

**Yertleuova B. O.**, master of Veterinary Sciences, **the main author**, <https://orcid.org/0000-0003-1990-570X>

NJSC «West Kazakhstan Agrarian Technical University named Zhangir khan», Uralsk, st. Zhangir khan 51, 090009, Kazakhstan, [aliba.87@mail.ru](mailto:aliba.87@mail.ru)

**Nametov A. M.**, doctor of veterinary sciences, professor, <https://orcid.org/0000-0002-8113-1912>  
NJSC «West Kazakhstan Agrarian Technical University named Zhangir khan», Uralsk, st. Zhangir khan 51, 090009, Kazakhstan, [anametov@mail.ru](mailto:anametov@mail.ru)

**Orynkhanov K.A.**, candidate of Veterinary Sciences, Associate Professor <https://orcid.org/0000-0001-6736-0498>

NJSC Kazakh National Agrarian Research University, Almaty, Abay Ave., 8, 050010, Kazakhstan, [k\\_orynkhanov@mail.ru](mailto:k_orynkhanov@mail.ru)

**Sidikhov B.M.**, candidate of Veterinary Sciences, <https://orcid.org/0000-0001-6471-3737>  
NJSC «West Kazakhstan Agrarian Technical University named Zhangir khan», Uralsk, st. Zhangir khan 51, 090009, Kazakhstan, [sidihovbm@mail.ru](mailto:sidihovbm@mail.ru)

## THE DEFINITION OF THE EFFECTIVENESS OF TREATING ASEPTIC WOUNDS IN DOGS WITH A MEDICINE BASED ON *ARTEMISIA LERCHIANA*

### ANNOTATION

Injuries in animals and the treatment of their complications remain one of the most important and urgent problems of modern veterinary surgery. Currently, veterinary specialists use various methods and chemicals for wound healing, but due to the resistance of microorganisms to existing drugs, the high cost of these drugs and the presence of side effects on the animal body, it requires the production of new inexpensive and highly effective medicines.

As specified in our study, in this aspect, the development of herbal preparations with antibacterial properties and stimulating tissue regeneration becomes important.

In this regard, the main purpose of our work was to prepare an essential oil ointment based on *Artemisia lerchiana* and study its therapeutic effect on animal wounds. To determine the effect of the infusion and 10 and 20% ointments (prepared from *Artemisia lerchiana* essential oil), mongrel dogs were taken on aseptic wounds in animals. For comparison, we used the traditional method of treatment with Vishnevsky's liniment. According to the results of the study, the wound healing process in animals that used 10 and 20% *Artemisia lerchiana* ointment occurred 1-2 days earlier than with the traditional method.

**Key words:** *Artemisia lerchiana*, infusion, essential oil, dogs, hematology.

**Introduction.** Currently, an urgent problem of surgery is wound healing, which is directly related to the spread of ulcers of various etiologies, frequent purulent complications, the formation of significant costs in the course of treatment [1-5].

There are many methods of wound healing, including new ones, which are being prepared and implemented in the rhythm of time. It should be noted that the massive and excessive use of antibacterial drugs leads to the formation of microflora that is less sensitive to them or less sensitive [6-8].

In such cases, the use of antimicrobial medicinal plants, which are considered an alternative to traditional antibiotics, as well as the use of medicinal plants with wound healing activity, which belong to the genus Wormwood in this row, are promising.

Many plants of the genus *Artemisia* belong to the line of medicinal plants. In recent years, research on the antibacterial, viral, anti-inflammatory, nematicid and fungicidal properties of essential oils and wormwood extracts has been of undoubted interest [9-14].

Among the class of metabolites of the genus Wormwood, terpenoids are the most studied. One of the promising directions in the treatment of inflammatory diseases is the local use of plant essential oils [15-17].

L. P. Tsedenova and other authors in their research it has been shown that some components of the essential oil from *A.lerchiana* (1,8-cineol, borneol,  $\alpha$ -tuion, bornyl acetate) protect the body from pathogens and have a fungicidal, bactericidal active effect. Cineol, borneol *A. lerchiana* contains active substances that have a bactericidal, antimicrobial effect [18].

