on sperm penetration and pregnancy.

The objective of this study was to determine effect of insemination year, insemination season, parity, number of inseminations, lactation days, fat corrected milk production in the 1st 100 days of lactation or disease occurrence in a lactation to sperm motility during 30, 60 and 90 minutes of the survival test in the cervical mucus, and pregnancy rates in Ovsynch-treated Holstein cows.

MATERIAL AND METHODS

Data and samples were collected at the university dairy farm Ruda with 423 purebred Holstein cows. Cervical mucus samples were collected and analysed from May 2005 to March 2007 ($n = 381$). Cows were calved from April 2004 to November 2006 from the first to the eighth lactation, with the average parity 2.28. The average daily milk production in the first month of lactation was 33.15 kg with a protein content of 3.27%, 3551.5 kg of milk with a protein content of 3.19% in the first 100 days of lactation, and 10014.2 kg of milk with a protein content of 3.28% in 305 days of lactation. TMR feed ration was based on preserved components during the whole year and did not change over the year. Feed ration consisted of basic components: corn silage, alfalfa silage, straw, hay, alfalfa hay, supplement concentrate, draft, waste brad, molasses and minerals. Portion of components was in relation to daily milk production of cows in individual groups. Cows with or without health disorders before insemination were treated with OVSYNCH for oestrus synchronization

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and bred by timed AI. Ultrasound detection of reproduction organ's health was made for the first time between 45th and 70th days of lactation. Subsumption of cows to OVSYNCH group was realized based on ultrasound investigation of ovaries and uterus and prerequisites for OVSYNCH treatment were presence of function corpus luteum or follicles in different stage of evolution or ovarian cysts and body condition on the level 2.5 points at least. Cows differed in heat or AI frequency before ultrasound, part of cows (n = 178) was inseminated before ultrasound and OVSYNCH treatment already. All cows were health at the time of subsumption to OVSYNCH group, but they differed in occurrence of health disorders before ultrasound investigation (retained placenta, n = 29, endometritis, n = 32, ovarian cyst, n = 322). The average values of reproduction parametres were 2.63 AI services per conception, 106.5 days from calving to the first AI, and 198.6 open days. Health disorders were noted in 87.93% of cows of this trial group. Retained placenta was reported in 7.61%, endometritis in 6.88%, and ovarian cysts in 85.41% of cases, with 38.15% of multiple incidence.

Cows were treated with OVSYNCH heat synchronization with timed AI. The cow treatment consisted of a gonadotropin-releasing hormone injection followed by one injection of PGF2α 7 days later, and a second GnRH injection 48 hours after PGF2α with the timed AI after 18 hours. A sperm survival test in the cervical mucus for assessment of cows' ability to conceive was performed. The cervical mucus was drained with a sterile pipette by the recto-vaginal method at the time of insemination in all cows. Samples were transported at 4 °C temperature to the university laboratory within 2 hours. Motion of the bull's sperm in cervical mucus was evaluated by microscopic checking. The percentage rate of progressively moving sperm cells was evaluated using a microscope with phase contrast. Frozen insemination doses of five Holstein bulls were used in the tests. Sperm motility after thawing was 50% on the average. The motility values were detected after 30, 60, and 90 minutes of the test duration in a water bath at a temperature of 38 ± 1 °C. Sperm motility in the cervical mucus survival test was estimated on the following scale: 0% – without, 1% – sporadic, 10%, 20%, 30%, 40%, and 50%. Control insemination doses were evaluated by the same procedure, but without cervical mucus. The average motility of the control measuring was 50, 40 and 30% respectively.

The year and season of insemination, parity, and milk production data were collected from the milk recording reports. The interval from calving to the evaluation date, i.e. the number of lactation days on the day of AI, including cervical mucus sampling, and the number of inseminations were obtained from the AI records for each cow. Cows' occurrence of health disorders such as retained placenta, endometritis, and ovarian cysts before evaluation were obtained from the herd personnel or the herd veterinarian's farm records. Grouping of cows was done in relation to fat corrected milk production (FCM100) in the first 100 lactation days (concerning $\bar{x}$ and s_d) and to the number of lactation days (DIM) (in accordance with the number and length of the oestral cycle).

