

Most Visible Deviations in Haematological Indicators in Cows Affected by the Downer Syndrome



Healthcare

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Abstract

During the period January 2014 – March 2017 downer cow syndrome cases in farm cows of Prizren region, Kosovo, were studied. Clinical cases were grouped based on clinical diagnosis and blood samples from jugular vein were taken from those. Hematologic indicators were analysed from blood samples for the total of white blood cells (WBC), red cells (RBC), haemoglobin (HB), haematocrit (HCT), mean corpuscular volume (MCV), red blood cell distribution width (RDW), and also leucocyte formula was defined with neutrophils, lymphocytes, monocytes, eosinophils and basophiles indicators. Obtained data were statistically analysed with ANOVA method and most visible deviations were defined in haematological indicators. Data showed that downer syndrome in cows dictate changes in haematological indicators. Most affected indicators are the total of white blood cells (WBC), number of neutrophils and basophils. Obtained data are statistically verified, ($p < 0.05$). These indicators increase more in cases of severe infections and muscular damages in cows. Based on the obtained results we think that changes in haematological indicators can be used to check clinical status and prognosis for cows affected by the downer syndrome.

Introduction

Cows which cannot stand up from the recumbent position for more than 24 hours are considered as cows with “downer” syndrome. Usually such cows are severe clinical cases because majority fails to stand up after several days of medical care, and often for them it should be applied forced slaughter. Downer syndrome in cows is one of the most difficult clinical problems and is able to cause considerable, direct and indirect, economical damages. Determining an accurate diagnose in cows with downer syndrome is complex and should be supported in analysing haematological indicators. Current studies are focused in finding relations between clinical diagnosis and haematological changes. Haematological changes that occur in cows with downer syndrome can be used also for the patients’ prognosis.

Material and methods

The study was carried in the period January 2014 – March 2017. In 34 cows of different ages and breeds, clinical diagnosed with downer syndrome, blood samples were taken from jugular vein. Blood was sampled in vacuum tubes with anticoagulant (EDTA) in amount of 5 ml and 3 blood smears were prepared in that moment. Blood samples were analysed with haematology analyser, which is used in laboratory for standard procedures of blood check in cattle, whilst blood smears were checked with microscope for elements of leucocyte formula. Indicators that were studied were the total of white cells (WBC), number of red cells (RBC), haemoglobin (HB), haematocrit (HCT), mean corpuscular volume (MCV), corpuscular haemoglobin (MCH), the report between red and white blood cells (RDV) and the total number of thrombocytes (PLT). From prepared

blood smears leukocytes formula was defined and average values of constitutive elements (neutrophils, granulocytes, monocytes, eosinophil and basophiles).

Obtained data were statistically analysed with ANOVA method (homogeneity of variances and normality). Average values of indicators in the study, grouped based on the clinical diagnosis, were compared with reference values published by Radostits, 2005, and as well with average values of haematological indicators in clinically healthy cattle recommended for our country.

Obtained results

Haematological indicators in cattle diagnosed with downer syndrome in minimal, maximal and average values are given in table 1. In the table, given for comparison are indicators' data according to Radostits, (2005).

Table 1. Average values of haematological parameters in cows according to clinical diagnosis, compared with normative values.

Indicators	Normative values	Indicators according to clinical diagnosis			
		Hypocalcaemia	Bone damages	Nerve damages	Severe mastitis
WBC ($10^3/\mu\text{l}$)	4 - 12	5.58 ± 1.67	5.55 ± 2.61	$8.09 \pm 1.56^\dagger$	13.0*
RBC ($10^6/\mu\text{l}$)	5 - 10	5.91 ± 0.60	6.00 ± 0.78	6.29 ± 0.64	7.0
HGB (g/dl)	8 - 15	9.90 ± 0.86	$10.07 \pm 0.83^\dagger$	9.71 ± 0.92	9.0
HCT (%)	24 - 46	$29.57 \pm 2.80^\dagger$	29.37 ± 2.64	29.07 ± 2.71	28.0
MCV (fl)	40 - 60	49.81 ± 3.36	$50.09 \pm 3.85^\dagger$	46.50 ± 2.80	46.0
RDW (%)	16.7 - 23.3	$20.15 \pm 1.29^\dagger$	20.11 ± 1.56	19.93 ± 1.23	18.0

* : Significant changes against Group A ($p < 0.05$); \dagger against Group B ($p < 0.05$).

Reference values according to *Radostits O.M., 2005*.

From the obtained data, after statistically analysis, it seems that average values for the amount of red blood cells (RBC), haemoglobins (HGB), ratio of red and white cells (RDW) and mean corpuscular volume (MCV) had differences between cattle that were diagnosed with downer syndrome, but they remain in the normative limits when compared to the reference values.