In studies of the antimicrobial activity of wormwood tinctures, test microbes of two types of wormwood (*Artemisia absinthium*, *Artemisia lerchiana*) showed that they have a high antimicrobial effect in relation to *Staphylococcus aureus*, *Streptococcus* and *Escherichia coli* [19,20].

The main representatives of the conditionally pathogenic microflora in dogs include yellow and white staphylococci, pyogenic and epidermal streptococci, less often coliform bacteria. In our studies, 83% of gram-positive bacteria found *Staphylococcus* in dog wounds, and 50% of gram-negative bacteria found *Escherichia coli* [21].

Seeing the high occurrence of these bacteria on wound surfaces, the determination of the antibacterial effect of the infusion and essential oil prepared on the basis of *Artemisia lerchiana* was carried out. The results of the study showed that the infusion and essential oil based on *Artemisia lerchiana* have a high antibacterial effect [20].

In this regard, the main goal of our work was to prepare an ointment from essential oil based on *Artemisia lerchiana* and study its healing effect on animal wounds.

**Research materials and methods.** The experimental work was carried out in the veterinary clinic of the West Kazakhstan agrarian and technical university named after Zhangir Khan.

When carrying out research work on experimental animals, it was used according to the requirements of the local ethical commission of the West Kazakhstan agrarian and technical university named after Zhangir Khan.

Also, the provisions stipulated by the "European convention for the protection of vertebrates used for experimental and scientific purposes" were observed.

To determine the effect of an infusion of *Artemisia lerchiana* essential oil and an ointment of 10% and 20% on aseptic wounds, non-breed dogs were taken from animals aged 3-5 years and weighing 20-22 kg, selected according to the analog principle. In total, a study was conducted on 20 dogs. The dogs were kept in rooms with natural light and an ambient temperature of +21+23°C.

During the research, a sample of an ointment containing *Artemisia lerchiana* essential oil as an active substance and vaseline oil was tested. For comparative purposes, we used Vishnevsky liniment as a traditional method of treatment.

The study of the therapeutic effectiveness of *Artemisia lerchiana* ointment and Vishnevsky liniment was carried out for 14-21 days. The wound model was developed in practice as follows. In the case of a veterinary clinic, after scraping the fur of the excess leg by anesthetizing the dogs, a scalpel incision was made on the skin in the thigh area, thus making a linear incision up to the fascia. The wound size was  $14,0 \pm 1,0$  cm<sup>2</sup>. Then the bleeding was stopped and treatment work was carried out. The test ointment was applied to the wound once a day. Wounds of dogs of the first experimental group were selected with 10% *Artemisia lerchiana* ointment, wounds of dogs of the second group with 20% *Artemisia lerchiana* ointment, Vishnevsky liniment for the third group and the fourth as a control group.

During the treatment, thermometry was performed and changes in heart rate and respiratory rate in animals were detected.

A planimetric study of the change in the size of the wound was carried out according to the method of L. N. Popova [22]. Its essence was as follows: sterile cellophane was placed in the wound and the edges of the wound were drawn on it. Next, the drawing was transferred to graph paper and the size of the wound was calculated. The measurement was carried out before and during 1; 3; 5; 10; 14 days of treatment. In the initial study, the percentage of the reduced volume of the wound surface per day was calculated in relation to the calculated volume.

Hematological indicators of the blood of groups of experimental animals on the 1st; 3rd; 5th; 10th and 14th days of pre-treatment and treatment were studied in the Mindray BC-2800 Vet hematological analyzer and biochemical indicators in the BioChem SA analyzer.

For statistical processing of the results, the electronic program Microsoft Excel was used.

**Results and analyzes.**

The results of the study showed that before conducting experimental studies, the general condition of the animals studied, food intake, body temperature, pulse and respiratory rate were within normal indicators (Table 1).

