WELFARE ASSESSMENT OF SHEEP DURING TRANSPORT USING HEMATOLOGICAL AND HORMONAL BIOMARKERS

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Animal Transport

- Transportation at some stage in their lives
- Regular transport for feed and management practices
- Handling, loading, transporting and unloading
- High impact on animal welfare
- Studies for transport stress
  - Behavioral parameters
  - Physiological parameters (blood constituents, chemical and hormonal parameters)

Adenkola and Ayo, 2010; Broom *et al.*, 1996; Broom, 2003; Fazio *et al., 2011;* Knowles, 1998; Tarrant and Grandin, 2000; Zhong *et al., 2011;* …

Sheep in Macedonia

- **Traditional pasture system**
- **Regular yearly movements of herds – May/June and October/November**

OBJECTIVE: To determine the changes in hematological parameters and cortisol levels, before/after train and walking translocation of sheep, as indicators of sheep welfare

Animals:

- Local breed Pramenka, 2-4 years old non-pregnant ewes

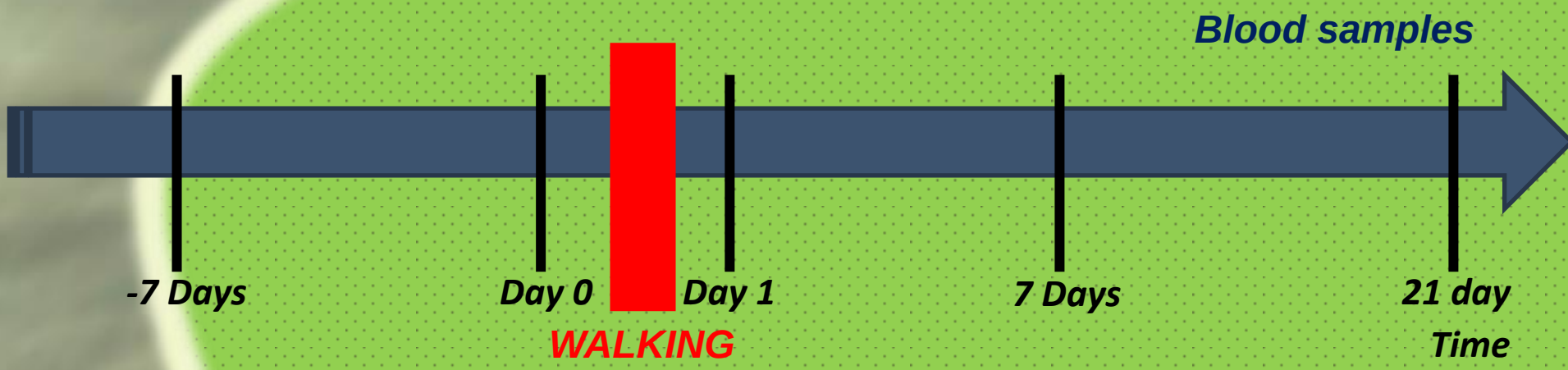
Groups and blood samples:

- **GROUP I – Control group**

- No transport - 20 tested animals within the one mountain herd

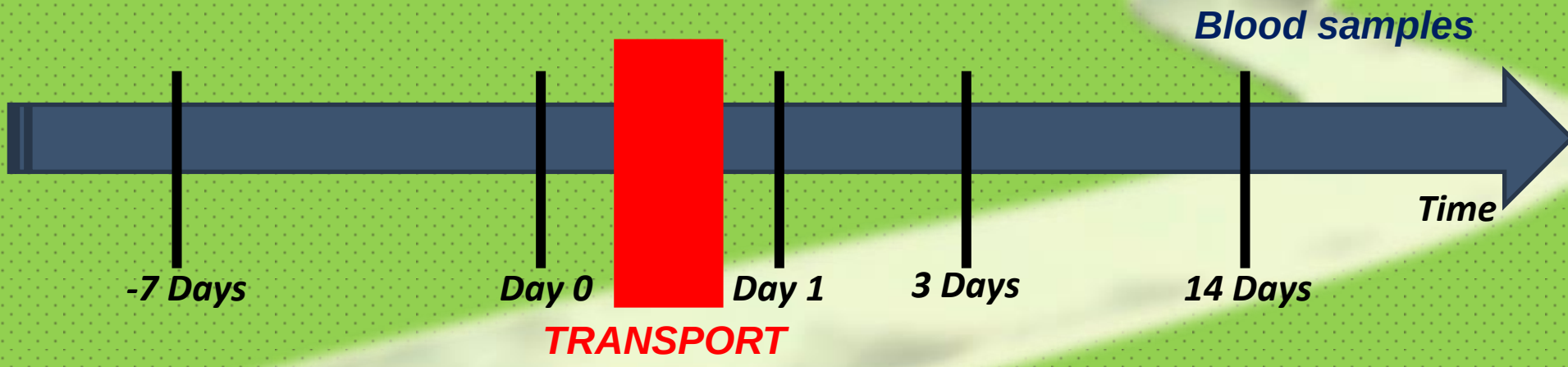
- **GROUP II – Translocation by walking (65km distance)**

- 20 tested animals within the one herd



