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ANALYSIS OF THE ADAPTIVE SYSTEM FOR SUPPRESSION OF THE INTERFERENCE CONCENTRATED ON A SPECTRUM

Systematic control over the health of farm animals becomes a necessary condition for the functioning of livestock complexes, and its improvement is one of the most important tasks of veterinary science and best practice [1].

At present, the main indicator of the state of animals is temperature. In veterinary practice contact (thermometers) and non-contact (thermal imagers) methods of temperature measurement are used. The use of thermometers leads to injuries or rupture of the rectum. The use of thermal imagers requires the fixation of animals and special preparation of the skin surface [2].

Therefore, preference should be given to a remote method based on the reception of the thermal radiation of the animal organs. The power of thermal electromagnetic radiation of tissues and organs of animals is $10^{-15} - 10^{-20}$ W.

Veterinary diagnostic system of radiothermal mapping is intended for diagnosing circulatory disorders, tumors, inflammatory processes of internal organs of animals. The analysis of existing radiometric receivers shows that their parameters do not meet the requirements for accuracy, sensitivity and noise immunity. The sensitivity of existing radiometric receivers in the millimeter range does not exceed 10^{-10} W. A millimeter-wave radiometric system for measuring the animals' own electromagnetic radiation, having a relatively wide reception band, can be exposed to a combination of interference [3].

The main sources of interference for the radiometric system, in the zone of measurement with animals, are industrial disturbances [4]. A practical analysis shows that one of the dangerous is a spectrum-focused interference with a random or varying

frequency, which can be suppressed by means of special circuits using differences in the characteristics of useful signals and interference [5].

Therefore, suppression of a noise-centered noise, with a random or varying frequency, is an actual problem.

For the remote determination of the condition of animals, a passive radiometric receiver of the modulation type should be used. The radiometric receiver is designed for measuring the thermal electromagnetic radiation of tissues and organs of animals in the range of 30-40 GHz.

The suppression of a focused noise, with a random or varying frequency, up to 30 dB allows:

- increase the sensitivity to 10⁻¹⁹ W, instead of 10⁻¹⁷ W;
- increase the detection of temperature fields to 10 cm, instead of 5 cm;
- increase speed up to 1 second, instead of 2...4 seconds;
- increase the reliability of diagnoses by an order of magnitude when analyzing the picture of the animal's thermal field.

Weaknesses. The weakness of the receiver is that it requires further development to protect against industrial and broadband interference.

Opportunities. The use of a radiometric receiver for the diagnosis of the condition of animals has allowed in their treatment:

- reduce the consumption of medicines by 15...20 %;
- to develop a feeding ration and conditions for their maintenance and, as a result, increase productivity by 20...25 %;
- save the economy (1000 head of cows) 5000...6000 USD.

The cost of completion will not exceed 10 % of the cost of the radiometric receiver.

Threats. The cost of modifying the receiver to protect against industrial and broadband interference will be approximately 10 % of the cost of the radiometric receiver.

References

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