Table 1 – Dynamics of clinical indicators of control and experimental groups of dogs in the process of treating aseptic wounds

Research time	Temperature °C				Pulse rate shock / min				Breathing rate breathing movements/min			
	Control	Vishnevsky liniment	10% ointment	20% ointment	Control	Vishnevsky liniment	10% ointment	20% ointment	Control	Vishnevsky liniment	10% ointment	20% ointment
Healthy animals	38,00±0,14	38,50±0,18	38,26±0,12	38,20±0,16	88,0±1,54	84,00±1,68	82,90±1,52	86,00±1,56	22,00±0,70	21,80±0,73	24,20±1,00	22,30±0,70
Post-treatment: 1 day	38,7±0,10	38,80±0,10	38,72±0,17	39,10±0,07	98,00±1,19	96,00±1,09	87,90±1,68	92,20±1,29	24,00±0,54	26,00±0,54	26,50±1,16	26,20±0,89
3-day	38,70±0,16	38,47±0,16	38,45±0,17	38,86±0,05	104,00±1,11	98,00±1,35	87,00±1,30	84,60±1,40	26,00±0,77	26,40±0,76	24,30±1,20	22,70±0,77
5-day	38,90±0,15	38,78±0,17	38,30±0,16	38,15±0,22	100,00±1,14	91,10±1,48	85,70±1,56	82,40±1,22	26,00±0,90	24,10±0,88	23,70±0,99	21,90±0,78
7-day	39,10±0,13	38,70±0,20	38,09±0,11	37,78±0,20	96,00±1,10	89,30±1,94	81,60±1,61	78,80±1,24	36,00±1,31	24,30±1,16	21,90±0,62	21,20±0,73
10-day	38,80±0,20	38,60±0,18	37,97±0,10	37,65±0,11	94,00±1,41	86,10±1,72	80,70±1,51	76,80±1,10	34,00±0,90	23,90±1,44	21,30±0,82	20,20±0,58

Within a day after the wound was made, all groups of animals experienced anxiety, a slight increase in body temperature, an increase in pulse and respiratory rate within the normal range. In the 3rd and 5th days of the study, the pulse rate in the animals of the control group was at a high level of normal indicators, and in the 7th day, the indicators of body temperature and respiratory rate were at a higher level of the normal visual threshold compared to the initial indicators. In the 10th day of the study of clinical indicators in experimental groups, the level of initial indicators was reached. In general, at all stages of the study, clinical indicators were manifested by changes within the limits of normal indicators in all animals in the study group.

Treatment of aseptic wounds in animals began on the day the wound was made. On the 1st day after the wound was made, only light inflammatory tumors appeared on the edges of the wound area in all animals of the study group, the level of skin movement was maintained, the level of pain was clearly observed in animals and a small amount of fibrin tissue coating was formed on the wound surfaces (Figure 1).

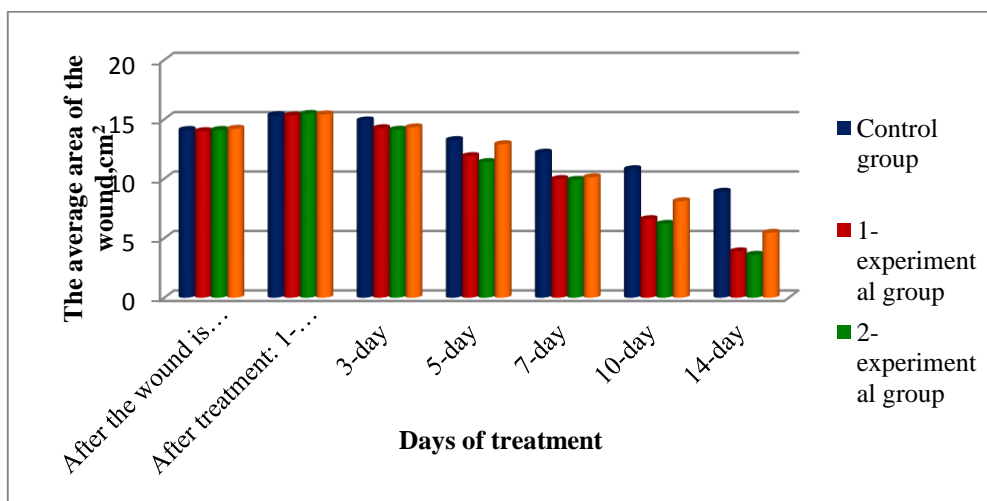


Figure 1 – Changing the area of aseptic wounds in dogs

In animals of the control group, tumors in the wound area remained in the initial days, and the increase in the wound volume to the initial indicators began to manifest only in the 5th day, that is, the wound volume decreased by 6.02% compared to the day of the initial study, and in animals of the experimental groups, the wound volume decreased by 15.0% and 19.14%, respectively, in the 1,2 experimental groups, where *Artemisia lerchiana* ointment was used by 10% and 20% compared to the initial indicators during this day, and Vishnevsky liniment was used in the 3rd experimental group, the reduction in wound size was 9.15%.