Data were analyzed by the statistical program SAS STAT 8.0 – GLM (SAS, 2001), the general linear model being:

$$Y_{ijklmno} = \mu + A_i + B_j + C_k + D_l + F_m + G_n + e_{ijklmno}$$

where:

$Y_{ijklmno}$ – observed value of the trait as a dependent variable (cervical mucus sperm motility in %, AI result – pregnant/non-pregnant)

μ – average value of dependent variable

A_i – effect of i-AI year (i = 2005, 2006, 2007)

B_j – effect of j-AI season (j = 1 – from 15th December to 14th May, 2 – from 15th May to 14th September, 3 – 15th September to 14th December)

C_k – effect of k-parity of cows (k = 1st, 2nd, 3rd and other lactations)

D_l – effect of l-AI number (l = 1st, 2nd, 3rd and next AI)

F_m – effect of m-interval of lactation days at AI (m = 1 – ≤ 72 days, 2 – 73–96 days, 3 – 97–120 days, 4 – 121–144 days, 5 – 145–168 days, 6 – 169–216 days, 7 – 217 days ≥)

G_n – effect of n-group of fat corrected milk production in the first 100 lactation days (n = 1 – $< \bar{x} - s_d$, 2 – from $\bar{x} - s_d$ to $\bar{x} - 0.25\ s_d$, 3 – from $\bar{x} - 0.25\ s_d$ to $\bar{x} + 0.25\ s_d$, 4 – from $\bar{x} + 0.25\ s_d$ to $\bar{x} + s_d$, 5 – $\bar{x} + s_d >$)

$e_{ijklmno}$ – residual effects

Evaluation of the effect of health disorders, or cervical mucus sperm motility was based on the same general linear model supplemented with

H_o – fixed effect of o-occurrence of retained placenta or endometritis or ovarian cysts or ovarian cyst frequency (o = 1 – without disorder or 1x ovarian cyst occurrence, 2 – disorder occurrence or multiple ovarian cyst occurrence) or fixed effect of o-cervical mucus sperm motility in % after 30, 60, and 90 minutes (o = 1 – ≤ 1%, 2 – 10%, 3 – 20%, 4 – 30% after 30, 60, and 90 minutes, and also 5 – 40% ≥ after 30 minutes).

The numbers of animals in the individual classes within the framework of fixed effects by AI number/order were: 1st = 127, 2nd = 69, 3rd = 88.

Differences between dependent variables were tested on the levels of significance $P < 0.05$ (*); $P < 0.01$ (**) and $P < 0.001$ (***).

RESULTS

The objective of this study was to determine effect of insemination year, insemination season, parity, number of lactation, lactation days, number of inseminations, and fat corrected milk production in the 1st 100 days of lactation or disease occurrence in a lactation to sperm motility during 30, 60 and 90 minutes of the survival test in the cervical mucus, and pregnancy rates in Ovsynch-treated Holstein cows.

Sperm motility after 30, 60 and 90 minutes of a survival test in 381 cervical mucus samples collected from 314 Holstein cows and their pregnancy rates were determined. Average sperm motility in the cervical mucus sam-

