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ASSESSMENT OF THE COURSE OF CALVING AND MATERNAL QUALITIES OF FIRST-BORN COWS OF THE ZNAMIANSKY TYPE OF POLISSYA BEEF BREED DEPENDING ON THE LEVEL OF FEEDING DURING REARING AND SEASONAL CHANGES

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Abstract

The course of calving and maternal qualities of first-born cows of the Znamiansky type of Polissya beef cattle, which were raised with different levels of feeding, were studied. Heifers with intensive feeding (group 2) came into heat, were fertilised and calved easily 5 months earlier than their counterparts with traditional feeding (group 1). Their calving season was in spring, which had a positive impact on their milk yield, calf growth and welfare. In heifers with traditional feeding, the calving season was in summer (average air temperature 35-40°C). As a result of hyperthermia, these first-born heifers were forced to stand in a standing position during the prenatal period and during calving to cool their bodies. This had a negative impact on their welfare. The calving process in these first-born cows required staff assistance. Their calves had lower birth weights and lower weight gain in the first two months of life than calves in group 2. This is due to a shortage of grass due to the hot summer.

Key words*: calving and season, heat stress, intensively reared heifers, maternal qualities, milk yield, udder condition, Znamianskyi type of Polissya beef breed.*

INTRODUCTION

Beef production is essential for providing the human population with high quality protein food (Aboah & Lees, 2020; Apaoblaza et al., 2020; Giannico et al., 2024). Therefore, breeding beef cattle is promising (Spears et al., 2024; Nogoy et al., 2022; Honcharova & Khokhlov, 2022). In Ukraine, the Znamiansky type of Polissya beef cattle breed was created on the basis of a breeding plant in the Kropyvnytskyi region (Burkat, 1997; Popova et al., 2024). Its creation is the result of a complex reproductive crossbreeding of the original breeds: 5/8 Aberdeen Angus blood, 1/4 Charolais or Simmental, 1/8 other breeds (depending on the place of breeding) (Dorotiuk, 2006; Vdovychenko, 2012).

The success of beef cattle breeding depends on the ability of cows to reproduce and establish a strong bond between them and their offspring (Wiltbank et al., 1970; Sartori et al., 2002; Pochukalin et al., 2016; Honcharova, 2022). The critical period of calving of first-calf cows requires special attention of farmers to identify individuals that need timely assistance (Dargatz et al., 2004; Mainau et al., 2011; Lorenz et al., 2011; Barrier et al., 2012).

An important indicator of the maternal qualities of a beef cow is its milk production, which is estimated by the amount of product obtained from it per year (Honcharova, 2010; Nevard et al., 2022; Redifer et al., 2024). The quantity and quality of her milk is an important factor in the growth of calves until weaning. Calves of beef cows with high milk production, compared to offspring from other mothers, have a higher live weight at weaning, all other things being equal (Honcharova, 2016; Pochukalin et al., 2019). A beef cow with low milk yields is not able to feed a large calf suitable for further intensive rearing and fattening without additional feeding (Honcharenko & Tmanov, 1998). The main reasons for low milk production of beef cows are the lack of selection for this indicator, insufficient feeding

and improper animal husbandry, as well as extensive rearing of replacement heifers, which leads to their general underdevelopment (Martin et al., 2007; Roberts et al., 2009).

Many of them do not meet the class standards and have low weight during insemination (Poghosyan, 2021; Valiente et al., 2021). Such heifers have poor fertility, and the cows that grow from them have low milk productivity. This negatively impacts the average daily weight gain of suckling calves and hinders the development of the entire beef cattle industry.

In today's environment, the welfare of livestock, especially ruminants, is threatened by global warming (Horbatenko et al., 2018; Tang et al., 2022). Cattle often suffer from high temperatures, which have a detrimental effect on both their bodies and the vegetation composition of pastures, causing their shortage (Mitlöhner et al., 2002; Brown-Brandl et al., 2010; Pandey et al., 2017; Collier et al., 2017; Chauhan et al., 2023; Lovarelli, 2024; Țogoe & Mincă, 2024).

