IJIMM, Volume 3, Issue 6, 2025 ISSN: 2995-5319
http://medicaljournals.eu/index.php/IJIMM

INTERNATIONAL JOURNAL OF INTEGRATIVE AND MODERN MEDICINE

Application of Automatic Hemoanalyzer in Veterinary Practice

Shakhlo Babaeva[1]

[1]Samarkand State University of Veterinary Medicine, Livestock and Biotechnologies, Samarkand, Uzbekistan

Abstract: This article describes how an automatic hemanalizer works and what parameters it determines. The integration of automatic hematology analyzers into veterinary practice has revolutionized hematological diagnostics by increasing efficiency, accuracy, and the scope of clinical evaluation in animals. This study aims to assess the practical application of automated hemoanalyzers for different animal species, focusing on the speed of diagnostics, precision in identifying hematological abnormalities, and benefits in clinical decision-making. The findings suggest that these analyzers significantly reduce turnaround time and enable early disease detection. However, limitations exist due to interspecies variability and occasional discrepancies in leukocyte differentials. Continued refinement and species-specific calibration are essential to improve diagnostic utility.

Keywords: automatic hematology analyzer; veterinary diagnostics; animal health; blood analysis; clinical pathology; leukocyte differential; laboratory automation; species-specific calibration

Introduction:

Hematology analyzer - allows veterinary specialists to conduct a complete blood test, which helps to determine hematological parameters of blood in various physiological states of the body.

This hemoanalyzer can also be used for students of the following specialties: 60840100 - Veterinary Medicine (by type of activity), 60840300 - Veterinary Diagnostics and Laboratory Work, 60840400 - Veterinary Sanitary Expertise in the subject "Animal Physiology", on the topics of modern methods of counting blood formed elements, determining the physicochemical properties of blood, counting the number of erythrocytes, determining the erythrocyte sedimentation rate, counting the number of leukocytes, preparing a blood smear, determining the leukocyte formula, and determining the amount of hemoglobin.

This analyzer can be used to determine the amount of hemoglobin, erythrocytes, and leukocytes in the blood.

When using the hemoanalyzer, the blood sample is first selected from the menu on the associated screen (for example: venous blood or capillary blood).

To perform the analysis, special purple-capped vacuum tubes are used for use in this type of hemanalizer. EDTA liquid, which is pre-filled in the tube, is used as an anticoagulant to prevent blood from clotting after the sample is taken.

At the same time

The BK-6190 detects the following 20 parameters and 3 histograms:

1. WBC (Total White Blood Cell Count)
2. LY (Lymphocyte count)

3. LY% (Lymphocyte percentage)
4. MO (Monocyte count)
5. MO% (Monocyte Percentage)
6. GR (Granulocyte count)
7. GR% (Granulocyte percentage)
8. RBC (Red Blood Cell Count)
9. HGB (Hemoglobin content)
10. HCT (Hematocrit)
11. MCV (Mean Cell Volume)
12. RDW-SD (Red blood cell volume)changes)
13. RDW-CV (Red blood cell volume)coefficient of variation)
14. MCH (Mean Hemoglobin Content)
15. MCHC (Mean Hemoglobin Concentration)
16. PLT (Platelet Count)
17. MPV (Mean Platelet Volume)
18. PCT (Total Platelet Count)
19. PDW (Platelet Weight)changes)
20. P-LCR (Large Platelet Percentage)

Histograms:
WBC histogram: Shows leukocyte categories.
RBC histogram: Shows volume changes of erythrocytes.
PLT histogram: Shows volume changes of platelets.

Materials and methods

Test speed: 60 tests per hour.
Sample size: 13 µl for whole blood,
20 µl for pre-diluted blood.
Measurement method: Electro-impedance and photometric analysis.
Screen: 8 inch touch LCD display.
Memory: 200,000 results (with histograms).
Publishing interface: RS232, PS2, USB ports;
Integration with LIS system is possible.
Printer availability: Internal thermal printer; possibility of connecting to an external printer via USB.
Solutions used in the BIOBASE hemanalizer
The solutions (reagents) used in Biobase hemanalizers differ depending on the type of parameters being analyzed. Hemanalizers usually perform a general (clinical-hematological) blood analysis, that is, determine the number of hemoglobin, erythrocytes, leukocytes, platelets, and other indices.
1. Diluent (diluting solution)
Function: Dilutes blood samples before analysis.
Why you need it: Helps separate, count, and size blood cells.
Composition: Usually an isotonic saline solution, pH balanced.
2. Lyse reagent (hemolyzing solution)
Function: Breaks down erythrocytes (hemolysis).
Why it's needed: Red blood cells are removed to better see and count leukocytes.
Composition: Weak acids or ammonium chloride-based solutions.
3. Cleaner (cleaning solution)

