

Correlation between the total nuclear cell count and the buffy coat present in centrifugated equine synovial fluid samples

Veterinary Degree Final Project, June 2016

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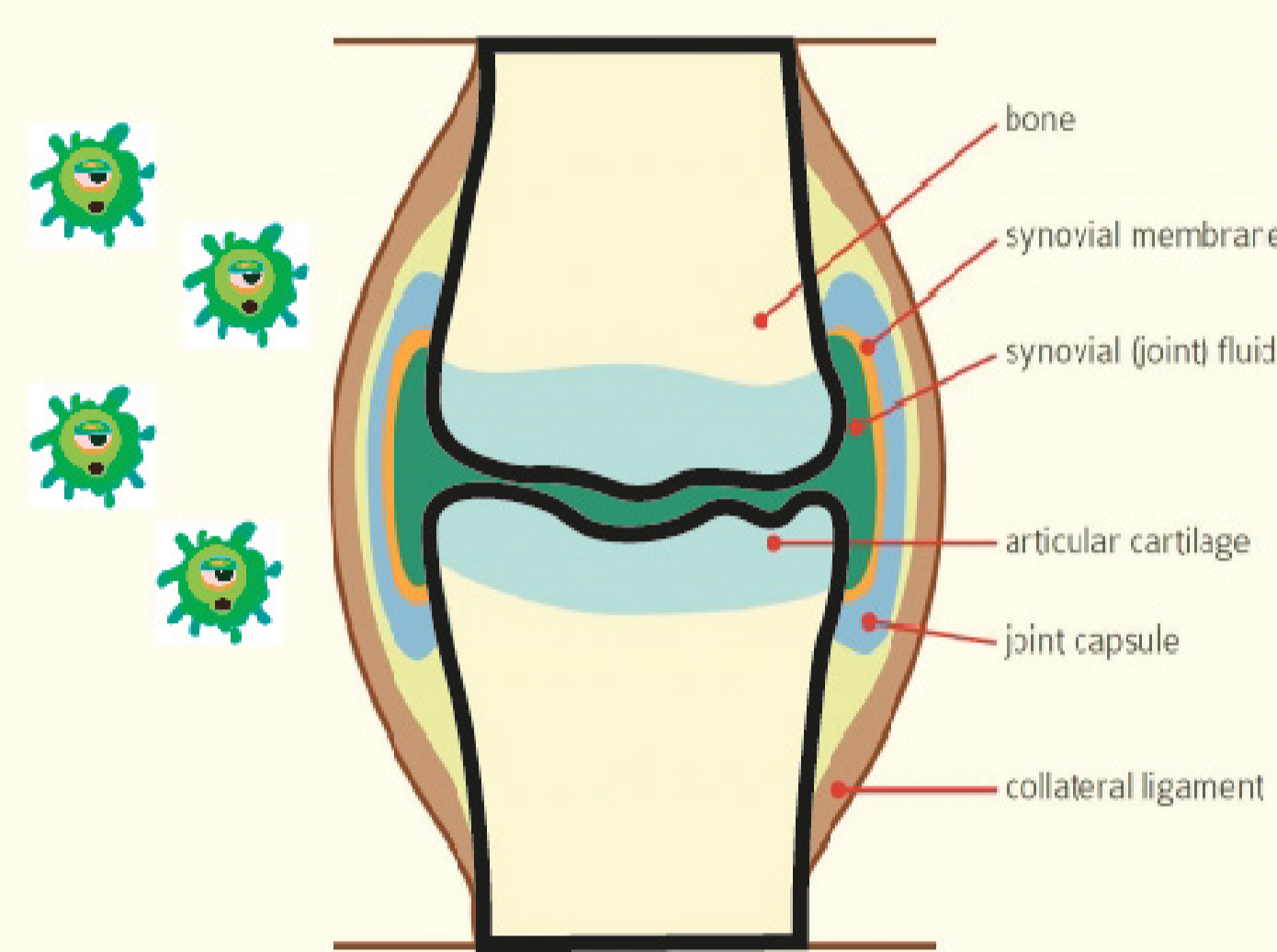
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Background

Septic arthritis is considered an emergency which requires an early and aggressive treatment in order to safe horse's performance and welfare. The current diagnostic methods, mainly synovial fluid (SF) standard laboratory analysis and bacterial culture, are too slow in field conditions.

An affordable field test such as determination of the synovial fluid buffy coat after centrifugation could be a reliable procedure to diagnose this disease.



Healthy equine joint prior the inoculation of the bacteria.