Tropical livestock breeds are more heat-tolerant, while beef animals in temperate regions are highly vulnerable to hyperthermia. In certain geographical areas, there are seasonal differences that affect the feed supply of beef cattle (Purwanto et al., 1993; Walmsley et al., 2016; Sapkota et al., 2020).

Hyperthermia leads to a decrease in appetite in beef cattle, reduced body weight gain and quality of meat raw materials (it loses elasticity, moisture and becomes denser) (Stefanovska et al., 2010; Wang et al., 2020; Scerri et al., 2023). Adaptation of cows to high temperatures requires significant body costs, which reduces their milk production. More concentrated feed has to be consumed to feed calves. It also degrades the quality of meat raw materials compared to that obtained from cattle grazing on grass (Durunn et al., 2014; Apaoblaza et al., 2020; Aboah & Lees, 2020; Spears et al., 2024; Wicks et al., 2024).

The alarming trend of increasing summer air temperature and its negative impact on the well-being of animals of the Znamiansky type of Polissya meat breed, which is bred in the south of Ukraine, is increasing every year. It is expedient to study the course of calving and maternal qualities of first-born cows of this breed depending on the intensity of feeding of replacement heifers, the timing of their insemination and the calving season.

MATERIALS AND METHODS

The aim of the study is to investigate the course of calving and maternal qualities of first-born cows of the Znamiansky type of Polissya beef breed depending on their maintenance at different levels of feeding and calving period.

The experimental part of the research was carried out in a specialised farm for breeding cattle of the Znamiansky type of Polissya meat breed (Kropyvnytskyi region, Ukraine). The farm is located in the steppe zone with a temperate continental climate that is not sufficiently humid; the average annual relative humidity is 73-76% (Dyachenko & Kendyukhova, 1998; Kuzyk et al., 2005). Snow cover is usually established from late November to mid-March. The warmest month of the year is July (with a maximum air temperature of 35-40°C).

The natural ground cover consists of wild cereals and grasses. Xerothermic plants predominate: fescue (*Festuca sulcata* L.) and steppe timothy (*Phleum phleoides*). Also found are hairy feather grass (*Stipa capillata*), meadow bluegrass (*Poa pratensis*), narrow-leaved bluegrass (*Poa angustifolia* L.), creeping wheatgrass (*Elymus repens*), beardless fescue (*Bromus inermis*) and meadow clover (*Trifolium pratense*). In early spring, while the soil has sufficient moisture from snowmelt, the plants vegetate quickly and form fruits with seeds after flowering. In spring the pastures are rich in grass, and in summer the sun dries the soil in the treeless steppe.

The farm also has perennial pastures for haymaking and grazing. Adverse climatic events include droughts, dry winds, dust storms and hail, which damage the farm by reducing and destroying crop yields.

The present study is the next stage of the comprehensive monitoring of intensive rearing of Znamiansky type replacement heifers of Polissya beef breed. At the first stage, we studied their housing and feeding conditions from 8 months of age until insemination (Honcharova et al., 2024).

The material for this stage of the experiments were replacement heifers, first-calf cows and

their calves of the Znamiansky type of Polissya meat breed. The replacement heifers met the standard of this breed: they were comolli, brown in colour, had a low-set long body with well-developed muscles.

Methods used: assessment of the exterior and constitution of animals; ethological observation and clinical examination; primary registration (zootechnical and veterinary); statistical (biometric processing of digital data); analytical.

The heifers were obtained by mating cows with bulls (bull/cow ratio 1:20). The farm uses a 10% annual cow replacement rate.

After weaning, the heifers of the experimental groups were reared according to the intensity level: I (control) - 1.57; II - 1.75.

Based on the results of the breeding value data, a bull that had given birth to full-term calves with a conditioned weight (not too large) was used to inseminate heifers. This reduced the risk of heavy calving. To prevent accidental mating of heifers and cows, the bulls are kept separately on the farm (in the warm season - on pasture, in winter - under a shed).