On the 7th day of the study, an accumulation of purulent-fibrinous exudate was observed on the wound surfaces of animals from the control group. In addition, the animal shows that the painful symptoms of the area where the wound was made are preserved. And in experimental groups, it was observed that the tumor of the wound surface was completely removed, and the wound was filled and smoothed to the level of the skin surface.

A significant change in the size of the wound in animals, that is, wound healing, was 72.2% and 74.4% in the 1st and 2nd experimental groups compared to the initial indicators on the 14th day, respectively, in the 3rd experimental group this indicator was 61.6%. And in the animals of the control group, the reduction in the size of the wound compared to the initial indicators was 36.9%.

These indicators indicate an acceleration of the healing process in dogs using *Artemisia lerchiana* - based ointments, while in dogs in the control group the wound healing process slowed down, and in dogs using Vishnevsky liniment compared to experimental groups 1 and 2, there is a slight slowdown in the regeneration process, but the results of treatment are clearly visible compared to the indicators of the control group. After the 14th day, after the increase in the formation of purulent-fibrinous changes in animals of the control group, the process of wound healing in animals slowed down, complications began to form, further treatment of animals of this group was carried out, and the process of wound healing was completed by 26-29 days. And in the 1,2 experimental groups, complete wound healing was recorded 1-2 days earlier than in the 3rd experimental group.

In the course of the research work, changes in hematological indicators were identified, as well as clinical indicators of animals. From the hematological indicators of the blood, indicators of: erythrocytes, leukocytes, hemoglobin, platelets, monocytes, eosinophil and lymphocytes were determined.

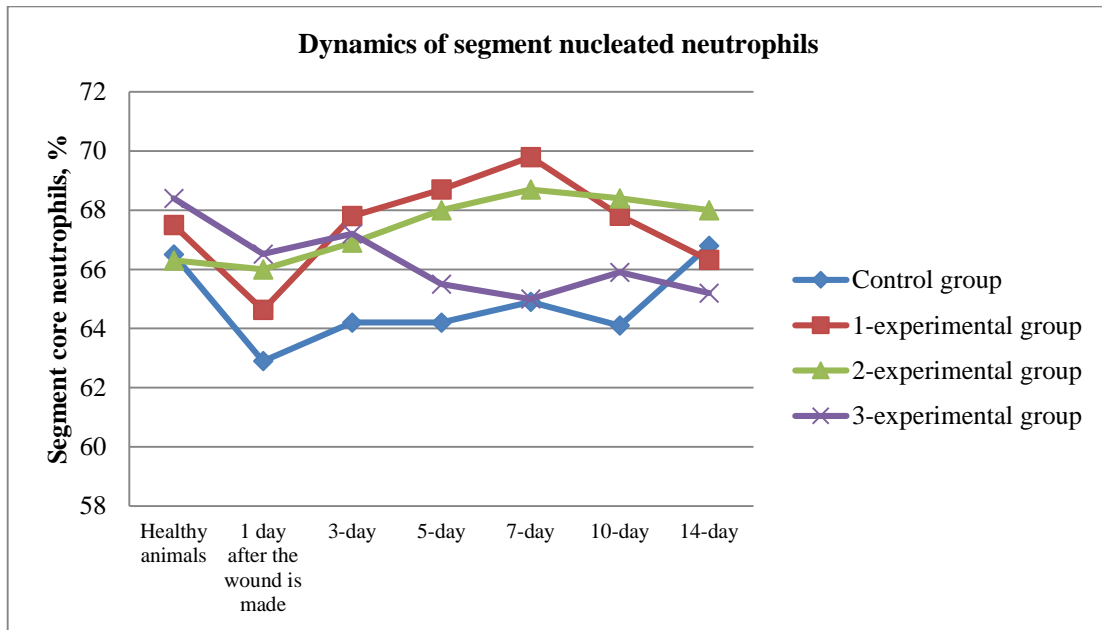
The indicator of red blood cells, platelets, hemoglobin and platelets in the blood from the start of the study to the 14th day of blood tests was manifested by changes within normal physiological indicators, and the main indicator that clearly reflects changes in the process of ulcers was manifested by changes in the dynamics of white blood cells in different groups. The presence of leukocytes above normal indicators remained in the animals of the control group from the 3rd to the 7th day, even during the 14th day of the study, the leukocyte indicator in the control group was 58.6% higher than the initial indicators, and in the experimental groups, fluctuations within normal indicators were observed in the 3rd, 5th day. The presence of leukocytes above the normal values in the control group, characterized by complications of the purulent process, and in the experimental groups-within the normal values, is explained by the timely course of treatment.