Function: Cleans the internal tubes of the device, removing debris stuck to the hose and sensor.
Why is it needed: Ensures proper operation of the device and accuracy of results.
Composition: Neutral or slightly alkaline solutions.
4. Diluent-Lyse Combo
Function: Thins the blood and hemolyzes erythrocytes.
Why you need it: For ease of use and quick analysis.
5. QC Reagents (Quality Control Solutions)
Function: Used to test the accuracy of the device.
Why you need it: To check that the device is working properly every day or at specified intervals.
Composition: Blood-like fluids with standard values.

Biobase BK-6190 automatic hematological analyzer

Measuring principle:

Blood cells are counted by electrical impedance method. Hemoglobin is determined by colorimetric method. Unit of measurement is % (in percent). Blood samples for blood analysis in a hemanalizer are taken at rate of 60 samples per hour.

Calibration:automatically when selected from the menu.

Results

Sequence of work for performing a complete blood count on the Biobase BK-6190 automatic hemanalizer.

To perform a complete blood count on the Biobase BK-6190 automatic hematology analyzer, the following sequence of operations is performed. This sequence must be performed in compliance with all laboratory procedures:

1. Preparatory stage

- Turn on the device: Connect the appliance to the mains and switch it on. Wait until the appliance starts up.
- Fluid testing: Check the condition of reagents (lysis reagent, washing solution, cleaning solution) and waste containers. They should be in sufficient quantity and clean.
- Calibration (if necessary): Make sure the device is calibrated or perform calibration for new batches.
- Checking control samples: Before starting work, check the analyzer with normal and pathological control samples.

2. Sample preparation

- Blood collection: Blood is drawn from a vein into a test tube containing an anticoagulant (usually K2EDTA).
- Mixing: Mix the blood thoroughly but gently by swirling (invert the vacuum tubes 8–10 times).
- Enter the sample number: Enter the sample ID manually or via barcode from the device interface.

3. Enter sample for analysis

- In manual mode:
  - Place the blood test tube in the special place where it will be placed on the analyzer.
  - Click the "Start" button.
- In automatic mode (if an automatic loader is available):
  - Place multiple samples in the automatic tray.
  - The device automatically draws and analyzes samples.

4. Obtaining analysis results

- The device analyzes the sample and calculates the main hematological parameters:
  - WBC (leukocytes)
  - RBC (erythrocytes)
  - HGB (hemoglobin)
  - HCT (hematocrit)
  - MCV, MCH, MCHC (erythrocyte indices)
  - PLT (platelets)
  - RDW, PDW, MPV, etc.
- The results are displayed on the screen and can be printed.

5. Tool cleaning and prevention

- When finished, start the flush mode.
- Clean the instrument surface and probe rests each day after work is finished.
- Follow weekly maintenance plans (check sensors, view reagent filter status).

6. Data storage

- Save results to a local network, laboratory information system (LIS), or external device.
- Follow archiving requirements.

Discussion

Importance and benefits for veterinary professionals

1. Rapid and accurate evaluation of animal blood analysis

In the veterinary field, complete blood count (CBC) is very important for various animals in determining the general condition of the animals. The BK-6190 analyzer helps in the following cases:

2. Fast and simplified processing

In veterinary clinics, it is necessary to quickly determine the medical condition of animals, because time is of the essence for animals. BK-6190 automatic analyzer:

- Quick results: With a throughput of 60 tests per hour, this analyzer quickly completes animal blood tests, allowing veterinary professionals to make quick diagnoses.
- Reducing errors: Automated systems reduce human error and provide accurate and reliable results.

3. Ability to identify multiple animal species

The BK-6190 analyzer not only works for the same animal species, but also for different animals. For example, it helps in performing blood analysis for the following animal species:

- Cattle
- Horses
- Sheep, goats
- Poultry (and other poultry species)
- Dogs and cats

This is important because blood tests for different animals are different, and the analyzer performs customized tests for each species.