Research Questions

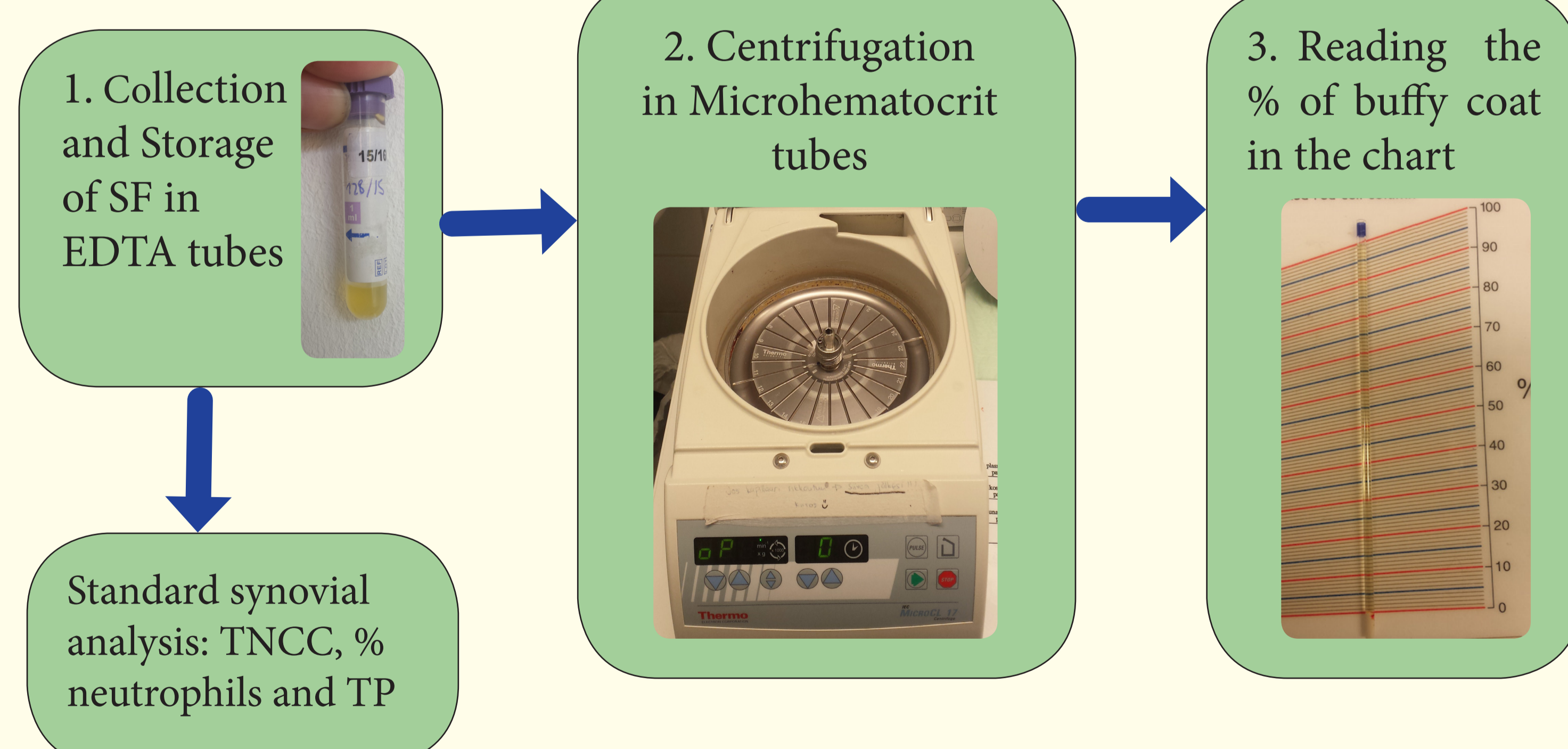
1. Is there any correlation between the Total Nucleated Cell Count (TNCC) and the buffy coat value (%) obtained in a centrifugated equine SF?
2. If so, can we diagnose septic arthritis by assesing the buffy coat percentage?

Material and Methods

Prospective clinical study

Animals: horses admitted to 3 Equine Veterinary Hospitals¹ who had a SF examined by the laboratory.

Study design:



Statistical Analysis: A Mann-Whitney U test and a linear regression model were performed to compare synovial TNCC and buffy coat (%).

$P < 0.05$ was considered a significant value.

¹ Equine Unit of Fundació Hospital Clínic Veterinari, UAB (Spain), Equine Hospital of Helsinki Veterinary Teaching Hospital (Finland) and Rossdales Equine Hospital (United Kingdom).

Results

A total of 25 synovial fluid samples were collected from 22 horses: 13 Septic Arthritis (SA) + 8 Non Septic Arthritis (Non SA) + 4 Control

Diagnosis	TNCC (cells/ μ l)	Buffy Coat (%)
Septic Arthritis	31940 (11490 - 40180)	3 (2.5 - 4)
NonSeptic Arthritis	820.5 (375 - 2980)	0.125 (0.0 - 0.5)
Control	2341 (1001 - 4500)	0

Fig. 1. Table showing the medians and interquartile range (25th–75th percentile) of the synovial total nucleated cell count (TNCC) organised by their diagnostic classification.