➢ **GROUP III – Transport by train (230km distance)**

- 20 tested animals within the one herd



Detection methods:

Hematological parameters **– Photometric method:**

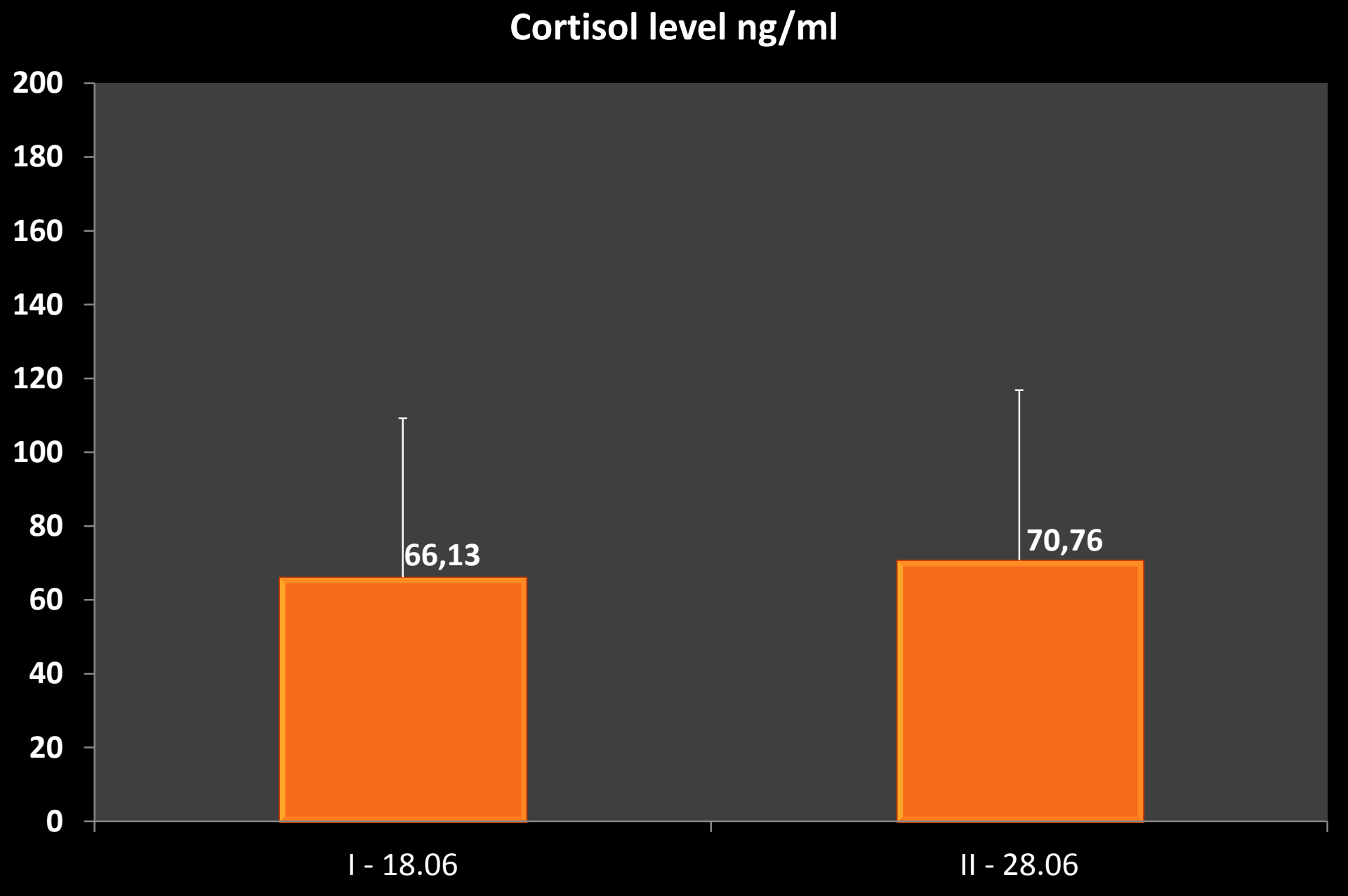
WBC, RBC, Hb, HCT, MCV, MCH, MCHC, RDW, Plt, MPV, PDW and Pct