Analysis of biochemical indicators of blood serum (total protein, albumins,  $\alpha$ ,  $\beta$ ,  $\gamma$  globulins) showed that no visible changes were detected in dogs of all groups during the study. All indicators were within the limits of physiological norms.

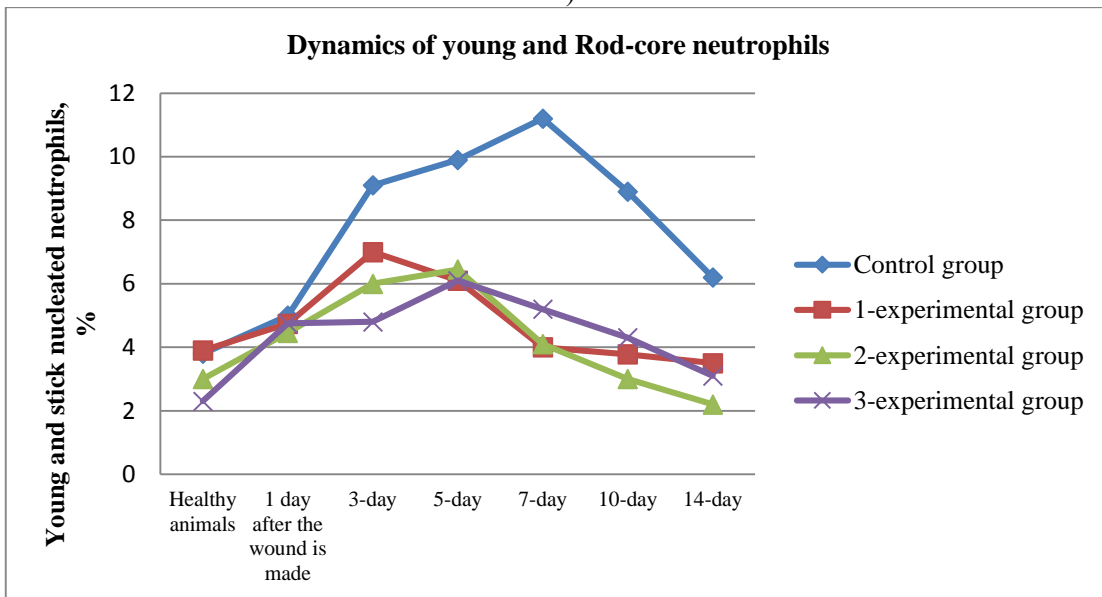
As the main indicators in the healing process of aseptic wounds in dogs, a blood leukogram was developed. In the course of the analysis of leukogram indicators, the main changes were revealed in neutrophils, i.e. young and Rod-core neutrophils and segment-core neutrophils (Figure 2).

In animals of all groups at the 1st day of the post-wound study, a decrease in segment-nucleated neutrophils beyond the limits of normal initial indicators was observed in all groups, and in contrast, an increase in the indicator of young and Rod neutrophils was observed in all groups by the 1st day. In the 1,2 experimental groups, the presence of segment-nucleated neutrophils above the initial indicators was observed at the 7th day, on the contrary, in the 3rd experimental group, a decrease in this indicator compared to the initial indicators is visible, and in the 3rd experimental group, it can be seen that young and Rod-nucleated neutrophils are above the threshold of the initial indicators from the specified day. In the animals of the control group, from the time of the wound, until the 7th day, there was an increase in young and Rod-nucleated neutrophils, and on the contrary, we see that the indicator of segment-nucleated neutrophils decreased compared to the initial indicators. The increase in young and Rod-core

neutrophils during this day can be seen in the fact that the healing process in the wound is slow, that is, the number of young and Rod-core neutrophils in the blood increases to form a healing process.



