

Research on Haematological Parameters in Aubrac Cattle Breed Exploited on the Conditions of Romania

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Abstract

The current paper checks the health of Aubrac cattle breed, exploited in the conditions of our country, thus achieving a highlighting of haematological parameters. It is an old cattle breed from France, originating from the Aubrac mountains (south of the Central massif), which has recently become an important object of major interest for beef cattle breeders in our country. Blood samples were collected from each animal studied, then they were analysed using the haematological analyser scil Vet ABC. This analyser is simple to operate and produces a complete three-part differential blood count in only 90 seconds, requires only 12 µl of whole blood. The results were highlighted by an individual blood count, including the following parameters: erythrocytes, thrombocytes, total leucocytes, haemoglobin and erythrocyte indices. In the case of one animal, were observed insignificant deviations from normal values, in terms of the number mean corpuscular volume. The other animals studied are in full health, this conclusion can be deduced from the fact that the observed values fall within the normal range of the literature.

Keywords: Aubrac, blood, haematology, health.

1. Introduction

Aubrac cattle, a very old breed from France, originating from the Aubrac Mountains (south of the Massif Central), which in the last 4 years has become an important object of interest for beef cattle breeders in our country. In general, the representatives of this breed are of medium size (adult cows: height at the withers 130cm, 550 - 800kg, bulls: height at the withers 140 cm, 900 - 1200kg), reddish-brown colour, darker around the eyes and snout which it continues with the white colour, the black skin, the lyre-shaped horns, the short neck, the broad chest, the muscular rump, the short and strong legs. They are rustic animals that have special biological properties, of

increased resistance and adaptability to diseases and severe environmental conditions, with a very long longevity, being recognized for light calving. If at calving, a calf weighs about 40 kg, in a year it reaches over 400 kg. Moreover, cows can weigh up to 800 kg, and a bull up to 1,200 kg.

The breed is exploited mainly for meat production, although initially in the nineteenth century, this breed was highly valued for the quality of milk, with a production of about 2,200 kg of milk/lactation, containing about 4.13% fat. Due to the extraordinary organoleptic properties of milk, a type of high-quality cheese was created, famous in France under the Laguiole brand, which is still very popular today. The meat obtained from Aubrac cattle has a beautiful red colour, intensely marbled, with a high protein content and its subtle aromas make it one of the tastiest and most appreciated beef.

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Due to the good quality pastures in our country, the first important Aubrac cattle specimens in our country have easily acclimatized to the environmental conditions, and for this reason this breed increases the interest of cattle breeders for meat in Romania.

Haematology concerns the issues related to blood and the hematopoietic system, which is the first to respond to any disruptions in intrabody homeostasis [1]. Hematologic analysis is not only relevant for diagnosing disorders of the hematologic system but also helpful in the diagnosis of many organ and systemic diseases. Although the diagnosis of a disease can only occasionally be based solely on a complete blood cell (CBC) count, the hemogram contribute valuable information in the diagnosis, surveillance, and formulation of a prognosis regarding the future progression of a disease in an individual [1]. However, if pathological or irregular results are discovered, or abnormal morphology or blood cell function impairment is suspected, an additional microscopic blood smear evaluation is strongly recommended.

This study evaluates the haematological parameters of the Aubrac cattle breed by analysing the blood samples and interpreting the results on the blood count cell. The blood count cell is a laboratory test that evaluates quantitatively and qualitatively the figurative elements (cells) in the blood [2]. It provides information about the number of types of blood cells, as well as their size, shape and other physical characteristics. The term also refers to the bulletin containing the result of such a laboratory examination. The blood count is one of the commonly recommended tests for general health assessment.

Erythrocytes (red blood cells) cells produced in the bone marrow during the process of erythropoiesis; have a peripheral life of 120 days in peripheral blood haemoglobin - containing anucleate cells, which transport oxygen from the lungs to the tissues and carbon dioxide from the tissues to the lungs, respectively.

Platelets it forms in the bone marrow of megakaryocytes small, round, anucleate cells with a major role in maintaining vascular integrity are found in the peripheral blood, a small percentage being located in the spleen and liver. Platelets play an important role in blood clotting [3].

Leukocytes are cells produced in the bone marrow divided into granulocytes (neutrophils, basophils,

eosinophils) and non-granulocytes (B and T lymphocytes, monocytes). The role of leukocytes: acts against phagocytosis infections, protecting the body from invasion of pathogenic microorganisms, production, transport and distribution of antibodies during the immune response [4].

Haemoglobin - the concentration of this parameter evaluates the total amount of haemoglobin in the peripheral blood. Of haemoglobin is an erythrocyte, with a role in the transport of oxygen and carbon dioxide [1].