Glucose level **– GOP/PAP method**

Cortisol levels **– cELISA (GenWay Biotech,Inc., San Diego, CA)**

Statistics: KW ANOVA, Friedman ANOVA, Sign Test & Wilcoxon test

Control group - RESULTS:



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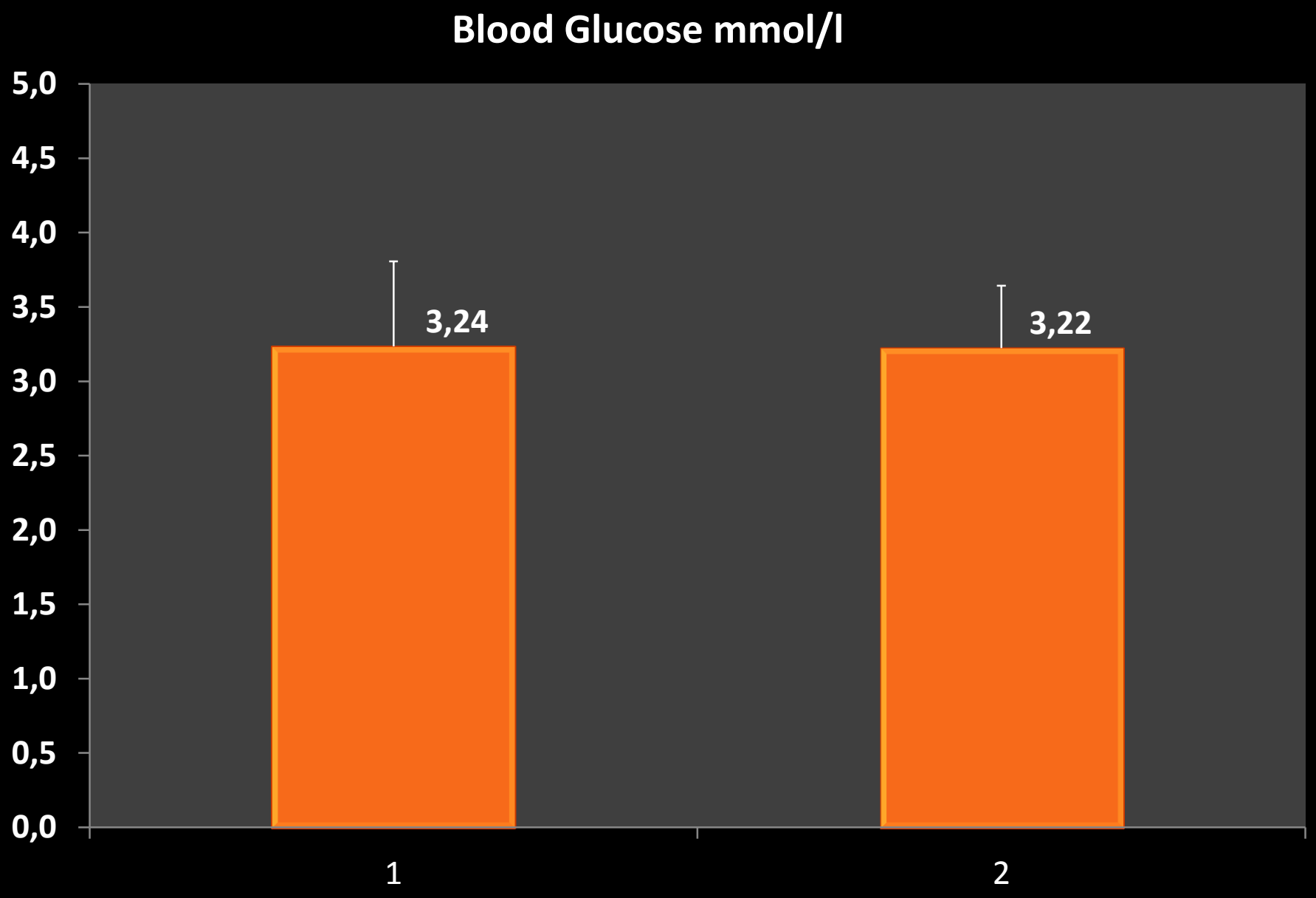
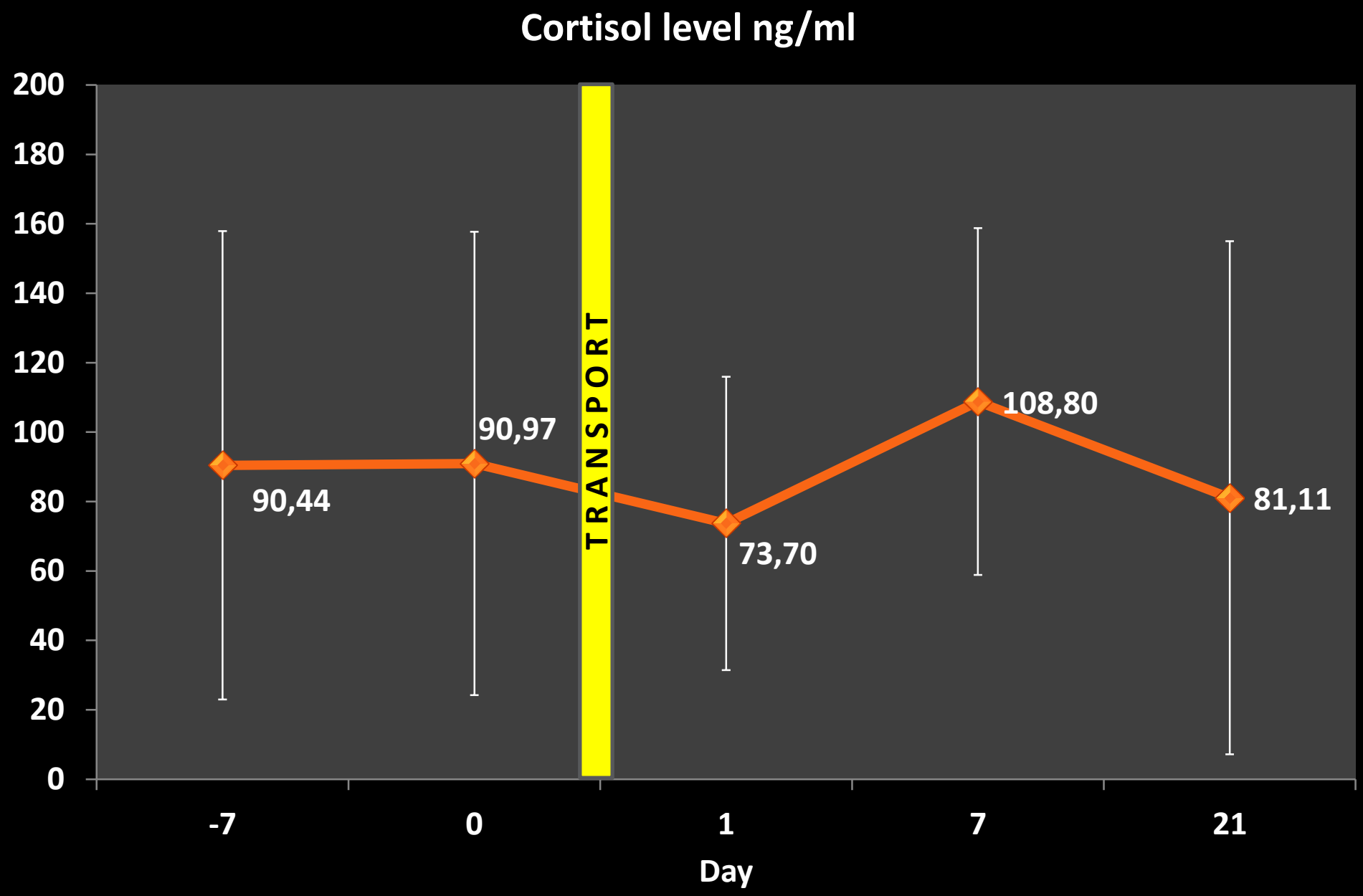


