

# The Application of Ultrasonographic Imaging to Determine Sole Horn Thickness in the Bovine Claw

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## Introduction

Maintaining adequate sole horn thickness is becoming an important consideration in lameness prevention in large dairy operations. Due to a number of managerial, nutritional and environmental factors, the rate of wear often exceeds the rate of sole horn growth. This situation is often exacerbated by poor claw trimmign techniques, resulting in overly thin soles predisposing to lameness. Non-invasive determination of sole thickness have been dependant on indirect methods, including a) compression of the sole horn using finger pressure or hoof testers, b) using a correlation between dorsal wall length and sole thickness, and c) using the white line as a guide to determine sole depth. The use of ultrasound to determine sole depth has been described using cadaver feet. This has not been used in live cattle. The purpose of this study is a) to test the method in live dairy cows and b) to evaluate sole thickness in cows that have been trimmed according to the method described by Toussaint Raven, also referred to as the Dutch method.

## Materials and Methods

Fifty dairy cows presented for routine claw trimming were used. The cows were restrained in a stand-

up foot chute and trimmed according to the Dutch method. All loose horn which could trap air was removed to achieve a flat and clean sole surface. Ultrasonography was carried out using an Aloka 500 and a 7.5 MHz linear transducer. Sole thickness was measured at the apex of the toe adjacent to the abaxial whiteline. In addition, the distance from the outside of the sole to the surface of the third phalanx was recorded.

## Results and Conclusions

The sole horn, underlying soft tissue layer and the distal phalanx could be visualized in all claws. Visualization is more difficult in front claws, probably due to conformation and water content. The sole horn appears as a heterogeneous hypoechoic layer. The inside border of the sole with the underlying soft tissue appears as a very thin, clearly visible echogenic line. The underlying corium and soft tissue form a predominantly anechoic band. The surface of P3 is seen as a curved hyperechoic line. Application of the Dutch trimming technique provided sufficient sole thickness (excess of 0.3 inches) as determined by this technique. Ultrasonography appears to be an easy and reliable method to determine sole horn thickness in dairy cattle.