This study lasted from the period of insemination of heifers to the weaning of their calves at 8 months of age. Heifers from the intensive rearing group (II) were inseminated at 15 months of age and at the time of calving were 5 months younger than heifers from the control group (I). The study of animals in both groups lasted 17 months: in Group II - from the first decade of June 2022 to the end of October 2023; in Group I - from November 2022 to March 2024. The total study period was 21 months.

After calving, the first-born cows of Group II and their calves were put out to pasture in April 2023, and the first-born cows of Group I and their calves were put out to pasture in July and August of the same year. Water troughs are placed in shaded areas around the perimeter of each pasture. The movement of cows and calves on perennial and rotational pastures depended on the availability of grass. The animals stayed on the pastures until the end of the second decade of November 2023.

To provide nutritious fodder for the livestock, the farm owner grows crops that can grow without irrigation: winter wheat (*Triticum aestivum* L.) or rye (*Secale cereale*) in combination with vetch (*Vicia villosa* Roth); perennial grasses (a combination of alfalfa, sainfoin and stemless fescue).

A mixture of oats and peas, as well as a mixture of maize (hybrids of different maturity groups) and tall late-maturing soybean varieties were sown in three cropping seasons on the farm and periodically mowed to feed first-calf cows and calves during rainy periods. Each heifer was fed 2-2.5 kg of concentrates per day in the stall. In the second half of pregnancy, their diet included 50-55% roughage by nutritional value (hay - 20%, silage - 15-20% and concentrates - 25-30%) Two months before calving, the average daily intake of concentrates was 1.2-1.5 kg, and roughage was at least 60% by nutritional value (Bohdanov & Kandyba, 2012).

On the day of calving, the first-born heifers were fed good quality cereal-legume hay, wheat bran mash and given salted warm water. In the following days, they were fed withered grass.

The first-born cows calve in special compartments equipped with collapsible individual boxes measuring 3x3 metres. They have a solid fence 1.5-1.8 metres high, are electrified and lit, and have a feeder and drinker. The boxes are disinfected and covered with a 20-30 cm thick layer of straw. There are 10 boxes on the farm.

Pregnant heifers in group II were moved from pasture to a special premises calving 5-7 days before the expected calving.

In the last month before calving, pregnant heifers from the first group had to be periodically irrigated with water in the pasture because they were in a state of hyperthermia due to hot weather. To minimise the risk of heat stress, they were moved to a calving box 7-10 days before the expected calving date.

The first-born heifers of each group with newborn calves were kept in the boxes for three to five days.

The analysis of the course of calving in first-calf cows was carried out by observing them, evaluating it on a five-point scale: 5 points - calving without complications; 4 - with little help; 3 - with the help of several people or using additional devices; 2 - with the help of a veterinarian; 1 - with a fatal outcome.

The viability of newborn calves was determined by the following signs: the number of respiratory movements and heart rate per minute; live weight, body length, development of milk teeth, appetite, body structure, speed of getting up, appearance and manifestations of the sucking reflex. The safety of calves was determined by the postnatal viability index - the ratio of their number one month after birth and at weaning/to the number of births.

Calves at the age of one month, three months and 8 months were weighed on electronic scales before suckling feeding. Based on the data obtained, the live weight of calves and their average daily weight gain were determined.

Maternal qualities of firstborn cows were studied by the following parameters: fertility, ease of calving, milk yield.

The maternal behaviour of firstborn cows was assessed immediately after calving (within the first 2 hours), noting the activity of their protective behaviour towards the calf. The assessment was carried out on a five-point scale, where 1 is an indicator of ignoring the calf by the firstborn cow, and 5 is an indicator of active maternal behaviour of the cow towards the calf (licking and sniffing the calf immediately after calving, its stimulation to suckle the udder).

