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1. DESIGNATION

Petrolaser heat detector is purposed for determination of heat period and optimization of insemination time for animal breed.

Functioning of the instrument is based on measurement of electrical impedance of animal vagina mucous and representation of the results on a digital indicator.

The heat detector represents a portable battery-powered electronic device. Autonomous power supply of Petrolaser heat detector enables to use it not only in various kinds of farms, but in the pasture, field conditions etc.

2. BASIC TECHNICAL FEATURES

Overall dimensions, maximum, mm	160x100x80
Heat detector weight, maximum, kg	0.8
Electrical power	9 V battery
Continuous operation time for fully charged battery, minimum, hours	25
Mean time between failures, minimum, hours	5000
Maximum average shelf life to decommissioning, years	5
Operating conditions:	
• ambient temperature range	+1 °C to +40 °C
• relative humidity, maximum	80 % at + 25 °C
• atmospheric pressure range	84 to 106.7 kPa

3. DELIVERY SET

No.	Name	Quantity
1	Petrolaser heat detector electronic module	1 pc.
2	Electrode sensor with connecting cable	1 pc.
3	Carry bag	1 pc.
4	Power cable	1 pc.
5	Operation manual	1 copy

8. OPERATION HINTS AND SAFETY

- 8.1. To ensure electrical safety and protection of the personnel from electrical shock, it is not allowed to operate the instrument when the batteries are being charged from 220 V power mains.
- 8.2. To prevent early failure of the accumulator, it is not allowed to start charging the instrument before the battery has completely become flat (continuous indication of three points between the second and the third indicator grades during the operation of the instrument means that the battery is out of charge or needs to be replaced; at that it is normal when this indicator switches on for a short while when switching off the instrument). Charging time of a flat battery is around 12 hours.

9. TRANSPORTATION AND STORAGE

- 9.1. The instrument shall be stored in heated and ventilated rooms at the temperature of + 1 to + 40°C at the relative humidity not exceeding 80%. Air in the room should not contain any corrosive pollutants.
- 9.2. Instrument in its normal package can be conveyed by any kind of roofed carriers at the temperature of minus 50 to + 50°C. In case of shipping by sea, the instruments shall be additionally packed in special water-tight polyethylene bags with silica gel.

10. WARRANTY

- 10.1. The Manufacturer guarantees that the instrument conforms with the technical specifications requirements, provided that the customer observes the operation, transportation and storage requirements. The Manufacturer is entitled to make changes in the instrument without affecting the performance specification and operating properties of the same.
- 10.2. The Manufacturer shall repair the instrument free of charge within the warranty period, provided that the customer observes the operation and storage regulations and provided that instrument has not been mechanically damaged.
- 10.3. Warranty period is 12 months from the date of sale, but not more than 18 months from the manufacturing date.
- 10.4. Should any malfunctioning of the instrument be detected during the warranty period, please fill the warranty card stating the instrument malfunctioning symptoms and send the warranty card and the full delivery set of the instrument to Petrolaser Co.

or increase. Therefore it is feasible to carry out commissioning of the instrument concurrently with prophylactic medical examination of the flock.

Warning! Should the mucous tunic be contaminated with manure or other kinds of dirt, the instrument can go off-scale or give very high reading. In this case wipe the electrode with clean cloth dampened with ethyl alcohol and thoroughly flush with water, then carry out hygienic procedure of the cow's genitals and repeat the measurements after 2-3 hours.

7. FIELD CLINICAL TESTS RESULTS

Results of field clinic tests in Makeevo ZAO, Moscow region, and Lakash, SPK, Ryazan region, where 152 cows from the milk flock were examined with the aid of Petrolaser heat detector, demonstrated the advantages of this method as compared with conventional methods for determining the insemination period, namely:

- higher percent of pregnant animals after the insemination as compared with the inseminations without use of the instrument;
- possibility to get additional information when the particular animal is in the heat period;
- possibility to detect cows in the heat period even with mild symptoms of the heat period;
- reduction in number of rectal studies and reduction in time required to carry out the diagnostics (20 – 30 sec), which considerably increases the labour efficiency of the personnel;
- less stress for the animals;
- savings of the sperm due to single-time insemination;
- enables to diagnose chronic pathologies of cows' reproductive organs, including latent endometritis.

Compact and mobile Petrolaser heat detector is a reliable assistance for both insemination technician and veterinary surgeon, which provides sufficient savings enabling to choose optimal time for insemination of animals.



Fig.1. View of the instrument

- 1 – Electronic sensor with connecting cable
- 2 – Power button
- 3 – Digital indicator
- 4 – Electronic module

4. DESIGN AND FUNCTIONING

- 4.1. Physical and chemical properties of a female animal's genital secretion are closely connected with the physiological functions of the ovaries. During the heat period moisture of the mucous of vagina increases, reaching its maximum when the follicles reach their maturity in the ovaries. At that moment the electrical resistance of the studied surface changes abruptly, which is detected by Petrolaser heat detector. Later on, after the follicle having become mature and the ovule having come out of the ovary, the electrical resistance changes, thus moisture of the mucous changes respectively, which is also shown by the instrument. During the animal's service period and pregnancy time (from the 3rd to the 8th months) the electrical resistance characteristics of the vagina mucous are of a particular value, which is also detected by the digital indicator.