Control group - RESULTS:

HEMATOLOGICAL PARAMETERS						
PARAMETER	Measuring 1			Measuring 2		
	n	Mean	SD	n	Mean	SD
WBC x 10^9/L	7	10.46	1.70	9	11.20	2.58
RBC x 10^12/L	10	8.91	2.00	10	9.21	1.77
HGB g/L	10	80.90	11.78	10	84.50	9.95
HCT %	10	30.22	4.48	10	31.86	3.57
MCV fL	10	34.76	4.21	10	35.28	4.27
MCH pg	10	9.23	1.09	10	9.27	1.00
MCHC g/L	10	267.30	7.69	10	264.60	6.08
RDW %	10	16.63	2.22	10	16.23	1.61
PLT x 10^9/L	10	219.50	99.72	10	267.60	81.58
MPV fL	10	5.44	0.59	10	5.61	0.53
PDW	10	14.11	0.70	10	14.43	0.74
PCT %	10	0.12	0.06	10	0.15	0.05

Walking group - RESULTS:



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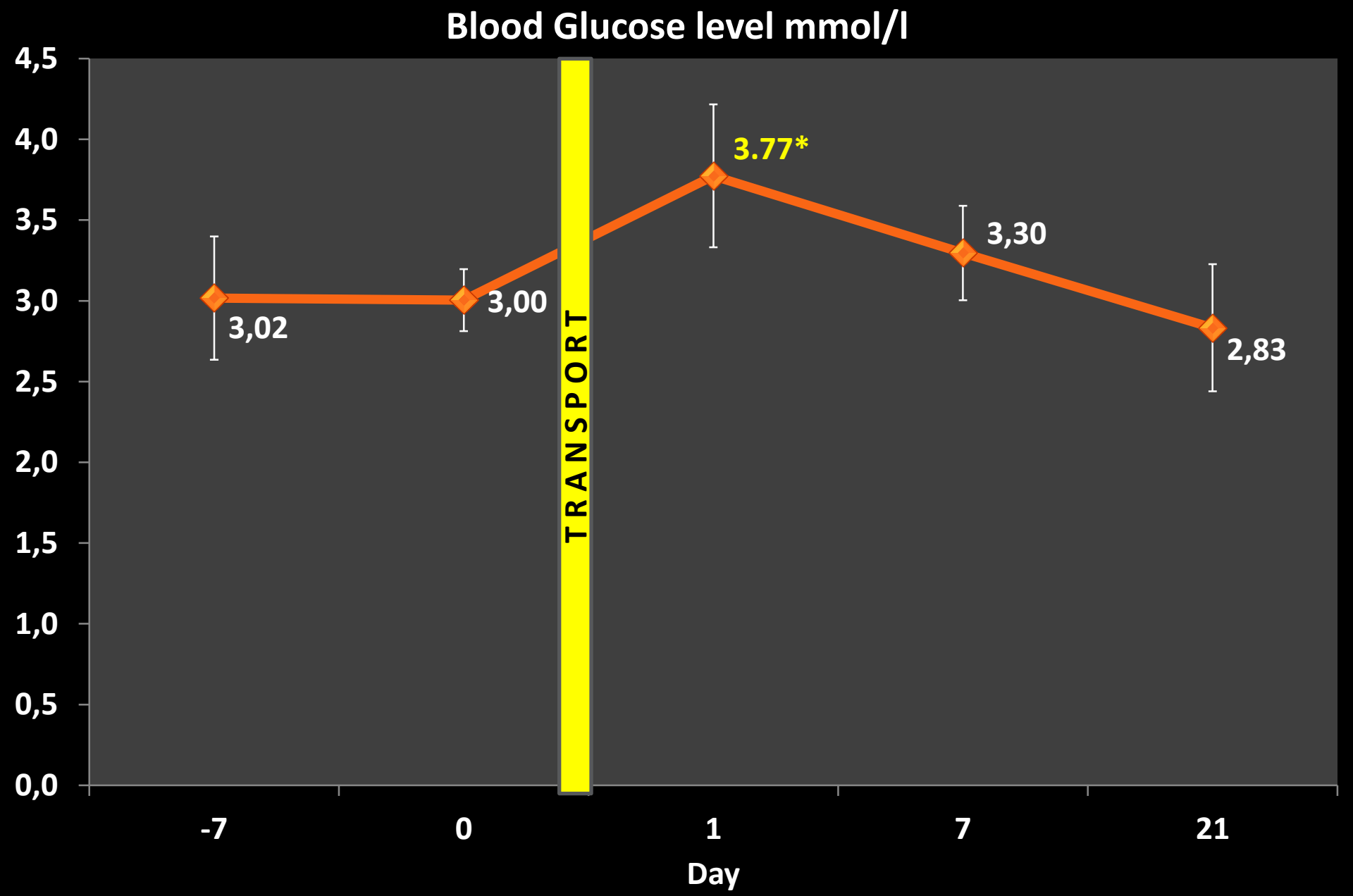
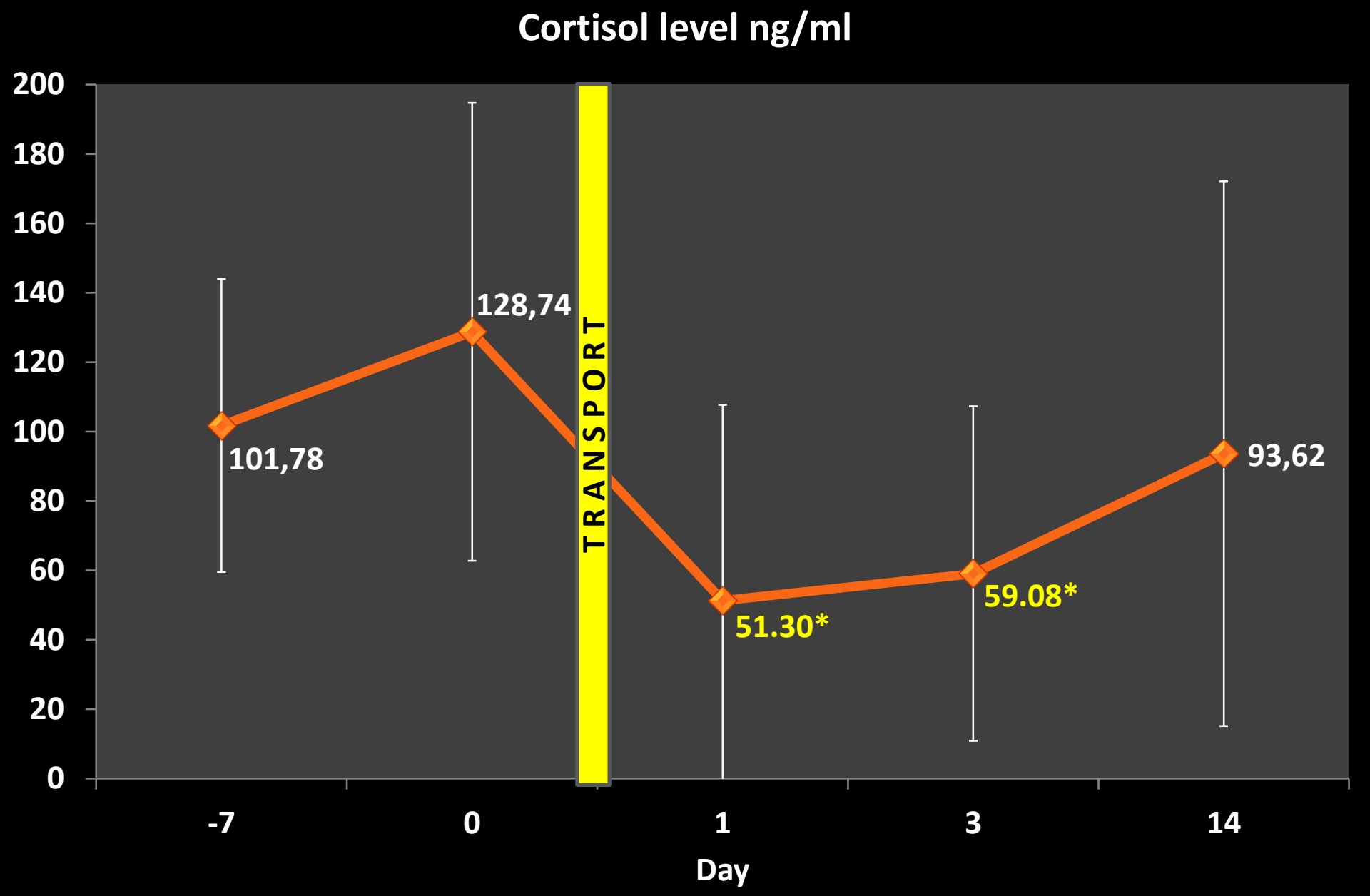