Also, during the entire lactation period, monthly checks of the parameters of maternal behaviour of first-born cows were carried out by observing them and their calves during daylight hours. We calculated the time (in hours and/or minutes) of maternal care of the calf by the cow: the time of its licking by the cow or other manifestation of close contact between them; the time of suckling feeding of the calf and its average duration; the time spent by the cow without the calf and its initiation of contact with the calf, following it to the pasture; the cow's reaction to weaning the calf. The milk yield of first-calf cows was determined monthly by double (two consecutive days) control weighing of their calves before and after suckling. Then the total amount of milk per day, per month and per lactation was calculated.

The condition of the udder was assessed on a five-point scale. Seven days before the expected calving, the udders of future first-born cows were examined. If there were signs of udder edema, their severity was assessed from 1 to 5 points, where 1 was a slight increase in size within the quarters, and 5 was a distinct swelling of the entire udder.

On the day of calving, the macroscopic parameters of the udder and teats were visually and palpably assessed. For maximum objectivity, this was carried out by one specialist who used low-magnification optical lenses to help visualise the presence of changes.

The digital data of the experimental experiments were processed by the method of variation statistics (Baranovskyi et al., 2017) using the MS Excel 2003 spreadsheet processor.

RESULTS AND DISCUSSIONS

The heifers studied, reared at different feeding intensities, differed in terms of reproductive capacity. Thus, at the time of fertile mating, heifers of group II were 5 months younger than control heifers. Due to sexual early maturity, heifers of group II gave birth to their first healthy offspring at the age of 24-25 months. Heifers of Group I calved for the first time at the age of 29-30 months.

It is known that early breeding of beef heifers has been practiced for many decades (Lesmeister et al., 1973).

We observed different duration of pregnancy in the first-born heifers of the experimental groups. In the firstborn cows of group II, it was on average 282 days, and in the firstborn cows of group I - 280 days. The decrease in duration of pregnancy in animals of group I was caused by the effects of heat stress.

Prenatal period. Approximately 3-5 hours before calving, the first-born cows of group II began to show restlessness and were in a standing position at that time.

External signs of preparation for calving were clearly visualised: udder enlargement, pelvic ligament sprain, vulvar swelling. These signs were not clearly visible in the first-born heifers of group I.

These first-born cows were stressed by the hot period and often had to stand to cool their bodies. Consequently, they did not lie down to rest, which had a negative impact on their overall condition. During the last week before

the expected calving, they were irrigated with water to reduce the effects of hyperthermia.
A similar procedure for cows was reported by Yadav et al. (2016).

Calving. The data characterising the course of calving of experimental heifers at different intensities of rearing are given in Table 1.

Table 1. Characteristics of calving of first-born heifers at different intensities of groving

Indicator	I	II
Calving: easy (without specialist assistance), heads/%	4/80	4/80
With minor assistance, heads/%	-	1/20
Complicated (with the help of specialists), heads/%	1/20	-