Summarizing the above mentioned, it can be said that Petrolaser heat detector is purposed for heat stage detection and enables to define whether the animal is in service period or pregnant. It has to be taken into account that the accumulated statistical data and conclusions are true for healthy animals.

- 4.2. In terms of design, Petrolaser heat detector consists of basic electronic module connected with electrode sensor by means of a separable cable. Connection cable for connection to 220V / 50 Hz power network is included in the delivery set for battery charging. Sensor of the instrument is made of elastic material, which allows to put it in anatomically correct position when entering into the animal's vagina, which makes the measurement procedure non-injuring. A cup with a sensing element for vagina mucous accumulation is located on the end of the sensor for data measurement. On the front side of the basic module there is a LCD indicator with the illumination function for low light level. On the side panel of the basic module there is a power on button and LED indicating that the power is on.

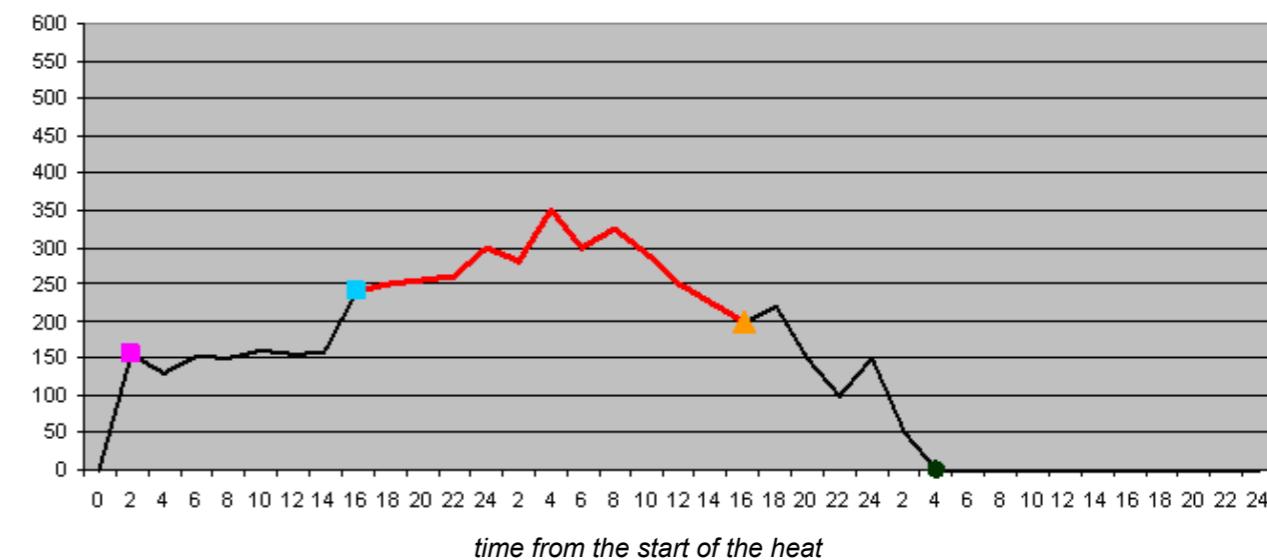
5. OPERATION PROCEDURE

- 5.1. Prior to starting to work, check battery charge conditions and make sure the electrodes are clean. For this purpose press the power button on the instrument. If the electrode is clean and dry, numbers within the range of 000 to 005 will be displayed on the LCD indicator, thus demonstrating that the instrument is ready for operation. If the indications exceed 005, it means the electrode is dirty. If required, wipe the electrode with clean cloth dampened with ethyl alcohol and flush with water. Continuous indication of three points between the second and the third indicator grades during the operation of the instrument means that the battery is out of charge. In this case it needs to be charged by plugging into 220 V power mains by means of the cable from the delivery set for 12 hours (the LED on the electronic module should go off, which indicates that the charging is over).
- 5.2. Starting to work, make sure the instrument is secured in the carry bag, and the carry bag itself is secured on the operator's body.
- 5.3. After the necessary genitals hygienic procedure, enter the sensor into the cow's vagina along the top wall up to the neck of uterus, and then retract it back for 10-12 cm, and then again back to the neck of the uterus in a cranial way along the bottom wall of the vagina. This way of measurement provides most stable readings.

- 5.4. Having secured the sensor in the cow's vagina, press the start button on the base module.
- 5.5. Depending on the physiological condition of the animal, readings of the instrument will be displayed on the digital indicator.

6. INTERPRETATION OF READINGS

- 6.1. Readings of the instrument within the range of 160 to 350 units mean that the period is optimal for insemination.
- 6.2. If the instrument reads 120 – 150 units, the animal is in the initial period of the heat or the heat is about to be over. For such reading the examination should be repeated after 4 – 6 hours. If over this period of time readings of the indicator change towards increase, this means the time is optimal for insemination; should the same decrease, the optimal time was missed.
- 6.3. If the readings of the instrument are high, exceeding 470 – 500 units, and stable within 3-5 days, this indicates serious problems in the reproductive system of the animal (latent endometritis, vaginitis, etc.) and the animal needs treatment.
- 6.4. If the instrument reads less than 100 units, insemination is not recommended. The animal is physiologically not ready for fertilization.



Note: for animals with serious chronic pathologies of infection or alimentary nature deviations from these possible readings will take place. In doubtful cases it is recommended to carry out additional rectal and laboratory tests. Moreover, depending on the kind of livestock, diet and breeding conditions, the above described indications of the instrument can shift towards decrease