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EFFECTS OF USING CANNABIS OIL (CBD) ON THE METABOLIC PROFILE OF CALVES DURING WEANNING

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INTRODUCTION

Cannabidiol (CBD) oil, derived from hemp plants and seeds (*Cannabis sativa*), is recognized for its therapeutic properties (anti-inflammatory, analgesic, anxiolytic, and anticonvulsant) due to its high content of cannabidiol and low content of psychotropic delta 9-tetrahydrocannabinol (THC), with limits of <0.2% THC on a dry matter basis. Cannabidiol (CBD) oil shows therapeutic potential in reducing stress during weaning and transportation in calves, which are critical stress events affecting calves' immune function, growth, and overall performance. This study aims to evaluate the impact of CBD oil supplementation on the haemato-biochemical profile of dairy calves during weaning, highlighting its potential to improve physiological responses to stress.

MATERIALS AND METHODS

- The study was conducted at the Experimental Farm of the Research and Development Institute for Bovine Balotesti, between *March and June 2024*.
- 19 half-sibs **Romanian Black and Spotted** dairy calves were divided into Experimental group (*E: n=10 head/group*) and Control group (*C: n=9 head/group*). The E group received *5 ml of CBD oil/head/day* in the first 2 days of the experiment (*pre-weaning*) and *10 ml CBD oil/head/day* for 3 consecutive days *post-weaning*.
- The calves were *weaned* at an average age of *90±5 days*.
- Maintenance*: individual hutches (*prior to weaning*) and group housing, 15-20 calves/group (*post-weaning*).
- The *diet/head/day* consisted of 6 kg milk, quality alfalfa hay, concentrates, and water *ad libitum*.
- Blood samples were collected from the jugular vein during the weaning day (T_1), at 2 days (T_2), and 5 days (T_3) post-weaning.
- Haematological parameters* (RBC, HGB, HTC, MCV, MCH, MCHC, PLT, WBC, LY, MO, NE) were performed using Abacus Junior Vet 5 automated analyser. *Biochemical parameters* (TPro, BUN, Cre, GGT) were determined using Spotchem EZ SP-4430 automated analyser.
- Results* were expressed as mean±SEM, SD, CV, minimum, and maximum values.
- To test the influence of cannabis oil on the blood parameters studied, the *Mann-Whitney test* was used (significant threshold: $p \leq 0.05$, trends $p \leq 0.10$).
- The correlations between blood parameters across T_1 , T_2 , and T_3 were estimated using *Pearson's correlation coefficient* (significance threshold: $p \leq 0.05$).



RESULTS

Table 1. The effects of CBD oil diet addition on the haematological and biochemical parameters in dairy calves during weaning

Variable	Experimental group					Control group					p
	X±SEM	SD	CV	Min	Max	X±SEM	SD	CV	Min	Max	
RBC, T_3	9.68±0.23	0.73	7.56	8.49	10.37	10.35± 0.21	0.63	6.12	9.56	11.47	0.0951
MCV, T_1	32.30±0.57	1.82	5.66	31.00	36.00	30.00± 0.33	1.00	3.33	29.00	32.00	0.0016
MCV, T_2	32.44±0.42	1.34	4.13	30.00	34.36	31.00± 0.44	1.32	4.27	30.00	33.00	0.0188
MCH, T_1	12.08±0.62	1.97	16.36	10.80	17.50	10.74± 0.21	0.63	5.91	9.20	11.40	0.0057
MCH, T_2	10.91±0.42	1.35	12.41	7.300	12.00	10.78±0.18	0.54	5.00	10.10	11.90	0.0232
MCH, T_3	11.57±0.18	0.57	4.97	10.90	12.40	10.72± 0.18	0.54	5.04	10.00	11.50	0.0180
PLT, T_2	374.0±52.6	166.3	44.47	139.0	697.0	526.4±21.9	65.6	12.45	409.0	607.0	0.0050
WBC, T_2	10.33±0.51	1.61	15.66	6.77	13.45	11.83±0.62	1.87	15.83	9.320	14.62	0.0050
GGT, T_2	30.40±3.94	12.45	40.94	20.00	62.00	30.22±1.15	3.46	11.44	26.00	36.00	0.0822
GGT, T_3	28.60±3.42	10.82	37.85	18.00	54.00	29.22±0.83	2.48	8.52	25.00	32.00	0.0764

For the E group, RBC and GGT showed a strong negative correlation ($r=-0.699$; $p=0.025$) at T_1 , suggesting metabolic stress affecting RBC dynamics. At T_2 , a strong positive correlation ($r=0.807$; $p=0.005$) was found, highlights a significant direct relationship, reflecting adaptive changes in liver function and RBC levels under experimental conditions. HGB and GGT showed a moderate positive correlation ($r=0.554$), without statistically significant ($p=0.096$) at T_3 . For the C group, a moderate positive correlation for RBC and GGT ($r=0.651$; $p=0.058$) and HGB and GGT ($r=0.0637$; $p=0.065$) at T_1 was found.

CONCLUSIONS

The obtained results suggest that **CBD oil diet supplementation improves haematological and biochemical parameters stability in dairy calves during the weaning stress period**, when both immune and metabolic markers are concerned.

Significant improvements in mean corpuscular volume (MCV), mean corpuscular hemoglobin (MCH), platelet (PLT), and total white blood cells (WBC) at specific time points (T_1 , T_2 , and T_3) highlight the potential use of CBD oil as a natural and effective strategy to mitigate weaning stress and improve overall calf health during this critical transition phase.

Further research is necessary to explore the long-term effects of CBD oil supplementation, its impact on other physiological parameters, and its applicability across different dairy farming conditions.