The analysis of the data in Table 1 shows that early mating of heifers reared under intensive feeding did not have a negative effect on calving behaviour. These first-born heifers gave birth to calves in the supine position. In 80% of them, calving was easy (5 points). One first-born heifer from this group required minor assistance from a farm worker (20%/4 points). In the conventionally fed group, one heifer had a difficult calving and required qualified veterinary assistance (20%/2 points). She was diagnosed with a pathology of the labour process (abnormalities at the stage of fetal delivery, weak contractions and pushing).
Researchers Durunna & Kendiukhova (2014), Kaurivi et al. (2020) show that the first insemination of beef heifers at 15 months of age has the potential to increase the productivity of a herd of beef breeding cows.
However, they observed frequent manifestations of calving pain in first calving heifers at 2 years of age compared to mature cows. According to their data, the cause of the pain was the disproportion between the large size of the fetus and the small pelvis of the first-born heifer. In order to prevent this feto-maternal disproportion, the experimental farm uses a bull that has produced medium-sized calves to inseminate heifers.
The number of respiratory movements per 1 minute in newborn calves from the first-born of group II was, on average, 32-38, and in calves from the first-born of group I - 28-34. The heart rate of newborn calves from the firstborns of group II was 148-156 per minute, and that of calves from the firstborns of group I was 114-128. The weight of calves at birth from the first-born of group II was, on average, 31.0 kg, and from the first-born of group I - 29.5 kg. The length of the body of calves from the firstborn of both groups was in the range of 80 to 90 cm. In calves from the first-born of group II, the whole body was covered with thick, uniform wool. In calves from the first-born heifers of group I, skin turgor was reduced; the mucous membranes of the mouth and nasal cavities and conjunctiva of the eyes were dry; the hair coat was dull, sparse, with alopecia. In calves from Group II heifers, the time from birth to the first active movements was 45 minutes on average, and in calves from Group I heifers, 50-68 minutes. The postpartum period was normal for all heifers that were intensively fed. Most of the first-born cows in both groups had rapid contact with their offspring in the postpartum period. They spent considerable time licking and sniffing their calves. During calf licking, the firstborn calf was positioned to facilitate access to its udder. Most of the newborn calves from the first-born sires of both groups stood up after 45-60 minutes, found the cow's udder and started sucking colostrum. Two calves from heifers in Group I were helped to find the udder by a farm worker who sucked several portions of colostrum from the teat and put it directly into their mouths.
To increase the resistance of the newborn calf, it should receive the first portion of colostrum as early as possible (0.5-1.0 hours after birth) (Kertz, 2023). Licking and sniffing behaviour is an important component of cow-calf bonding (Cushman et al., 2007; Michenet et al., 2018).
After calving, the firstborn calves of group II (100%) and group I (80%) showed good maternal instinct (5 points). For the first three days, newborn calves slept in between suckling feedings, which were, on average, 10 times a day. One heifer of group I, due to heavy calving and general weakness, was inactive and ignored the calf (1 point). It was transferred to another cow for supplementary feeding. The next day, this first-born heifer rose to her feet and let her calf approach the udder.
Calving in boxes has a positive effect on the formation and manifestation of maternal qualities of first-calf cows (Jensen et al., 2019; Nevard et al., 2022). During calving in the herd, stronger cows often prevent first-born

calves from licking the calf and even drive them away, often resulting in the first-born refusing to accept the calf (Yavas & Walton, 2000; Rørvang et al., 2018). Older calves may suckle a cow that has just calved, and the newborn calf will not receive its first portion of colostrum in time.

Due to spring calving and, consequently, early release of the first-born cows of the second group with calves to pasture (Figure 1), the farm saved feed costs.

Figure 1. Znamianske beef cows with calves in the pasture (own source)

The seasonal deficit of the feed base in the hot summer months of the year coincided with the gestational, prenatal and postnatal periods in conventionally fed animals. They were exposed to complex stress (feed and heat), which negatively affected the course of calving, the postpartum period and the live weight of newborn calves.

When observing the contact of firstborn cows with calves, it was noted that firstborn cows had longer contacts with bull calves. Firstborn cows of group I spent more time with calves with lower birth weight. The maternal behaviour of first-born cows was individual and significantly depended on the general condition of the cow's body, calf weight and sex.

Examination of the udder. Variants of udder shape in the first-born heifers of both groups are shown in Table 2.

Table 2 shows that the firstborn cows of both groups had the following udder shapes: bathtub, cup-shaped and rounded.

The bathtub udder shape is considered by some researchers to be optimal for beef cattle (Bhutto et al., 2010; Sinha et al., 2022).

Table 2. Characteristics of first-born cows by udder shape, %

Indicator	I	II
Tubular	20	20
Cup-shaped	20	60
Rounded	60	20

In the firstborn cows of both groups, this shape was found in 20%, respectively. In most of the firstborn cows, when palpating the udder after it was suckled by the calf, it was soft to the touch and slightly drooping with the formation of peculiar folds. The udders of the first-born cows of group II were slightly larger. Calves tended to choose the left front udder lobe for sucking colostrum and later milk. Therefore, there was stagnation of secretions in the remaining lobes, especially the hind lobes. In two first-born heifers of this group, udder edema was diagnosed in the first days after calving in some quarters. There were the following macroscopic changes in the udder: an increase in the size of the hind quarters with tension, stretching, doughiness and bluish shine of the skin; the appearance of dents after pressing on the enlarged udder quarters and shortening of the swollen nipples here; palpation of the udder was without signs of pain in the cow. Udder swelling caused by stagnation of colostrum and milk is a risk criterion for mastitis. To prevent this, cows with large udders were partially milked in the first week after calving.