Table 1. Sperm motility after 30 (SM30), 60 (SM60), and 90 (SM90) minutes of survival test and pregnancy rate (PR) in relation to insemination year (AIY) and season (AIS), number of lactation (NL), days in milk (DIM), and fat corrected milk production in the 1st 100 days of lactation (FCM100)

		n	SM30			SM60			SM90			PR		
			μ + α	SE	*P*	μ + α	SE	*P*	μ + α	SE	*P*	μ + α	SE	*P*
AIY	1. (2005)	150	25.65	1.17		15.96	1.21		10.14	0.98		40.35	5.76	
	2. (2006)	170	9.61	1.13	1–2,3***, 2–3***	4.65	1.08	1–2,3***, 2–3***	2.49	0.94	1–2,3***, 2–3*	35.75	5.55	
	3. (2007)	61	1.80	1.85		–0.05	1.77		–0.96	1.54		37.26	10.3	
AIS	1. 15. 12.–14. 5.	170	18.00	1.02		11.97	0.97		7.85	0.85		39.53	5.31	
	2. 15. 5.–14. 9.	86	7.17	1.71	1–2,3***, 2–3***	2.39	1.64	1–2,3***, 2–3*	0.83	1.43	1–2,3***	33.47	8.61	
	3. 15. 9.–14. 12.	125	11.88	1.27		6.20	1.21		3.00	1.05		40.35	6.55	
NL	1st lactation	203	13.75	1.33		9.07	1.28		5.91	1.11		42.71	6.96	
	2nd lactation	80	11.81	1.27		6.03	1.22	1–3*	3.62	1.06	1–3**	35.00	6.67	
	3rd and later lactation	98	11.50	1.12		5.46	1.08		2.14	0.94		35.63	5.84	
DIM	1. (≤ 72 days)	48	14.07	1.95		6.74	1.87		3.57	1.62		33.63	9.95	
	2. (73–96 days)	57	13.52	1.81		8.91	1.73		6.03	1.51		35.97	9.12	
	3. (97–120 days)	32	12.98	2.16		6.11	2.07		4.74	1.80		26.58	11.04	
	4. (121–144 days)	65	12.23	1.57		7.10	1.50		3.50	1.31	2–6*	26.76	8.46	4–5,7*
	5. (145–168 days)	39	12.00	1.81		6.81	1.73		3.61	1.51		48.98	8.94	
	6. (169–216 days)	57	10.53	1.48		5.32	1.41		1.78	1.23		42.79	7.67	
	7. (217 days ≥)	83	11.12	1.59		7.00	1.52		3.99	1.32		49.77	7.94	
FCM 100	1. (≤ 2800 kg)	57	9.80	1.63		5.07	1.56		2.17	1.36		37.13	8.37	
	2. (2801–3386 kg)	106	12.99	1.29		6.92	1.23		4.45	1.07		38.03	6.64	
	3. (3387–3778 kg)	78	13.66	1.32	1–3,5*	8.82	1.26	1–3,5*, 3–4**, 4–5**	5.34	1.10	3–4*, 4–5*	36.84	7.05	
	4. (3779–4365 kg)	70	11.33	1.49		3.99	1.42		2.21	1.24		44.18	7.56	
	5. (4366 kg ≥)	69	13.98	1.62		9.47	1.55		5.28	1.35		35.74	8.13	

P = levels of statistical significance of differences among groups: $P < 0.05$ (*), $P < 0.01$ (**), $P < 0.001$ (***)

ples were 15.95%, 9.88%, and 5.89% at 30, 60 and 90 minutes during the survival test. The average pregnancy rate of cows was 42.70%.

Table 1 demonstrates the results in relation to insemination year (AIY) and season (AIS), lactation number (NL), days in milk (DIM) – groups, which were established in accordance with lactation days, and milk production (FCM100) – groups, which were established in accordance with milk production during 100 days of lactation.

Sperm motility was significantly declining from the year 2005 to 2007 ($P < 0.05$ to $P < 0.001$), while significant differences were not found in pregnancy rate during this period.

Significant differences related to the insemination season were determined during the entire test time. In the case of cows inseminated from 15th May to 14th September the lowest sperm motility ($P < 0.05$ to $P < 0.001$) and pregnancy rate were detected.

The best sperm motility was found in cows during the 1st lactation. This trend was significant ($P < 0.05$ to $P < 0.01$) after 60 and 90 minutes. Decline in primiparous cows' sperm motility during the test was lower than in cows on the 2nd and subsequent lactations. Higher sperm survival ability was not confirmed by better conception in primiparous cows.