- Buffy coat (%) has a markedly relation with the diagnosis of SA ($P < 0.001$).

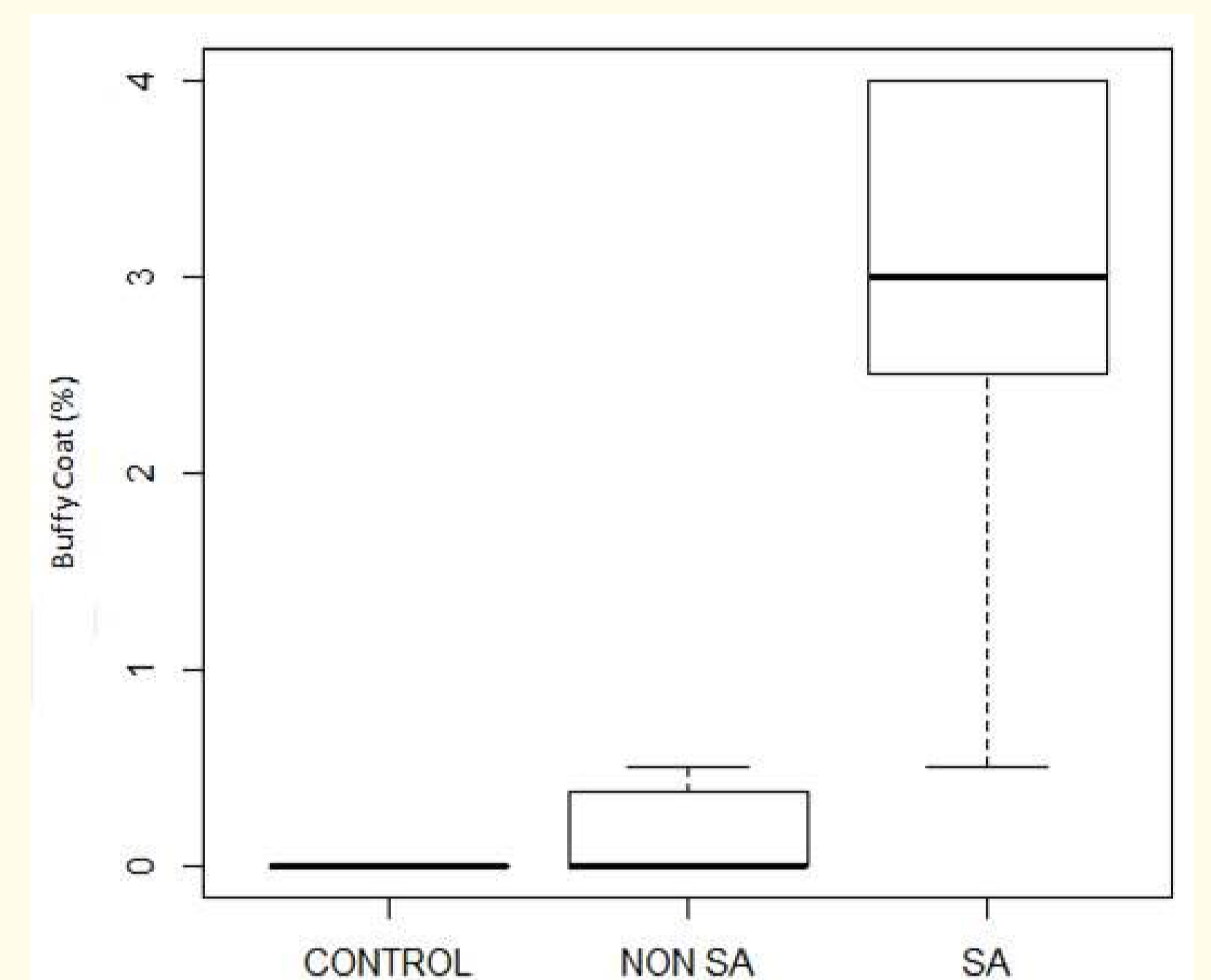
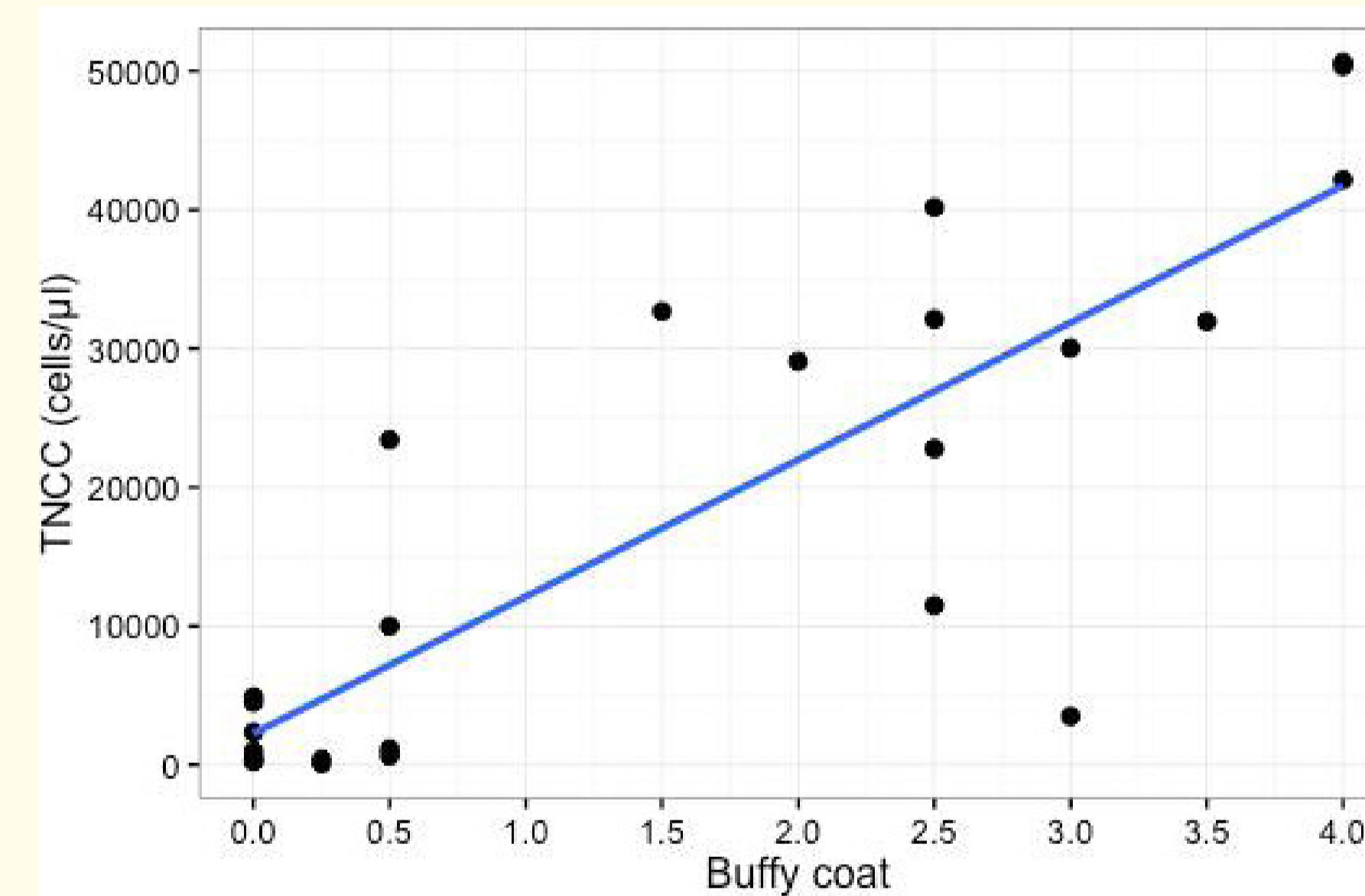


Fig. 2. Boxplots graphics showing the median and interquartile range (25th–75th percentile) of the buffy coat (%) of the different analysed groups.



- TNCC has a significantly positive correlation with the buffy coat (%) ($P = 0.008$).

- More than 70% ($R^2 = 0.737$) of buffy coat (%) variability is explained by TNCC.

- Predictive equation:

$$\text{TNCC} = 1804 + (9534 \times \text{BuffyCoat})$$

Fig. 3. This graphic displays the regression of total nucleated cell count (TNCC) in cells/ μ l on the buffy coat (%) in the SF.

Buffy Coat (%)	Range TNCC (cells/ μ L)
0	0 - 11338
1	11338 - 20872
2	20872 - 30406
3	30406 - 39940
4	39940 - 49474
5	49474 - 59008

Fig. 4. This table determines the range of total nucleated cell count (TNCC) in cells/ μ l calculated upon the buffy coat percentage.

Septic arthritis is diagnosed when there is more than 3×10^4 cells/ μ l in the sample.

Conclusion

There is a significant correlation between the total nuclear cell count and the buffy coat (%) present in centrifugated equine synovial fluid samples.

SA could be confirmed with a buffy coat $> 4\%$.

SA is highly unlikely if the buffy coat $< 1\%$.