

The relationship between mastitis and the B-mode, colour Doppler, and pulsed-wave Doppler ultrasonography measurements of supramammary lymph nodes in cows

Ali Risvanli¹@, Halef Dogan², Tarik Safak¹, M. Akif Kilic³ and Ibrahim Seker⁴

¹Department of Obstetrics and Gynecology, Faculty of Veterinary Medicine, University of Firat, 23159, Elazig, Turkey.

²Department of Obstetrics and Gynecology, Faculty of Veterinary Medicine, University of Namik Kemal, 59100, Tekirdag, Turkey.

³Department of Obstetrics and Gynecology, Faculty of Veterinary Medicine, University of Bingol, 23159, Bingol, Turkey.

⁴Department of Zootechny, Faculty of Veterinary Medicine, University of Firat, 23159, Elazig, Turkey.

Running title: Mastitis and Supramammary Lymph Nodes in Cows

@Corresponding author: E-mail: arisvanli@firat.edu.tr Phone: 00 90 424 237 0000 Fax: 00 90 424 238 8173. <https://orcid.org/0000-0001-5653-0025>

Summary

This research paper aims to test the hypothesis that B-Mode, colour Doppler, and Pulsed-Wave (PW) Doppler ultrasonographic measurements and characteristics can identify mastitis in dairy cows. A total of 102 lactating cows were divided into 3 groups: cows in which all mammary lobes were CMT-negative, cows with CMT-positive mammary lobes, and cows with clinical mastitis in at least one mammary lobe. The cows in the group with clinical mastitis had, on average, the longest and widest lymph nodes with the longest perimeters and thickest cortices. The cows with mastitis also had the highest rates of hyperechogenicity, calcification, and irregular borders out of the 3 groups. There were no statistically significant differences between the study groups in terms of the PW Doppler ultrasonography measurements of the supramammary lymph nodes ($p>0.05$). Regarding the colour Doppler ultrasound evaluations of the supramammary lymph nodes, the mastitis group also had the highest rates of distortion-type vascular morphology, type 4 vascular density, and mixed-type vascular distribution among the 3 groups. Avascularity was most frequently observed in the supramammary lymph nodes of the CMT-negative group. When the 3 types of ultrasonographic data were examined together in the clinical mastitis group, the time-averaged maximum velocity value was significantly correlated with the length, perimeter, calcification intensity, and border irregularity. The vascular distribution category was also significantly negatively correlated with the cortical thickness and calcification density of the supramammary lymph nodes in the clinical mastitis group. In conclusion, the use of B-mode, colour Doppler, and PW Doppler ultrasonographic measurements of the supramammary lymph nodes will provide useful information about the current condition of mastitis in cows.