No significant differences in sperm motility during the survival test or in the pregnancy rate in relation to the number of inseminations were detected.

Differences in sperm motility in relation to number of lactation days were statisticaly non-significant and very low. Lowest level of pregnancy was achieved by cows inseminated between 97 and 144 days of lactation and the highest pregnancy rate was detected in cows inseminated from 144 to 168 days of lactation.

The lowest fat corrected milk production during the first 100 lactation days significantly related to the lowest sperm motility at the beginning of the test ($P < 0.05$). The group of cows giving 3779–4365 kg of FCM ($\bar{x} + 0.25\ s_d$ to $\bar{x} + s_d$) had the greatest decline in sperm motility during the whole test. However, the lowest pregnancy rate was detected in cows with FCM production on the average of evaluated group ($\bar{x} - 0.25\ s_d$ to $\bar{x} + 0.25\ s_d$).

Table 2 illustrates the effect of the cows' health disorders. Significant differences were observed, when evaluation was made, depending on the type of disorder. Cows with retained placenta (REPL) after calving had lower sperm motility by 4.17% in the 30th minute, 3.73% in the 60th minute, and 3.52% in the 90th minute ($P < 0.05$), but their pregnancy rate did not differed significantly. In endometritis-affected conception after monitored inseminations (END), the difference was 26.31% in favour of cows

Table 2. Sperm motility after 30 (SM30), 60 (SM60), and 90 (SM90) minutes of survival test and pregnancy rate (PR) in relation to retained placenta (REPL), endometritis (END), ovarian cyst (OC), and multiple ovarian cyst occurrence (MOC)

		n	SM30			SM60			SM90			PR		
			μ + α	SE	*P*	μ + α	SE	*P*	μ + α	SE	*P*	μ + α	SE	*P*
REPL	1. (no)	352	12.65	0.86	*	7.12	0.83	*	4.14	0.72	*	38.24	4.71	
	2. (yes)	29	8.48	2.15		3.39	2.06		0.62	1.79		32.38	10.79	
END	1. (no)	349	12.25	0.86		6.77	0.82		3.80	0.71		37.87	4.64	*
	2. (yes)	32	11.18	2.33		5.86	2.22		1.98	1.93		11.56	11.40	
OC	1. (no)	55	14.57	1.55		8.81	1.47		5.25	1.28		47.58	7.75	*
	2. (yes)	322	11.69	0.92		6.31	0.88		3.45	0.76		33.97	5.02	
MOC	1. (1x)	104	6.56	4.02		1.42	4.18		1.46	3.82		53.36	18.91	*
	2. (2x ≥)	105	7.67	4.13		2.07	4.29		1.11	3.92		32.83	19.40	

P = levels of statistical significance of differences among groups: $P < 0.05$ (*), $P < 0.01$ (**), $P < 0.001$ (***)

Table 3. Relationships between sperm motility after 30 (SM30), 60 (SM60), 90 (SM90) minutes of survival test, and also pregnancy rate (PR)

		n	SM60				SM90				PR			
			μ + α	SE	*P*	*r* (*P*)	μ + α	SE	*P*	*r* (*P*)	μ + α	SE	*P*	*r* (*P*)
SM30	1. (≤ 1%)	99	0.15	0.70	1–2,3,4,5***, 2–3,4,5***, 3–4,5***, 5–6**	0.7844 (0.0001)	0.25	0.79	1–3,4,5 ***, 2–3,4,5 ***, 3–4,5 ***, 4–5*	0.5947 (0.0001)	35.38	5.84	1–4*	0.1068 (0.0419)
	2. (10%)	89	4.40	0.75			1.33	0.84			43.15	6.06		
	3. (20%)	86	10.23	0.82			6.00	0.92			42.42	6.72		
	4. (30%)	88	21.43	0.89			12.79	1.00			55.01	7.13		
	5. (40 % ≥)	19	27.18	1.83			16.76	2.05			60.18	14.24		
SM60	1. (≤ 1%)	182					0.08	0.44		0.8178 (0.0001)	38.94	4.76	1–4*	0.0935 (0.0752)
	2. (10%)	88					3.10	0.61			45.12	6.06		
	3. (20%)	58					12.90	0.79			41.00	8.05		
	4. (30% ≥)	53					21.58	0.87			57.30	8.74		
SM90	1. (≤ 1%)	259									41.40	4.30		0.0545 (0.3008)
	2. (10%)	56									46.10	7.68		
	3. (20%)	41									39.37	8.99		
	4. (30% ≥)	25									55.82	11.59		

