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EFFICIENCY OF LIFETIME USE OF COWS OF DIFFERENT AGES OF THE FIRST CALVING

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Age at first calving, which is one of the many factors affecting dairy farm profitability [1], is an important factor in determining the length of the non-productive period and also affects the subsequent reproductive ability and productivity of dairy herds [2]. A younger age at first calving reduces breeding costs due to reduced feed, maintenance and housing costs [3] and an earlier return on investment. However, fertile insemination at an early age can lead to difficult calving and reduced milk production during the first lactation [4]. Conversely, an older age at first calving increases rearing costs, reduces milk production, impairs reproduction, and increases culled animals

from the herd [5]. In a study by J. S. Cooke et al., productivity during the first lactation was the best in cows that calved at the age of 23-25 months, and the worst in cows that calved later than 30 months [6]. For a longer productive life of cows according to research by A. Sawa et al., [7] it was recommended a first calving age of 22.1 to 26.0 months. Today, most breeders aim to inseminate repair heifers by 15 months to calve at 24 months of age. Age at first calving (AFC), close to 2 years (from 23 to 25 months), is optimal for economic productivity, as it minimizes the non-productive period and preserves the seasonal nature of calving [8]. According to researchers, a late first calving (especially after 28 months) causes a significant decrease in milk yield for the first lactation and lifetime milk productivity, shortens the productive period, reduces the number of calvings, and also increases culling rates due to low milk yield and udder diseases [7].

Thus, in order to increase profitability on dairy farms, it is necessary to establish the optimal age of first calving, which can affect further milk production, productive life, reproduction and culled from the herd. Therefore, the purpose of this study was to determine the effect of the age of first calving on the lifetime efficiency of dairy cattle.

The research was carried out at the breeding farm of LLAC "Agrosvit", Myronivsky district, Kyiv region, using the method of retrospective analysis based on the materials of the primary zootechnical and breeding records. The materials of the electronic information base of SUMS "Intel Orsek" were used. The matrix of observations in sta format on 1557 cows with a dated first calving during 2004–2010 was formed. The average milk yield of first-calf heifers for the specified years turned out to be quite high and ranged from 6214 kg in 2008 to 8159 kg in 2004 with a range of intergroup variability of 1945 kg. The research results were processed using the methods of mathematical statistics and biometrics.

During the studied period, the average lifespan of cows in the herd was 2071 ± 18.5 days, duration of economic use – 1238 ± 18.3 , and lactation – 1031 ± 14.9 days. Cows were used in the herd for an average of 3.13 ± 0.043 lactations. The average lifetime productivity was 22083 ± 380.1 kg of milk with the content of milk fat 849.8 ± 14.6 kg and milk protein 715.3 ± 12.2 kg. On average, 9.7 ± 0.103 kg of milk were obtained from each cow in one day of life, and 17.4 ± 0.119 and 20.4 ± 0.125 kg in one day of economic use and lactation, respectively.

With the increase in the age of first calving, on average, from 22 to 34 months, there is a steady curvilinear trend in cows to decrease life expectancy, economic use, lactation, number of lactations per life, decrease in lifetime milk productivity and milk yield, milk fat and protein per day of life.

It turned out that the most effective lifetime use of cows of different ages of first calving was at the age of 22-24 months, which significantly ($P < 0.01$) prevailed over animals with the age of first calving of 32-34 months by the number of lactations by 19.8%, the number of calves for life by 17.4%, by the duration of economic use by 16.4%, by the lactation period by 21.3%, by lifetime milk yield by 27.9% ($P < 0.001$), lifetime fat yield by 30.6% ($P < 0.001$), protein by 30.4% ($P < 0.001$), by lifetime output of fat and protein together by 30.9 ($P < 0.001$). Cows in the herd with the age of first calving over 34 months prevailed over the previous group of animals (age of first calving 32-34 months) in all indicators of lifetime productivity, life span, economic use and lactation, number of lactations and calves per lifetime. However, indicators of milk yield and milk fat and protein for one day of life prove that the least effective lifetime use of cows is precisely with the age of first calving over 34 months. Thus, a highly reliable advantage ($P < 0.001$) in terms of milk yield per day of life by 43.4%, economic use by 12.9%, an advantage in milk fat and protein output per day of life by 33.1%, economic use by 14.2% and lactation by 12% also have animals

with the age of first calving 22-24 months. According to the coefficient of economic use, cows of two groups that calved at the age of up to 22 months and 22-24 months were significantly superior in terms of the age of first calving by 24.9% ($P < 0.001$). According to the coefficient of productive use, the largest highly reliable advantage (by 31.4%) was in animals that calved before 22 months of age.

According to most of the considered signs of duration and effectiveness of lifetime use, the advantage remains at a reliable level also in first-calf heifer when calving at the age of 24-30 months compared to groups with later calvings. In the group with the age of the first calving up to 22 months, the efficiency of lifetime use compared to the group with calving in 22–24 months decreases, but not significantly, and in terms of indicators of lifetime milk productivity they approach animals with the age of the first calving at the age of 30-32 months, and the lactation coefficient of cows of this group reliably exceeds all the studied groups.

Therefore, according to the results of our research, which coincide with the research of other scientists [6, 8], we believe that the most optimal first calving should be at the age of 22-24 months, with correspondingly fertile insemination of heifers at the age of 13-15 months.

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