In beef cows, a medium-sized udder that is well attached is optimal from an economic point of view (Goonewardene et al., 2003; Giannico et al., 2024).

It is important to identify cows with optimal udder and teat characteristics and use their offspring to replace the breeding stock. The uniformity of the development of the udder quarters (hind and anterior) is essential. In the studied first-born heifers, one animal from each group (20%) had such indicators.

The udder parameters of beef cows should not be overestimated in terms of their impact on calf weight gain. Because those calves that did not keep milk due to certain morphological features of the udder and teats of mother cows compensated for the lack of nutrient substrates by consuming plant feed on the pasture.

Study of the live weight of calves from the firstborn of both groups at weaning. One of the main criteria for herd reproduction is calf yield and live weight at weaning. It is closely related to the cost of growth and the level of profitability of the beef cattle industry (Burkat, 1997; Damiran et al., 2018).

A comparative study of the growth and development of calves from the firstborn of both groups showed that they gave a full-fledged litter. There were no deaths of offspring or firstborn calves in both groups. Data on live weight and weight gain in calves are given in Table 3, Figure 2.

Table 3. Live weight of calves, n = 5

Indicator	I	II
Live weight (kg)		
at birth, kg	29.5±0.54	31.0±0.37
3	90.4±2.0	105.3±1.9
6	190.3±2.2	197.4±2.2
at weaning at the age of 8 months, kg	231.5±5.29	250.0±5.03

Calves from intensively reared first-born heifers at weaning at 8 months of age had a live weight of 18.5 kg (8.0%, P≥0.95) higher than calves of the control group. The safety of calves during feeding in cows of both groups was 100%.

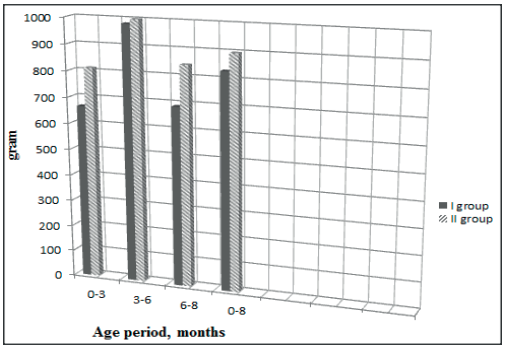

Figure 2. Average daily weight gain of calves, grams

Starting from the third month of life, calves of cows of the first group, despite poor growth in the period 0-3, almost caught up with calves of the second group in terms of growth rates and at the age of 3-6 months had a weight gain of 982.5 grams.

Calves from the first-born heifers of the second group were born in the spring in comfortable temperature conditions (without the influence of extreme temperatures observed in the region where the farm is located in summer). This led to optimal growth and development of these calves in the early stages of ontogeny. By the time the summer heat set in, they had grown up and had a stable thermoregulation mechanism.

In calves from first-born cows of group I, the grazing season began in the hot season, when the quantity and quality of grass was worse than in spring.

This resulted in lower weight gain in calves from first-born cows of group I. At the same time, more frequent feeding of such calves was observed (Figure 3).

Figure 3. The first-born of the first group with a calf aged 5 months on suckling (own source)

This resulted in excessive udder sucking in first-calf cows, which led to their exhaustion. Researchers also point to another negative effect of intensive udder sucking by calves. For example, Dorotyuk (2006) notes that intense udder irritation contributes to the formation of the so-called 'milk dominance' when cows have a long service period (up to 85-90 days or more).

Due to the lack of grass in the hot summer months, there was overgrazing of pastures with a decrease in their productivity.