Erythrocyte indices provide information on the size of erythrocytes (MCV, RDW), the degree of haemoglobin loading of erythrocytes (MCH), respectively the concentration of erythrocyte haemoglobin (MCHC), being useful in classifying anaemias [2].

2. Materials and methods

The biological material that contributed to this study is Aubrac cattle breed. The method consisted of collecting blood samples directly from the jugular vein, in special tubes coated with anticoagulant agents (EDTA) [5], specific to haematological analysis. Blood samples were collected from each animal studied, then they were analysed using the haematological analyser scil Vet ABC. Scil Vet abc is an easy-to-use device, it contains a smart card provides the device with the settings of the animal species corresponding to the samples. Scil Vet abc smart Cards are available for 11 animal species, including cattle. The measurement is started by pressing a single button, the results being then automatically transferred to the software of the computer to which it is connected. When the measurement is started, 12 µl of whole blood EDTA are aspirated automatically, it is not necessary to prepare the sample beforehand. The results were obtained in about 90 seconds, being expressed by means of a blood count.

Scil Vet abc gives us information about the following parameters: erythrocytes, platelets, total leukocytes, haemoglobin indices and erythrocytes.

3. Results and discussions

Through the haemoleukogram, results were obtained on the following parameters: leukocytes, (WBC); Lymphocytes (LYM); Monocytes (MON)

and neutrophils (NEU). The values obtained from the parameters subject to analysis are presented in the table below. Based on these results, we can

observe the general state of health and we can also detect various disorders, including anaemia [6], infections, diseases etc.

Table 1. Values of haemoleukogram parameters

| Haematological parameters | Animal no.1 | Animal no.2 | Animal no.3 | Animal no.4 | Animal no.5 | Unit | Reference interval |
|---------------------------|-------------|-------------|-------------|-------------|-------------|--------------------|--------------------|
| WBC | 8.05 | 10.57 | 9.83 | 8.78 | 9.05 | 10 ⁹ /l | 4 - 12 |
| LYM | 5.24 | 7.28 | 6.10 | 6.00 | 6.31 | 10 ⁹ /l | 2.5 – 7.5 |
| MON | 0.38 | 0.52 | 0.48 | 0.41 | 0.51 | 10 ⁹ /l | 0 – 0.84 |
| NEU | 1.98 | 2.42 | 2.21 | 2.03 | 2.18 | 10 ⁹ /l | 0.6 – 7.6 |

WBC = leukocytes, LYM = lymphocytes, MON = monocytes, NEU = neutrophils

White blood cells (WBCs) or leukocytes play an essential role in immune defence, and include different subpopulations: neutrophil, eosinophil, and basophil granulocytes, monocytes, and lymphocytes. Leukocytes are produced and mature in the bone marrow, and, in the case of lymphocytes, in the lymphoid tissues. The number of leukocytes in the blood constitutes only a small percentage of the total population and undergoes a wide fluctuation. In Table 1 it can be seen that the

values obtained fall within the limits specified by the literature. In the case of leukocytes, a value of 8.05 was obtained, which is within the normal range reported by other researchers (10⁹/l; 4-12) [7]. We can also see that normal values were obtained for the number of lymphocytes (5.24, the limits being between 2.5, and 7.5), monocytes (0.38, the limits being between 0 - 0.84) and neutrophils (1.98, limits being between 0.6 and 6.7) [8].

Table 2. Values of haemoleukogram parameters

| Haematological parameters | Animal no.1 | Animal no.2 | Animal no.3 | Animal no.4 | Animal no.5 | Unit | Reference interval |
|---------------------------|-------------|-------------|-------------|-------------|-------------|--------------------|--------------------|
| EOS | 0.39 | 0.29 | 0.31 | 0.18 | 0.38 | 10 ⁹ /l | 0.1 – 1 |
| BAS | 0.06 | 0.06 | 0.10 | 0.07 | 0.06 | 10 ⁹ /l | 0 – 0.5 |
| LY% | 65.1 | 68.9 | 66.2 | 60 | 64.35 | % | 0 – 100 |
| MO% | 4.7 | 4.9 | 4.6 | 4.1 | 4.6 | % | 0 – 100 |
| NE% | 24.6 | 22.9 | 22.5 | 20.0 | 23.2 | % | 0 – 100 |
| EO% | 4.9 | 2.7 | 3.5 | 2.5 | 5.1 | % | 0 – 100 |
| BA% | 0.8 | 0.6 | 0.6 | 0.5 | 0.7 | % | 0 – 100 |

EOS = eosinophils, BAS = basophiles, LY% = lymphocytes, MO% = monocytes, NE% = neutrophils, EO% = eosinophils, BA% = basophiles