P = levels of statistical significance of differences among groups: $P < 0.05$ (*), $P < 0.01$ (**), $P < 0.001$ (***)

without endometritis disorder ($P < 0.05$). A trend of higher sperm motility in cervical mucus of healthy cows was determined, but differences were not significant. Cyst occurrence (OC) had significant influence to decline of 13.61% in pregnancy rate ($P < 0.05$). While multiple cyst frequency (MOC) during lactation influenced decreasing pregnancy by 20.53% in observed inseminations ($P < 0.05$), on the other hand, no differences were detected in sperm motility during the test.

Table 3 describes relationships between sperm motility in the survival test and observed insemination results. The lowest sperm motility at the beginning of the test means the worst results during the entire test time. The best sperm motility after 30 minutes signified the highest motility in the 60th or 90th minute as well ($P < 0.01$ – $P < 0.001$). Pearson's correlation coefficients confirm this significant relationship ($P < 0.001$). Higher pregnancy ($P < 0.05$) was determined in cows with higher sperm motility after 30 and 60 minutes of test.

DISCUSSION

Problems associated with cows' reproduction include inability to detect oestrus properly and altered hormone profiles resulting in low conception (M o o r e, T h a t c h e r, 2006). We found that the conception rate increased only a little in Ovsynch cows compared to the herd average by only 2.97–5.8%. R a b i e e et al. (2005) noted little or no significant improvement in pregnancy rates using Ovsynch over other programs. Our results indicate that hormonal treatment does not mean consequent increase of dairy cows pregnancy rate.

Our sperm motility and pregnancy results in relation to the AI season, when the lowest results were detected in cows inseminated from the half of May to half of September, correspond to the findings of G a n d o t r a et al. (2006), who confirmed significantly low sperm penetration in summer on the basis of chemical changes in mucus. C o l l i e r et al. (2006) believed that oestrus behavior and reproduction figures are adversely affected by heat stress and that it offers the posibility of timed AI schemes in the warm summer months. Our result does not confirm positive effect of timed AI with OVSYNCH to pregnancy rate when OVSYNCH was used on a large scale in evaluated dairy herd during summer months. Explanation of this fact can consist in variable reaction of cows to hormonal treatment.

We have stated that primiparous cows achieved higher sperm motility after 60 and 90 test minutes ($P < 0.05$ – $P < 0.01$) and higher pregnancy rate than cows in 2nd or subsequent lactations. Řezáč and Olič (2006) mentioned that the parity significantly affects vestibula mucus impedance and it relates with total mucus quality, which is important for sperm survival. Crane et al. (2006) found that primiparous cows were more likely to become pregnant than multiparous cows. Chebel et al. (2004) confirmed this trend in relation to higher occurrence of health disorders in multiparous cows. In our study, cows in 3rd and subsequent lactations had higher occurrence of health disorders, by 1.32–8.42% higher occurrence of REPL, by 2.12–8.49% higher occurrence of END and by 2.4–8.5% higher occurrence of OC.

