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## THE ANALYSIS OF BREEDING USE OF POLISH HOLSTEIN-FRIESIAN HERD IN THE YEARS 2003-2013

**M. Momot<sup>1</sup>, M. Langowska<sup>1</sup>, J. Pogorzelska<sup>1</sup>, B. Miciński<sup>1</sup>,  
N. Bermagambetova<sup>2</sup>, T. Kobzhassarow<sup>2</sup>, D. Szczepańska<sup>1</sup>, J. Miciński<sup>1</sup>**

<sup>1</sup> – University of Warmia and Mazury in Olsztyn, Olsztyn, Poland

<sup>2</sup> – Kostanai State A. Baitursynov University, Kostanay, Kazakhstan

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**Abstract.** The aim of this work was the analysis of polish Holstein-Friesian cows reproduction use indexes formation depending on the efficiency of cows used in the years 2003-2013 in a family farm. Analysis concerning evaluation of cows fertility indexes i.e. the length of calving and parturition interval, insemination index and cow milk yield included 264 reproduction and production cycles. The studies showed that in years 2003-2007 cows with a higher efficiency made more problems with reproduction than cows used in the years of 2008-2013. An improvement in bull fertility was a consequence of improving nutrition and use of mineral and vitamin supplements in doses. The biggest difficulties with fertilisation occurred in cows from the highest efficiency group i.e. producing over 8000 kg of milk. Evidence of this is a higher amount of semen portions used for fertilisation. Insemination index degraded with progression of cows age i.e. in their next lactations. Statistical differences on the level of  $p \leq 0,01$  and  $p \leq 0,05$  were the confirmation.

**Introduction.** The Holstein-Friesian race, thanks to the selection focused on a high milk yield, in recent years had its milk yield doubled or tripled. In many countries the average efficiency of cows of this race exceeded 10000 kg

of milk per lactation. However, the breeding work directed on one feature caused a deterioration of functional traits i.e. fertility, disease resistance and longevity. Fertility is one of the most important factors determining profitability of milk production. Along with the increase of milk yield followed deterioration of fertility indexes. The parturition interval was elongated and thus the calving interval, the number of semen portions used for fertilisation was increased. High efficiency cows need breeder's special care. Extremely important is the so-called perinatal (temporary) period, including 3 weeks before and 3 weeks after calving. During this period cow's biggest energetic shortfall is created resulting in lower milk production and elongation of the so-called cow resting period i.e. the period from appearing of the first estrus to calving. At the peak of lactation performance fertility loses in the competition for energy. Successful inseminations start to appear only when a cow starts to lower its milk yield.

The peak of lactation falls most often on the 8-10 week after calving. Then the highest energy demand occurs and cow reaches the ability to intake the maximum amount of feed only in 12-15 week. This leads to mobilisation of cow's fat reserves to meet the energetic demand for existence and production. A consequence of this state can be metabolic diseases i.e. ketosis, acidosis, hepatic steatosis and reproduction problems.

The aim of this work was the analysis of polish Holstein-Friesian cows reproduction use indexes formation depending on the efficiency of cows used in the years 2003-2013 in a family farm.

**Material and methods.** Surveyed polish Holstein-Friesian cows were maintained in the alcove system all year round. Their feeding was based on roughage, especially that produced on the farm: corn silage, grass haylage and legume silage. Part of the feed was purchased: soybean and rapeseed meal, vitamin and mineral premixes. Breeder inseminated cows with the semen of HF bulls both of polish and foreign origin.

Analysis concerning evaluation of cows fertility indexes i.e. the length of calving and parturition interval, insemination index and cow milk yield included 264 reproduction and production cycles obtained in the years 2003-2013. Data was collected from heifer-cow cards and from cow evaluation documents.

Cows were divided into two research groups: A – used in years 2003-2007 and B – used in years 2008-2013. In each of the examined groups 4 sub-groups were made: first-calf heifers; in 2nd lactation; in 3rd lactation and >3rd lactation. Taking into account standard milk yield cows were divided into 3 groups: of efficiency up to 6500 kg; 6501 – 8000kg and over 8000kg of milk. Collected data was subjected to statistical analysis by calculating arithmetic means (LSM), standard deviation (Sd). The significance of differences was determined by F-Fisher test.

**Discussion of results.** Over the years, there was an increase in average milk yield in each lactation. The biggest difference in performance applied to the oldest cows, while the smallest to first-calf heifers. Over the years, the number of the least efficient cows decreased and number of cows with capacities exceeding 8000 kg of milk per standard lactation increased (Fig. 1).

Figure 2 shows the relationship between the level of productivity and the number of semen portions used for fertilisation. The largest use of semen portions for fertilisation, exceeding 2, applied to high yielding cows, regardless of years of analysis. There was a general improvement in the value of this indicator in 2008-2013. It concerned all groups of cows. This may prove increasing breeder efforts to detect estrus and a timely implementation of insemination.