This has a negative impact on the biodiversity of the botanical composition, causing soil erosion, desertification and disruption of pasture biocenoses. In recent years, the proportion of pyrrolizidine-containing plants that are more tolerant of high temperatures has increased on some of the farm's pastures. It is known that when grazing on them, cattle develop severe intoxication with pyrrolizidine alkaloids (Shchetinsky et al., 2010; Shchetinsky et al., 2017; Shchetinsky et al., 2018). These hazardous substances enter the

body of calves with cow's milk and cause severe damage to the liver and other organs.

To minimise the negative impact of hyperthermia, Group I cows and their calves were kept in a separate room with sunshades in late July and early August. This required the presence of workers, which was costly for the farm.

Beef cows are known to graze on crop residues of barley, oilcake, rapeseed and wheat (Damiran et al., 2016).

The farm owner used a method of revegetation in isolated areas of pasture by rotating them and irrigating the soil at night. This had a positive effect on restoring the botanical composition of the pasture and provided cows and calves with high quality grass.

Study of milk production of first-born heifers.

A comparative study of the milk yield of first-born heifers reared at different intensities is shown in Table 4.

Table 4. Dynamics of monthly milk yields in first-born heifers, kg (X ± Sx)

Month of lactation	I	II
1	183.7±1.35	189.0±0.91
2	204.0±0.65	209.1±0.65
3	205.1±1.19	210.3±1.02
4	151.0±1.32	182.0±0.80
5	133.0±0.70	147.0±0.74
6	120.0±0.97	131.1±0.63
7	94.2±1.24	109.1±1.35
8	64.0±0.57	72.5±1.03
8 months of lactation	1155.0±27.53	1250.1±20.62

Calves from Group II heifers received more nutritious milk than calves from Group I cows. After all, their mothers had 95.1 kg more milk yield than cows in Group I.

We found that the level of milk yield of the first-born heifers of both groups increased until the third month of lactation and then decreased. The same pattern was observed by Honcharenko et al. (1998) in Ukrainian beef breed and Charolais cows. It is known that the milk production of cows is largely determined by heredity, feeding and housing (Cortes-Lacruz et al., 2017).

Monthly milk yields (for 8 months of lactation) were 8.2% higher in the firstborn cows of group II compared to the firstborn cows of group I. In addition, the milk of the first-born cows of group II was more nutritious. They grazed with calves on pasture from the end of April, receiving juicy green grass and a dosed level of ultraviolet radiation.

In general, the level of milk production of the studied first-born heifers ensured optimal development of their offspring. The age of mating did not have a significant effect on the milk production of the first-born heifers. But it was slightly higher in animals inseminated at an early age.

CONCLUSIONS

The early mating of heifers that were intensively reared did not have a negative impact on the nature of their births, which were easy. In the group of first-born heifers with traditional feeding, one animal had difficult calving due to heat stress and required qualified veterinary care. The firstborns of group II had relatively larger udders. Calves did not suckle it in the first days after calving, which led to stagnation of colostrum in it. A medium-sized udder is optimal for a beef cow. In terms of indicators characterising maternal qualities (fertility, ease of calving and milk yield), the firstborn of group II prevailed. In the animals of group I, these indicators were lower due to the negative effect of high temperatures. The maternal behaviour of the first-born heifers was individual and significantly depended on their general condition, as well as on the weight and sex of the calf.

Calves from first-born cows of group II grew more intensively and at 8 months of age exceeded the analogues of group I in live weight by 18.5 kg (8.0%, $P \geq 0.95$). The milk of intensively reared first-born cows was more nutritious. This was facilitated by spring grazing of calves on a grass-rich pasture under conditions of comfortable temperature and dosed insolation. The first-born cows of Group I and their calves were exposed to heat stress. To minimise its negative effects, in late July and early August, they were kept in a separate room equipped with special sun shades. This required the involvement of labourers, which

was expensive for the farm. The intensive rearing of heifers had a positive effect on their future milk yields (within 1250.1 kg), which is 8.2% more than in the control group.
The current challenges in the field of breeding cattle of the Znamianska Polissya beef breed require proper attention from relevant scientists and farmers.

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