Our results indicated decline in sperm motility after 30 minutes of test during lactation, in relation to days in milk. No significant tendency was detected in sperm motility during the whole test in relation to days in milk. These results show that the highest sperm motility in cervical mucus of dairy cows during 1st stage of lactation does not relate to their pregnancy rate necessary. These findings suggest that performing of sperm motility test during the first stage of lactation offers low information about cows´ ability to conceive. Moore and Thatcher (2006) emphasised importance of ovarian functionality as subsequent and probably more remarkable part of cows' pregnancy abilities. The lowest pregnancy rate was determined in cows inseminated between 97 and 144 days in milk. This fact emphasizes the importance of the first lactation stage, including the period of negative energy balance due to high milk production and its effect on dairy cow reproduction (Veerkamp et al., 2000). Lower effect of negative energy balance to pregnancy rate was detected before 97th day of lactation, when pregnancy rate was in the middle level.

The highest sperm motility was detected in cows with the highest fat corrected milk production in 100 days of lactation (FCM100) during the whole test. The lowest sperm motility at the beginning of test occurred in the group with the lowest milk production. Nevertheless, high production cows had the worse pregnancy rate from 1.1% to 8.44%. Crane et al. (2006) described better reproduction results of cows with higher milk production measured on only 1 day. High milk production during the 1st period of lactation increased dairy cows requirements for nutrition and feeding, quality of stable environment, and management. Our results confirmed this fact by high sperm motility at the beginning of test and worse pregnancy rate in high producing cows. Low producing cows are at greater risk to be unoestrous and experience low fertility (Lucy et al., 1992). We can confirm their findings, because these cows had by 7.36–12.89% higher occurrence of REPL, by 6.63–12.2% higher occurrence of END and by 6.65–12.5% higher occurrence of OC.

Our findings that cows without retained placenta after calving attained significantly higher sperm motility during the entire test time and their pregnancy rate was higher by 5.86%, were in agreement with Chebel et al. (2004). Another frequent disorder is endometritis. In our study endometritis causes a decline in pregnancy of 26.31%. Williams et al. (2005) emphasized the negative effect of endometritis on production of vaginal mucus, which can affect pregnancy rate. Cyst occurrence did not affect sperm survival significantly, but cows without cyst occurrence achieved higher sperm motility during the test time and significantly higher pregnancy rate by 13.61% ($P < 0.05$). Significant difference was determined in relation to cyst frequency occurrence ($P < 0.01$). Cows with a multiple cyst occurrence had lower conception, by 20.53%, compared to cows with only one cyst during lactation. Our results agreed with results of Waldmann et al. (2006), who suggested that a primary reason for low pregnancy rates in dairy cows after synchronization and TAI is inappropriate ovarian function prior to or following treatment.

Our results indicate a relationship between higher sperm motility in the survival test and a higher pregnancy rate as well ($P < 0.05$). This means that there exists on the part of the cow ability to conceive, in addition to the quality of oocytes, another effect, that of the quality of cervical mucus.

CONCLUSIONS

Our results documented significant effects of the insemination year, insemination season, parity, days in milk, fat corrected milk production in the 1st 100 days of lactation, retained placenta, and endometritis or cyst occurrence, and cyst frequency during lactation on sperm motility during 30, 60 and 90 minutes of the survival test or pregnancy rates in Ovsynch-treated Holstein cows. Definition of this relationship offers the possibility of their use for a detailed study and determination of cows' biological ability to conceive, which is one of the components of cow reproduction parameters. Further research will be necessary for detailed understanding and determination of the relationship between the relevance of mucus, the motility, penetration of sperm, and reproduction results and for posibility to choose traits for breeding value prediction and objective selection of cows focusing on conception ability.

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Faktory ovlivňující přežitelnost spermií v cervikálním hlenu a zabřezávání holštýnských dojnic ošetřených Ovsynchem.