The total of white blood cells seems to face largest increase ($13.0 \times 10^3/\mu\text{l}$ compared to the normative 4 ± 12) in cases of cows diagnosed with severe mastitis. The study found that the most visible changes incurred in the indicators of leucocyte formula.

The number of neutrophils increases (up to $56.12 \pm 5.16 \times 10^3/\mu\text{l}$ against 15.0 ± 47.0) in the blood of cows diagnosed with the severe mastitis. The number of lymphocytes changes according to the causes ($66.59 \pm 5.91 \times 10^3/\mu\text{l}$ in cows with bone damages against 45.0 ± 75.0). Less visible growth incurs in basophile number ($0.67 \pm 0.37 \times 10^3/\mu\text{l}$ in cows with severe mastitis against 0.0 ± 0.2), table 2. The number of monocytes and eosinophils remain in uninfluenced quotas. Haematological changes found in cows with downer syndrome were statistically verified ($p < 0.05$).

Data obtained in this study are close with changes that are reported by other authors related to haematological indicators, *Ceroni V. (2012, 2014)*.

Table 2. Average values of leukocytes formula in cows according to clinical diagnosis.

Parameters	Norm values	Indicators according to diagnosis			
		Hypocalcaemia	Bone damages	Nerve damages	Severe mastitis
Neutrofile ($10^3/\mu\text{l}$)	15.0 - 47.0	23.10 \pm 5.29	20.63 \pm 4.75	36.29 \pm 4.22	56.12 \pm 5.16*
Limfocite ($10^3/\mu\text{l}$)	45.0 - 75.0	63.46 \pm 4.52	66.59 \pm 5.91*	45.12 \pm 5.16	25.21 \pm 3.62*
Monocite ($10^3/\mu\text{l}$)	2.0 - 7.0	6.84 \pm 2.37	9.26 \pm 3.39*	2.61 \pm 3.55	6.12 \pm 1.88
Eozinofile ($10^3/\mu\text{l}$)	0 - 20.0	6.07 \pm 3.75	3.26 \pm 2.93	1.67 \pm 2.11	3.34 \pm 0.34
Bazofile ($10^3/\mu\text{l}$)	0 - 2.0	0.53 \pm 0.86*	0.26 \pm 0.62	1.11 \pm 0.21*	0.67 \pm 0.37

* : Significant changes against Group A ($p < 0.05$).

Reference values according to *Radostits O.M., 2005*.

Discussion

The cattle grouped by clinical diagnosis on the showed symptoms displayed changed picture on haematological indicators. Results of the study suggest that depending on the clinical picture and characteristics under suspicion of haematological indicators, the latter ones can be valuable in determining the prognosis about the dairy cows. Other researchers have come to such conclusions too, *Lumsden, J.H. et al. (1980), Doornenbal, H. et al. (1988)*.

Calculating erythrocytes' indexes showed that obtained values on the number of erythrocytes (RBC), mean corpuscular volume (MCV) and haemoglobin (HB), despite being within the normative limits, in this study they appear to have a significant decrease in changes with findings published by other authors, *Peinado, V.I. et al. (1999), Meglia G.E. et al. (2001, Jain, N.C., (1993)*. For cases of changes under the level of red cells (RBC) and mean corpuscular volume (MCV), we think that the slight growth in values of corpuscular haemoglobin (MCH), which is noted, is a compensatory response against the slow decrease of haematocrit (HCT).

In this study, biggest changes were seen in the number of white cells, in the amount of neutrophils, lymphocytes and basophils. The total number of lymphocytes was inconstant depending on the clinical diagnose. The largest number of lymphocytes was found in cattle diagnosed with bone damages. In cows clinically diagnosed with severe mastitis most significant changes were seen in increasing white blood cells. White blood cells were significantly higher also in cattle diagnosed with nerve damages and with hypocalcaemia. The increase of the amount of white cells was mainly due to increase of neutrophils and monocytes. Less this indicator is due to increase of the number of basophils.

Conclusions

1. In cows affected by the downer syndrome changes in few haematological parameters are present.
2. Indicators that are mostly influenced by the downer syndrome in cows are the total of white cells, haematocrit, number of neutrophils, lymphocytes and basophils.
3. Significant increase shows the total white blood cells and neutrophils number, whilst values of haematocrit (HCT) have tendencies to decrease.
4. The amount of red blood cells (RBC), haemoglobin (HGB), mean corpuscular volume (MCV), number of monocytes and eosinophils almost are not affected by the downer syndrome in cows.
5. Haematological indicators can be used to clarify diagnose and defining the prognosis in dairy cows affected by the downer syndrome.

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