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## SELECTED FACTORS WHICH CAUSE FERTILITY DISORDERS IN DAIRY COWS

## WYBRANE CZYNNIKI WPŁYWAJĄCE NA PŁODNOŚĆ KRÓW MLECZNYCH

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**Streszczenie.** Celem pracy było wskazanie wybranych czynników wpływających na zaburzenia w rozrodzie krów mlecznych oraz niektórych błędów, jakie popełniają hodowcy. Przeanalizowano czynniki środowiskowe wpływające na płodność oraz scharakteryzowano czynniki wpływające na jej zaburzenia. Jako jeden z głównych powodów zaburzeń płodności, występujących w stadach wielkotowarowych, wskazano nieodpowiednią opiekę weterynaryjną.

**Key words:** fertility disorders, milk cows, large-scale herds.

**Słowa kluczowe:** zaburzenia płodności, krowy mleczne, stada wielkotowarowe.

### INTRODUCTION

The cattle domestication process started about 10 thousand. years ago. Separate breeds were created only in the second half of the eighteenth century, when the industrial revolution in Europe required the need to keep animals more efficient (Litwińczuk and Barłowska 2015). In recent years, dairy herd breeders have been trying to increase productivity in their herds, which is linked to fertility and reproductive disorders. According to the GUS data, domestic cow milk production was 12.859.4 million litres in 2015 and it was higher than the 252.1 million litters achieved in 2014, its about 2.0%. This increase was due to an increase in milk yield per cow of 4.5% from 5164 litters in 2014 to 5395 litres in 2015. Average yearly cows decreased by 57.9 thousand (about 2.4%). According to preliminary data from the GUS, the cattle population in June 2016 amounted to 5938.7 thousand pieces which indicated a slight decrease in 0.4% in annual terms (22,000), and compared with the stock in December 2015 – higher by 3.1% (176.2 thousand). The decrease in total cattle stock was due to a 4.6% decrease in adult cattle over 2 years of age, including a 4.6% increase in cows.

The aim of the study was to identify and examine selected factors influencing the dairy cows' reproductive disorders and identify some mistakes made by breeders.

## BASICS OF MONITORING OF BREEDING IN HERDS

Appropriate veterinary care of cattle herds is one of the basic conditions leading to the detection and exclusion of possible health and organizational problems in breeding units as soon as possible. It also allows you to optimize your production process as much as possible. This is particularly important in large-scale cattle breeding, especially in dairy herds. Feeding and breeding errors lead to significant reduction in reproductive health and reproductive performance but also endangers good production and economic outcomes.

One of the main factors limiting the production capacity of animals and reducing the profitability of milk production is reproductive disorders occurring in dairy cows (Jankowska 2002; Litwińczuk et al. 2004). This is largely conditioned by many environmental factors (Bogucki et al. 2007). These include but are not limited to: feeding (Kowalski and Kamiński 2000), animal fitness, age on first day of calving (Hibner et al. 1999), further calving (Szucs et al. 1997) and difficulty in meeting their nutrition and mineral needs or their physiological needs.

It was found that in cows that were rapidly losing their condition during the first weeks of lactation, ovulation was delayed, intervals between gestation periods were increased and the prevalence index was higher (Domecq et al. 1997; Heuer et al. 1999; Januś and Borkowska 2010).

Fertilization of a cow after delivery usually results in peak performance, as well as the greatest energy deficit, protein, minerals and vitamins. These deficiencies affect the hypothalamus and the pituitary gland, indirectly affecting the growth of follicular follicles, the function of the corpus luteum, oocyte quality, uterine environment and the survival of embryos (Januś and Borkowska 2010).

Reproduction problems are most often observed in energy-deficient cows (Krzyżewski et al. 1998), but also fattened cows had difficulty bleeding after the first insemination (Januś 2003). Reduced fertility is also associated with the occurrence of various reproductive abnormalities in the postnatal period. The risk is increased in herds improperly supervised by a veterinarian. In addition, the results of studies conducted in the USA (Studer 1998), Great Britain (Royal et al. 2000), but also in Poland show a relationship of deteriorating fertility with high milk yield of cows (Sawa et al. 2002; Dymnicki et al. 2003).

Cattle breeding status is an indicator that enables diagnosis of abnormalities in the herd, can be properly monitored and analysed, not only by checking the incidence of individual disease units, but also based on comparison of reproduction rates. Gnya et al. (1999) and Sawy and Maciejewski (2000) show that failure due to sterility and disorders in the reproductive system becomes the major cause of cows' withdrawal (Bogucki et al. 2007). Continuous veterinary control of reproduction can result in the elimination or significant reduction of many abnormalities to ensure adequate fertility of cows (Zaajjer 2005).

Cattle reproduction efficiency can be controlled by using fertility indicators such as the fertility index, insemination index, intercourse length (OMC), intercourse length (OMW), and fertility rate. These indicators are closely related and cyclically analysed in most developed dairy cattle countries. In addition, they allow for a meaningful assessment of the status of breeding supervision, which translates into the health of the whole herd. The monitoring of breeding cows in herds in many countries are also analysed indicators show the percentage of cases *metritis*-, *endometritis*, ovarian cysts, silent oestrus, or miscarriage.

Reproductive system control in cows, apart from the interview, is based on clinical and specialized ultrasonography and endoscopic studies requiring appropriate equipment (Mordak et al. 2007).