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Práce je zaměřena na stanovení významnosti vztahů mezi rokem a obdobím inseminace, pořadím laktace, pořadím inseminace, počtem laktačních dnů, mléčnou užitkovostí za prvních 100 dnů laktace přepočtenou na produkci kg tuku (FCM100), výskytem zdravotních poruch (zadržení placenty, endometritida nebo výskyt ovariálních cyst) a motilitou spermií v průběhu 30, 60 a 90 minut testu přežitelnosti v cervikálním hlenu nebo zabřezáváním holštýnských krav ošetřených synchronizací říje metodou Ovsynch (n = 314). Sběr dat a odběr vzorků cervikálního hlenu byl realizován na mléčné farmě Ruda, na které je chováno 423 čistokrevných holštýnských dojnic. Testy motility spermií v cervikálním hlenu byly realizovány od května 2005 do března 2007 v celkovém počtu 381 analýz. Pro statistické vyhodnocení byl použit obecný lineární model GLM SAS.

V průběhu sledovaných roků docházelo ke statisticky průkaznému snižování motility spermií (P < 0,001), rozdíly v zabřezávání nebyly potvrzeny jako statisticky významné. V závislosti na období inseminace byly zjištěny průkazné rozdíly v motilitě spermií v průběhu celého testu (P < 0,01 až P < 0,001). Nejnižší motilita spermií byla detekována u dojnic inseminovaných mezi 15. květnem a 14. zářím (P < 0,001), na druhou stranu u těchto dojnic nebyla zjištěna průkazně nižší úroveň zabřezávání. Nejvyšší hodnoty motility spermií byly detekovány u skupiny prvotelek (P < 0,05 až P < 0,01). Současně u nich byl zjištěn nejmenší pokles motility spermií v průběhu testu. Ve vztahu k pořadí inseminace nebyly prokázány žádné statisticky významné rozdíly v motilitě spermií a zabřezávání dojnic. Počet dnů v laktaci dojnic výrazněji ovlivňoval výsledky zabřezávání než motilitu spermií v cervikálním hlenu. Nejnižší úrovně zabřezávání dosahovaly dojnice inseminované mezi 97. a 144. dnem laktace a po 145. dnu laktace docházelo k výraznému zlepšení zabřezávání dojnic ($P < 0,05$). Tato skutečnost naznačuje, že provedení testu přežitelnosti spermií v cervikálním hlenu v průběhu první fáze laktace nemusí poskytovat informace o schopnosti krav zabřeznout. Nejnižší produkce FCM100 průkazně souvisela s nejnižší motilitou spermií na počátku testu přežitelnosti ($P < 0,05$). Největší pokles motility spermií v průběhu testu, 64,78 %, resp. 80,49 %, byl zjištěn u krav s produkcí FCM100 v intervalu $\bar{x} + 0,25\ s$ až $\bar{x} + s$. Rozdíly v zabřezávání dojnic mezi skupinami podle produkce FCM100 nebyly statisticky významné. Zdravotní poruchy průkazně ovlivňovaly motilitu spermií i zabřezávání dojnic. Byla zjištěna průkazně nižší motilita spermií po 30 minutách testu ($P < 0,05$) v cervikálním hlenu krav se zadrženou placentou po porodu. Výskyt endometritidy průkazně snižoval zabřezávání dojnic o 26,31 % ($P < 0,05$) a negativně ovlivňoval i motilitu spermií. Výskyt ovariálních cyst souvisel se sníženým zabřezáváním, o 13,61 % ($P < 0,05$), a vícenásobný výskyt cyst v průběhu jedné laktace zhoršoval výsledky zabřezávání o 20,53 % ($P < 0,05$). Nejvyšší úroveň motility spermií na začátku testu znamenala nejvyšší motilitu v průběhu celého testu ($P < 0,01$ až $P < 0,001$). Byl potvrzen statisticky významný ($P < 0,05$) pozitivní vztah mezi lepší motilitou spermií po 30 a 60 minutách testu a zabřezáváním dojnic.

holštýnské dojnice; reprodukce; zdraví; motilita spermií; cervikální hlen

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