A)



B)

Figure 2 – Dynamics of neutrophils in the blood during aseptic wounds in dogs  
*A - segment nucleated; B - young and Rod nucleated.*

The presence of segment-nucleated neutrophils within the initial indicators at the 14th day, the presence of young and Rod-nucleated neutrophils below the initial indicators, indicates the active formation of the wound healing process in the body of animals of the 1,2 and 3rd experimental groups. And in the animals of the control group, it can be clearly seen that young and Rod-nucleated neutrophils are still higher than the initial indicators during the specified day.

At the same time, in the course of research, the indicator of basophil, eosinophil, lymphocytes and monocytes in the blood was manifested in all research groups with changes within the limits of normal physiological indicators.

**Conclusion.** Studies show that wound healing results in dogs in experimental groups occur 1-2 days earlier than in dogs in traditional groups.



Preparations of plant origin have a stimulating effect on the regeneration of tissues, do not have side effects, and also quickly restore the functions of the animal body. In addition, 10% and 20% of the plant preparation ointment were more effective in treating aseptic wounds in dogs compared to the type used for the traditional method of treatment.

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### РЕЗЮМЕ

Травмы у животных и лечение их осложнений остаются одной из важнейших и актуальных проблем современной ветеринарной хирургии. В настоящее время ветеринарные специалисты используют различные методы и химические средства для заживления ран, но в связи с устойчивостью микроорганизмов к существующим препаратам, дороговизной этих препаратов и наличии побочных эффектов на организм животных, требует необходимости выпуска в производство новых недорогих и высокоэффективных лекарственных препаратов.

Как уточняется в нашем исследовании, в этом аспекте приобретает значение разработка препаратов растительного происхождения, обладающих антибактериальным свойством и стимулирующих регенерацию тканей.

В связи с этим, основной целью нашей работы было приготовление мази из эфирного масла на основе *Artemisia lerchiana* и изучение ее терапевтического действия на раны животных. Для определения влияния настоя и 10 и 20%-ной мазей (приготовленных из эфирного масла *Artemisia lerchiana*), на асептические раны у животных были взяты беспородные собаки. Для сравнения нами был использован традиционный метод лечения с линиментом Вишневого. По результатам исследования процесс заживления ран у животных, которым применялись 10-и и 20%-я мазь *Artemisia lerchiana*, происходил на 1-2 дня раньше, чем при традиционном методе.

### ТҮЙІН

Жануарлардың жарақаттары және олардың асқынуларын емдеу қазіргі заманғы ветеринарлық хирургияның маңызды және өзекті мәселелерінің бірі болып қала береді. Қазіргі уақытта ветеринарлық мамандар жараларды емдеу үшін әртүрлі әдістер мен химиялық заттарды қолданады, бірақ микроорганизмдердің қолданыстағы препараттарға төзімділігіне, осы препараттардың қымбаттылығына және жануарлар ағзасына жанама әсерлердің болуына байланысты, жаңа әрі арзан және жоғары тиімділіктегі дәрілік препараттарды өндіріске шығаруды қажет етеді.

Біздің зерттеуімізде нақтыланғандай, бактерияға қарсы қасиеті бар және ұлпалардың регенерациясын белсендіретін өсімдік тектес препараттарды дайындау осы аспектіде маңызды болып табылады.

Осыған байланысты, біздің жұмысымыздың негізгі мақсаты *Artemisia lerchiana* негізіндегі эфир майынан жақпа май дайындау және оның жануарлардың жараларына емдік әсерін зерттеу болды. Тұнба мен 10% және 20% жақпа майдың (*Artemisia lerchiana* эфир майынан жасалған) әсерін анықтау үшін жануарлардың асептикалық жараларын қалыптастыруға тұқымсыз иттер алынып, салыстырмалы зерттеу үшін Вишне夫斯基 линиментімен емдеудің дәстүрлі әдісін қолдандық. Зерттеу нәтижелері бойынша 10% және 20% *Artemisia lerchiana* жақпа майы қолданған жануарлардағы жараларды емдеу үрдісі дәстүрлі әдіске қарағанда 1-2 күн бұрын жазылумен аяқталды.