Important elements of proper monitoring of cows' reproduction are proper identification of the oestrus, the time of reporting cows for insemination and the correct and timely insemination. The negligence of these factors, especially the misdiagnosis of oestrus, is a common cause of insemination in the wrong time, and not even in general. As a result of this effect is ineffective cows' insecurity, which translates into significant deterioration of reproduction rates and infertility.

The insemination procedure should only apply to healthy cows that do not exhibit defects in reproductive organs and pathological outflow from the genital tract.

Monitoring of reproduction does not only affect cows, but also bulls. Reproduction problems may also arise from the defect of the bull breeder used to cover the natural or reduced semen due to technical errors during storage or defrosting, which may cause a significant reduction value of semen.

## EFFECT OF NUTRITION ON FERTILITY OF DAIRY COWS

The energy balance determines the difference between the energy consumed in the feed and the sum of the energy required to produce milk (Nogalski et al. 2009). The risk of energy imbalance in dairy cows is highest in the perinatal period, ie about 10 days before childbirth and a few weeks after birth. Negative energy balance, leading to fat tissue mobilization, at the beginning of lactation in high yield cows is a biological necessity, as it is not possible to obtain sufficient dry matter at that time (Nogalski et al. 2009). Usually, in the 6–8 week of lactation, the cow achieves the highest milk production. The maximum intake of dry matter is 12–14 weeks postpartum. Reconstruction of lost weight of a cow usually begins at 13–14 weeks of lactation when balancing needs with the ability to obtain energy from feed (Nogalski and Górak 2008).

The feeding of cows in the perinatal period has a significant effect on the health of the cow. Mistakes made during that time can cause dysfunctions of the liver, ketosis, *mastitis*, displacement abomasum, fever post-natal, ovarian cysts, disorders of ovulation, purulent inflammation of the vagina or uterus (Gearhart and Curtis 1990; Domecqu et al. 1997; Olechowicz and Jaśkowski 2005). Extremely important and dependent on nutrition are the first weeks of lactation. Low intake of dry matter, incomplete coverage of energy needs and protein cows significantly reduce milk yield and reproductive performance (Nogalski et al. 2009).

Usually, weight loss can be observed in lactating cows associated with high milk production and the use of predominantly fatty reserves. In cows in early lactation, a portion of the metabolised fat is replaced by water, which may result in falsification of results, as the actual spare fat may be higher than the difference in mass (Staufenbiel et al. 2003). Moreover, body weight is affected by the degree of gastrointestinal tract filling and the size of internal organs, especially reproductive organs (Nogalski et al. 2009). According to Nogalski research (2009), changes in the condition of dairy cows can significantly affect their fertility. Based on the condition and especially its changes, decisions about reproduction can be made. In the same study, ripe follicles were found to be in an unfavourable state for development under conditions of loss of fitness. Incorrectly formed bubbles form, which hinders ovulation and reduces later secretion of progesterone. Cows with a strongly genetically conditioned decline, "defending

themselves from further pregnancies" naturally prolong postnatal rest (Dechow et al. 2002; Nogalski et al. 2009). Schröder and Staufenbiel (2006) in their studies state that the first operation only during the positive energy balance can improve the effectiveness of insemination.

Urea is an important and objective indicator of a properly balanced diet for protein and energy in cow feeding. Jankowska et al. (2010) analysed the effects of urea and protein on fertility rates. They found that worse indicators were observed in the cows of the element and in the lactation with energy deficiency in the feeding dose, whereas in the cows older in the III and IV lactations both more than protein and energy. Young cows showed the best fertility regardless of urea levels in milk, with excess protein, cows older regardless of protein level at lower and optimum urea content. Protein levels in milk more differentiate cow's fertility than urea. Parameters of fertility were worse in cows in I and II lactations than in older cows. The same research shows that the fertility of cows, whose protein content in milk was indicative of energy malnutrition, became weaker especially in the case of cows after first and second calving. Cows after the third and fourth calving had the worst fertility when there was more protein in the dose. Such results show that both deficiency and excess of protein and energy in feed affect fertility. Differences in the rates of fertility of cows' I and IV of lactation were not significant, as opposed to OMW in cows in II and III lactations. The rational feeding of cows and the favourable chemical composition of milk can be achieved by appropriate feed selection, correct balancing and the use of appropriate mineral-vitamin supplements. The results of many studies indicate the negative effects of the inappropriate protein-energy ratio of cows. Unbalanced feeding leads to a decrease in productivity, fertility disorders and loss of nutrients and environmental pollution by excessive nitrogen excretion (Różycka and Borkowska 2001; Sablik et al. 2003; Szarkowski et al. 2009).

## CONCLUSION

Fertility of cows is influenced by many factors ranging from proper energy balance, control of their condition, age on the day of first calving, subsequent calving and difficulty in meeting their energy and mineral needs, maladjustment to their physiological needs. Feeding and breeding errors lead to lowering of reproductive health and reproductive parameters but also poses a threat to good production and economic results. All activities of dairy cow breeders should consist primarily of proper, professional and reliable veterinary care.

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**Abstract.** The aim of the study was to identify selected factors influencing the dairy cows' reproductive disorders and some mistakes made by breeders in running herd, especially concerning feeding. Environmental factors influencing fertility were analysed and factors influencing its disorders were characterized. As one of the main causes of fertility disorders in large herds was indicated inappropriate veterinary care.