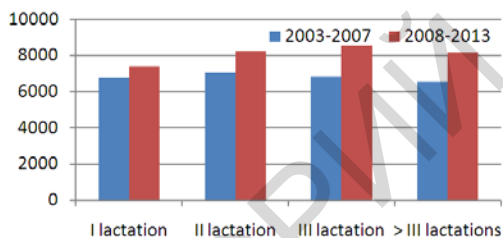


Fig. 1. – Evolution of the average productivity of cows in each lactation in the two study groups

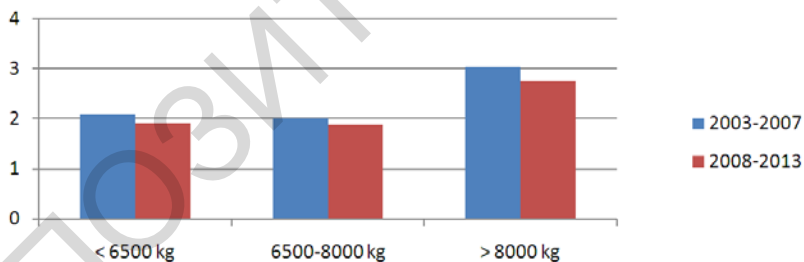


Fig. 2 – The relationship between the level of productivity and the number of semen portions used for fertilization

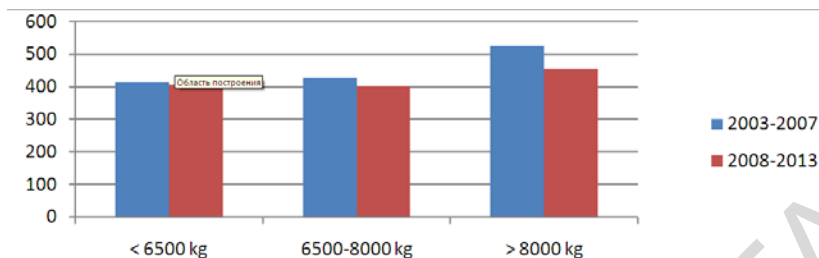


Fig.3 – The relationship between the level of yield and the length of calving interval.

From the data included in fig 3.appears that the longest calving intervals occurred among cows with the highest milk yield, exceeding 500 days in years 2003-2007. However among cows with the lowest yield calving intervals were longer than the accepted standard of 365 days.

Juszczak and Hibner (2000) stated that length of the calving interval should be from 360 to 400 days. Furman-Frątczak et al. (2006) reported that lengthening of calving intervals should be attributed to improvement of the breeding value of cows in terms of milk production. Bogucki et al. (2007) and Miciński (2009) have shown that due to the high efficiency it would be useful to lengthen the production cycle to 15-18 months. Kapela and Guliński (2006) observed that the calving interval is affected by the cow maintenance system; with tethered system it was 419 days and with free-stall system it was 454 days.

Table – Forming of the insemination index depending on years of use, efficiency level and lactation

Age of cows	Meas. Stat.	Years of use cows					
		2003-2007			2008-2013		
		< 6500 kg	6500-8000 kg	> 8000 kg	< 6500 kg	6500-8000 kg	> 8000 kg
I lactation	LSM	2,22 <sup>Aa</sup>	1,63 <sup>Aa</sup>	2,67 <sup>A</sup>	1,92 <sup>a</sup>	1,80 <sup>a</sup>	2,79 <sup>Aa</sup>
	Sd	1,35	0,84	1,21	0,95	0,77	1,05
II lactation	LSM	1,91 <sup>b</sup>	2,00 <sup>b</sup>	2,71	1,67 <sup>b</sup>	2,00 <sup>b</sup>	3,38 <sup>B</sup>
	Sd	1,14	0,87	2,14	1,15	1,55	1,82
III lactation	LSM	2,00 <sup>a</sup>	2,13 <sup>Bc</sup>	2,67	2,10 <sup>c</sup>	1,86 <sup>a</sup>	2,30 <sup>Ab</sup>
	Sd	0,82	1,90	1,53	0,76	0,69	1,63
> III lactations	LSM	2,80 <sup>Bb</sup>	2,43 <sup>Bd</sup>	3,80 <sup>B</sup>	2,04 <sup>c</sup>	1,86 <sup>a</sup>	2,69 <sup>Ac</sup>
	Sd	1,41	1,81	1,23	0,71	0,69	1,45

Table shows forming of the insemination index depending on years of use, efficiency level and cow lactation. It was shown that with rise of cow efficiency the effectiveness of fertilisation generally lowered. Evidence of this is the higher amount of semen portions used for fertilisation. Insemination index deteriorated with the progression of cows age i.e. in their next lactations. Indi-

cators closest to the optimum were reached among the cows of productivity of 6500-8000kg of milk.

NEBEL and MC GILLARD (1993), KOWALSKI (2010), BORKOWSKA et al. (2012) reported the dependencies between efficiency, cows age and insemination index.

**Summary.** Analysis of polish Holstein-Friesian cows reproduction use indexes used in one of the family farms in the years of 2003-2013 showed that in subsequent years cow efficiency level was rising. In years 2003-2007 cows with a higher efficiency made more problems with reproduction than cows used in the years of 2008-2013. An improvement in bull fertility was a consequence of improving nutrition and use of mineral and vitamin supplements in doses. The biggest difficulties with fertilisation occurred in cows from the highest efficiency group i.e. producing over 8000 kg of milk. Evidence of this is a higher amount of semen portions used for fertilisation. Insemination index degraded with progression of cows age i.e. in their next lactations. Statistical differences on the level of  $p \leq 0,01$  and  $p \leq 0,05$  were the confirmation.

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