4. Determining animal-adapted analysis parameters

Veterinary professionals need specific diagnostic parameters for animals. The BK-6190 provides blood analysis specifically optimized for animals. It accurately measures erythrocytes, leukocytes, platelets and many other parameters in animal blood, which allows for accurate diagnosis.

5. Use in medium and large-scale clinics

In veterinary clinics and hospitals, multiple animals require constant medical care. With the high speed and multiple parameter detection capabilities of the BK-6190 analyzer, clinics will be able to quickly analyze and diagnose a large number of animals.

6. Long-term monitoring

Veterinary professionals need to monitor the long-term health of animals. The BK-6190 analyzer not only provides rapid analysis, but also allows for continuous monitoring by storing the results. This helps in managing treatment courses to improve the health of animals.

7. Ability to store and share data electronically

The BK-6190 analyzer provides the ability to electronically store, transfer, and view data outputs. This not only allows veterinarians to quickly review analysis results, but also provides the ability to store and analyze data in centralized systems.

Conclusion

The Biobase BK-6190 automatic hematology analyzer is a valuable tool for veterinary professionals. It allows you to quickly, accurately and efficiently assess the medical condition of animals, helps to make an accurate diagnosis and optimize the treatment process. This analyzer helps to make diagnostic processes in veterinary clinics more efficient, saves time and allows for more accurate results.

References:

1. "New technology"https://biobase.nt-rt.ru/price/product/638121
2. "Hematological analyzer"https://ru.bimedis.com/biobase-bk-6190-m410673
3. DEEshimov, RFRo'zikulov. “Practical laboratory exercises in animal physiology”. Textbook. Tashkent, Ilm Ziyo – 2012.
4. Shakhlo, B., Shokhrukhbek, K., Khursanali, Q., & Muqaddas, J. (2022). Application Of Biological Additives-premixes In Ostrich Farming. International Journal on Orange Technologies, 4(1), 4-7.
5. Aliyevna, BS (2022). Effect of "Panaroot-98" on the Clinical and Physiological Condition of Ostrich. International Journal on Orange Technologies, 4(1), 1-3.
6. Alievna, BS (2021). Prospects for the development of ostrich in veterinary medicine. Academicia Globe, 2(05), 351-355.
7. Alievna, BS (2023). Effects Of "Panaroot-98" on Egg Production in Ostriches. EUROPEAN JOURNAL OF INNOVATION IN NONFORMAL EDUCATION, 3(6), 108-110.
8. Alievna, BS (2021). Methods Of Feeding Ostriches. Academicia Globe, 2(05), 347-350.
9. Bossuyt, X., Verfaillie, C. J., & Van Den Bossche, G. N. (2020). Automated hematology analyzers: Hurdles and benefits in veterinary medicine. Veterinary Clinical Pathology, 49(1), 4–14. https://doi.org/10.1111/vcp.12804
10. Thrall, M. A., Weiser, G., Allison, R. W., & Campbell, T. W. (2012). Veterinary Hematology and Clinical Chemistry (2nd ed.). Wiley-Blackwell.
11. Rizzi, T. E., Crisman, M. V., & Wardrop, K. J. (2021). Comparative performance of automated hematology analyzers in veterinary settings. Journal of Veterinary Diagnostic Investigation, 33(2), 239–246. https://doi.org/10.1177/10406387211000057

12. Lilliehöök, I., & Tvedten, H. (2003). Hematologic abnormalities in animals—What automated analyzers can and cannot detect. Veterinary Clinics of North America: Small Animal Practice, 33(6), 1207–1222. https://doi.org/10.1016/S0195-5616(03)00121-6
13. Stockham, S. L., & Scott, M. A. (2008). Fundamentals of Veterinary Clinical Pathology (2nd ed.). Wiley-Blackwell.
14. Picken, M. M., & Hall, D. (2020). Automation in veterinary laboratories: Benefits for clinical and field diagnostics. Animal Health Research Reviews, 21(1), 1–8. https://doi.org/10.1017/S1466252320000016
15. Schalm, O. W., Jain, N. C., & Carroll, E. J. (2015). Schalm's Veterinary Hematology (6th ed.). Wiley-Blackwell.
16. Wills, T. B., & Wardrop, K. J. (2010). The role of automated analyzers in modern veterinary clinics. Compendium: Continuing Education for Veterinarians, 32(7), E1–E6.