We can observe in Table 2 that the Aubrac cows studied have a normal state of health, the values obtained (EOS 0.39; BAS 0.06; LY% 65.1; MO% 4.7; NE% 24.6; EO% 4.9; BA% 0.8) fall between the minimum and maximum values reported in the literature: EOS (minim value 0.1 – 1 maxim values), BAS (0 – 0.5), LY%; MO%; NE%; EO%; BA% (0 – 100) [9]. The increased total number of values above the maximum limit denotes the presence of bacterial infections, inflammations, hemorrhages, tissue necrosis, acute leukemias, myeloproliferative diseases, etc. The small number indicates viral infections, anemia and

spinal cord infiltrative diseases. The leukocyte formula has clinical significance only interpreted in correlation with the total number of leukocytes [4]. Erythrocytes have an average diameter of 5–6 µm in cattle, which is small compared to other species. The key function of erythrocytes is the transport of oxygen, which is bound to haemoglobin. An RBC count typically includes the total number of RBCs, haematocrit (HCT), haemoglobin (HGB), erythrocyte indices, and occasionally the red cell distribution width (RDW).

Table 3. Values of hemaleukogram parameters

| Hematological parameters | Animal no.1 | Animal no.2 | Animal no.3 | Animal no.4 | Animal no.5 | Unit | Reference interval |
|--------------------------|-------------|-------------|-------------|-------------|-------------|---------------------|--------------------|
| RBC | 7.2 | 6.67 | 6.69 | 6.0 | 7.4 | 10 ¹² /l | 5 – 20 |
| HGB | 10.3 | 9.9 | 10.1 | 8.9 | 11.0 | g/dl | 8 - 15 |
| HCT | 31.57 | 29.7 | 30.2 | 28.4 | 36.46 | % | 24 - 46 |
| MCV | 44 | 42 | 42 | 39 | 45 | fl | 40 - 60 |
| MCH | 14.3 | 13.7 | 14 | 12.9 | 15 | pg | 11 - 17 |
| MCHC | 32.7 | 31.6 | 32.4 | 33.2 | 34 | g/dl | 30 - 36 |
| RDW_c | 24.8 | 24.5 | 25.7 | 24.4 | 24.8 | % | |
| RDW_s | 42.2 | 39.5 | 41.8 | 36.7 | 43.1 | fl | |

RBC = erythrocytes, HGB = haemoglobin, HCT = haematocrit, MCV = average erythrocyte volume (corpuscular), MCH = mean corpuscular haemoglobin, RDW_c/s = the width of the erythrocyte distribution

Erythrocyte indices include mean corpuscular volume (MCV), mean corpuscular haemoglobin (MCH), and mean corpuscular haemoglobin concentration (MCHC) [2]. All indicators subjected to red cell analysis (RBC) came out in normal parameters, which indicates a good health of the animals studied. In the case of one animal (no.4), were observed insignificant deviations from normal values, in terms of the number mean

corpuscular volume. *Wood and Quiroz-Rocha in 2010* reported the same minimum and maximum limits for framing these haematological parameters. Low values of erythrocytes, haemoglobin and haematocrit occur in cattle with: haemorrhage, haemolysis, deficient diet (e.g. iron, vitamin B12, folate), genetic disorders, chronic diseases, insufficiency of various organs (kidney disease, etc.).

Table 4. Values of haemaleukogram parameters

| Hematological parameters | Animal no.1 | Animal no.2 | Animal no.3 | Animal no.4 | Animal no.5 | Unit | Reference interval |
|--------------------------|-------------|-------------|-------------|-------------|-------------|--------------------|--------------------|
| PLT | 118 | 165 | 141 | 120 | 155 | 10 ⁹ /l | 100 – 800 |
| PCT | 0.07 | 0.11 | 0.10 | 0.8 | 0.19 | % | |
| MPV | 6.3 | 6.5 | 6.7 | 6.4 | 6.9 | fl | |
| PDW_c | 30 | 33.1 | 32.4 | 31.6 | 34.8 | % | |
| PDW_s | 8.5 | 10.6 | 9.3 | 8.4 | 11.2 | fl | |

PLT = platelets, PCV = platelets (plachetocrit), MPV = mean platelets volume, PDW_c/s = platelet distribution width

Platelets are non-nuclear cytoplasmic fragments of megakaryocytes, and play an essential role in haemostasis. Regarding the platelet index, in the case of the all the animals studied, good values were obtained, which fall within the limits of the literature, with no deviations.

4. Conclusions

Following the interpretation of the results, we can say that the animals studied are in full health, not suffering from any serious condition that could impair their physical/mental condition. From here we can say that the cattle of the Aubrac breed, adapt to the breeding conditions (maintenance system, climatic conditions, etc.) in Romania, the cattle breeders can be encouraged regarding the acquisition of this breed.

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