Walking group - RESULTS:

HEMATOLOGICAL PARAMETERS						
PARAMETER	Before Transport			After Transport		
	n	Mean	SD	n	Mean	SD
WBC x 10^9/L	2	11.35	0.49	7	9.13	3.41
RBC x 10^12/L	10	8.91	0.83	9	8.72	1.05
HGB g/L	10	89.90	5.74	9	82.67	6.61
HCT %	10	31.47	1.71	9	31.61	2.50
MCV fL	10	35.53	2.42	9	36.51	2.75
MCH pg	10	10.14	0.66	9	9.50	0.83
MCHC g/L	10	275.10	34.20	9	261.00	4.64
RDW %	10	16.09	1.11	9	15.92	1.26
PLT x 10^9/L	10	144.10	78.51	9	90.33	38.72
MPV fL	10	5.26	0.33	9	5.23	0.17
PDW	10	13.83	0.46	9	13.50	0.34
PCT %	10	0.08	0.05	9	0.05*	0.02

Train transport - RESULTS:



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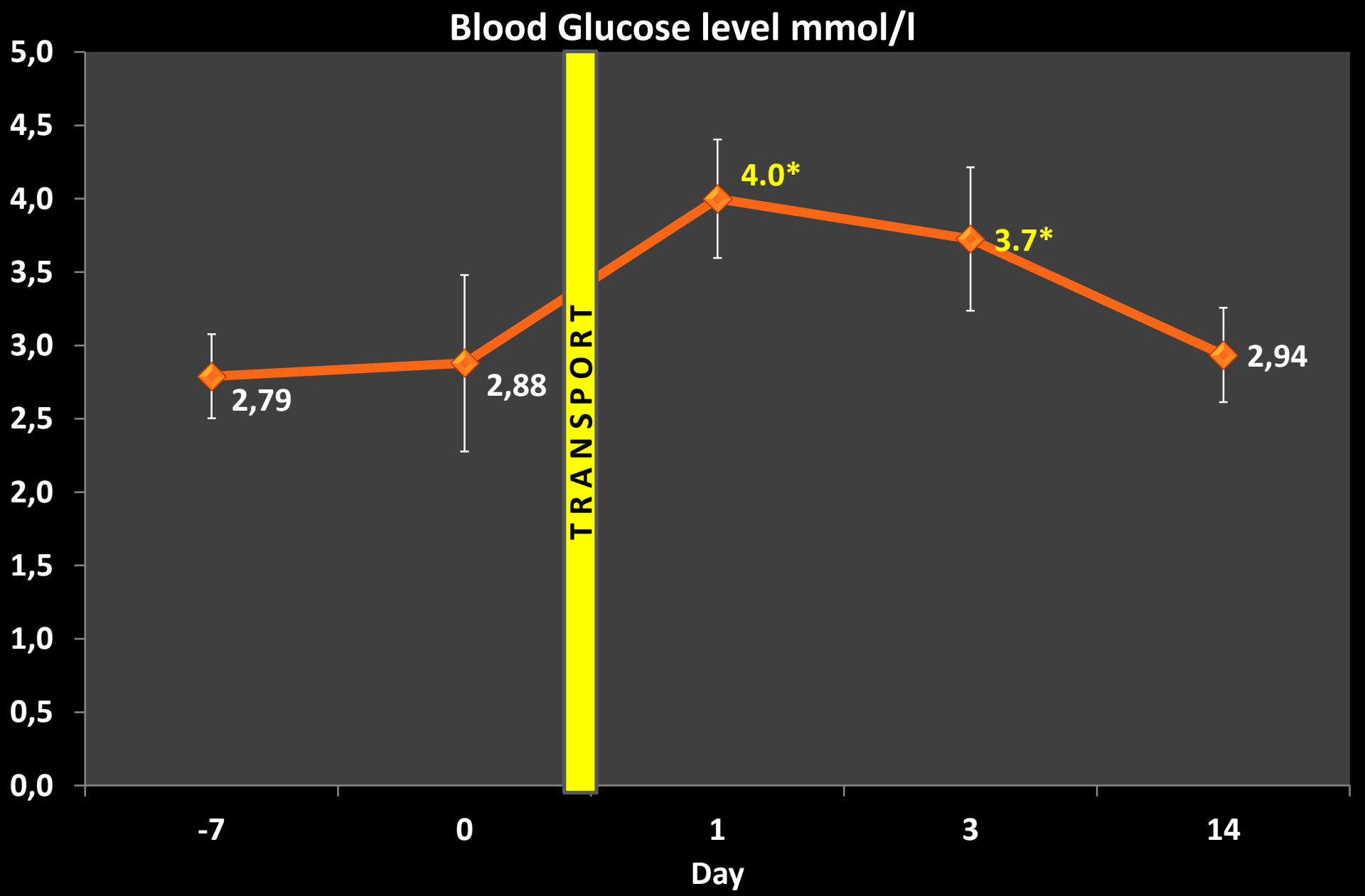

Train transport - RESULTS:

HEMATOLOGICAL PARAMETERS						
PARAMETER	Before Transport			After Transport		
	n	Mean	SD	n	Mean	SD
WBC x 10^9/L	11	9.76	1.87	9	10.71	4.05
RBC x 10^12/L	11	8.91	0.83	9	9.03	1.09
HGB g/L	11	80.73	7.79	9	81.67	7.13
HCT %	11	28.97	4.11	9	29.62	2.60
MCV fL	11	32.69	4.45	9	33.03	2.10
MCH pg	11	9.03	0.61	9	9.03	0.57
MCHC g/L	11	281.18	34.48	9	275.11	5.95
RDW %	11	15.62	0.75	9	16.01	0.58
PLT x 10^9/L	11	116.18	52.65	9	199.00	67.86
MPV fL	11	5.34	0.52	9	5.38	0.35
PDW	11	13.79	0.74	9	14.01	0.46
PCT %	11	0.06	0.03	9	0.11	0.04

CONCLUSIONS:

- Drop in blood cortisol levels after transport
- Increased blood glucose levels after transport
- Platelets changes after transport
- Stress and Physical exhaustion in both transports
- More severe changes in train transport

  - Train transport has higher impact on AW than walking

- More frequent consecutive sampling is needed for detailed AW assessment of sheep transport

THANK YOU FOR YOUR ATTENTION!