

Ultrasonographic Evaluation of Exogenous Isobutane Gas in the Mammary Gland of Cows

Steven S. Trostle, DVM, MS
Robert T. O'Brien, DVM, MS
Jenks Britt, DVM
Kenneth R. Waller, BS

Departments of Surgical and Medical Sciences
School of Veterinary Medicine, University of Wisconsin-Madison

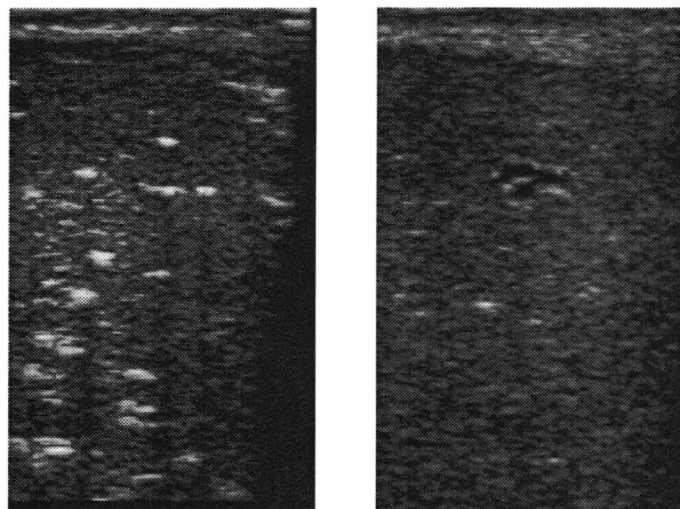
Abstract

Infusion of chemicals or gases into the mammary glands of dairy cattle has been used to alter the appearance of udders in cattle used in exhibitions. People who fit dairy cattle to enhance the gross appearance of the udder by making it appear larger and fuller have used these agents. The ethical issues surrounding this practice are controversial and the purebred dairy cattle show industry is considering methods to detect these practices. In the past, studies using thermography and ultrasonography were inconclusive in determining if agents placed in the udder could be detected.^{1,2} The purposes of this study were to determine the ultrasonographic appearance of exogenous isobutane gas infused into the udder. And to determine the effects of volume and pressure used to infuse exogenous isobutane gas and exogenous isobutane gas on duration of ultrasonographic appearance in the udder.

Eight Holstein cows, 28-32 days in milk were used in a randomized block study design, blocking for categorical variables of cow, quarter, and treatment. One quarter from each cow served as an untreated control and the remaining three quarters received one of three treatments. Treated quarters were classified as either group 2L (two vials of a commercial preparation^a [approximate volume 576 mLs of isobutane gas and 100 mg oxytetracycline] from a pressurized canister), 2S (576 mLs of isobutane gas from a non-pressurized balloon reservoir and 100 mg of oxytetracycline) or 8S (3000 mLs of isobutane gas from a pressurized canister and 400 mg oxytetracycline). Ultrasonographic imaging of the quarters was performed at -1h, 1h, 3h, 12h, 24h, 26h, 48h, 72h, and 96h. Potential interactions between categorical variables were evaluated by creating contingency tables and using Fisher's Exact test. Interactions were considered significant at $P < 0.05$.

Positive ultrasound findings associated with isobutane gas include bright echoes with associated

acoustic shadowing (Figure 1). Isobutane gas was ultrasonographically detected in treated quarters for 72-hours following treatment. Ultrasonographic determinations of exogenous isobutane gas (Figure 2) in the udder were not dependant of volume of isobutane gas injected (8S not significantly different than 2S or 2L) or pressure used to inject the isobutane gas (2S not significantly different than 2L). Gas was ultrasono-graphically detected in 6/8 control quarters (75%) at some time during the study. Milking may have resulted in re-distribution of isobutane gas between quarters. Ultrasound examination can be used to detect the presence of exogenous isobutane gas in udders of cattle used for exhibitions, sales or photography.



Figures 1A and 1B. Ultrasonography of mammary tissue with the transducer at the top to the image. Figure A represents normal ultrasonography findings of mammary glandular tissue. Figure B represents the ultrasonographic findings of an udder with exogenous isobutane gas as evidenced by the bright echoes and associated acoustic shadowing.

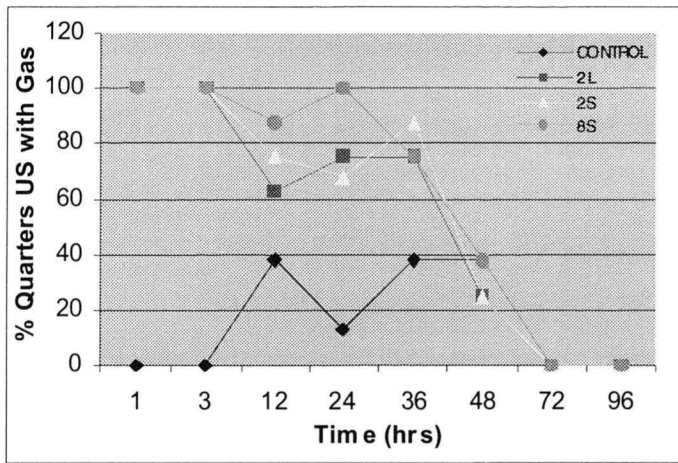


Figure 2. The effect of treatment on the percentage of quarters that were ultrasographically (US) detected to have isobutane gas.

References

1. Winkler JK, Purohit RC. Use of thermography and palpation to detect udder alterations. Unpublished study sponsored by Holstein – Friesian Association of America 1978.
2. Heider L, Schmall M. Use of ultrasonography and palpation to detect udder alterations. Unpublished study sponsored by Holstein – Friesian Association of America 1987.

Footnotes

^a Liquamast Aersol[®] - Rogar/STB Inc., Ontario Canada