The Effect of Age on Bovine Macular Degeneration

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Introduction

Age-Related Macular Degeneration, or ARMD, is a commonly observed phenomenon found in humans, but largely unexplored in bovines. Macular Degeneration is the deterioration of the center of retina, known as the macula. This part of the eye is responsible for clear and intricate central vision. This often leads to perception problems and occasionally complete blindness.

While there are many breeds of cattle, the Holstein- Friesian is the most common, making up around eight million head in the United States alone. When used in the dairy industry, the average productive life span of a Holstein is approximately four years old. The purpose of this project is to establish if there is a correlation with age and retinal thickness. Cows were put in four groups based off of their stage of production. Both their left eye and right eye were observed and measured with the ultrasound. The data was then averaged and each group compared to each other and analyzed. The results determine that age is a determining factor of macular degeneration in bovines.

Materials and Methods

A hundred cattle were divided into four distinct groups based on age. Their identification numbers and age were recorded. The retina and macula were observed, and measured in mm using a non-invasive ultrasound.

Results

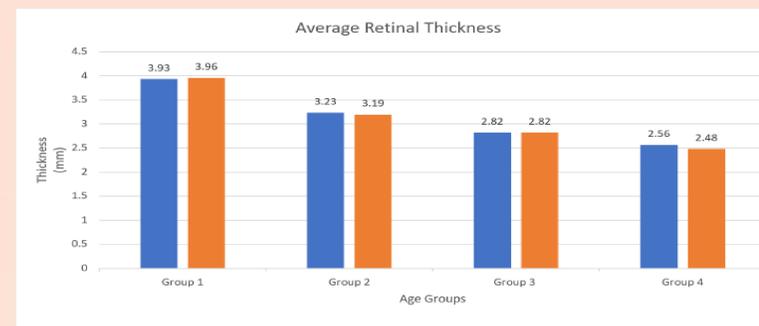Fig. 1. Ultrasound photos from left to right, of a young calf and a mature cow

Fig. 2. Mean retinal thickness in calves, yearlings, two-year olds, and three year and older cows. The blue column represents the left eye while the orange signifies the right eye of each age group.
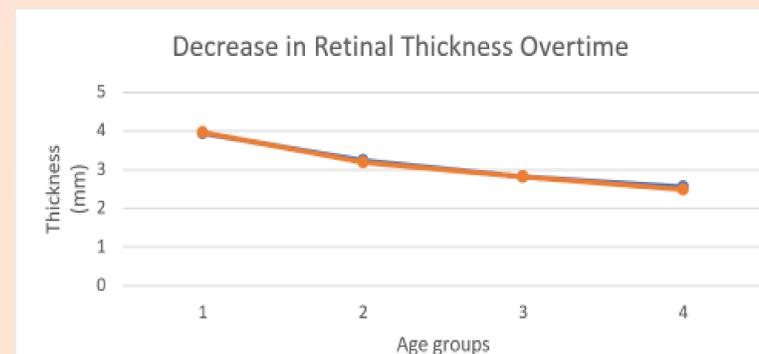

Fig. 3 Exhibits the decrease in retinal thickness overtime in both the left and right eye.

The results show that there was a statistically significant decrease in retinal thickness between the successional stages in the groups of Holstein cattle. The left eye, represented by the blue line, decreased 34.90% in thickness from Group 1 to Group 4 The right eye, shown as the orange trendline had a 37.37% decrease in thickness from Group 1 to Group 4.

Conclusions

Age-Related Macular Degeneration is a topic still generally uninvestigated in bovines. The deterioration of the retinal layer of the eye leads to loss in visual deficits, and eventually blindness. As macular problems lead to a lack of bovine visual acuity, cattle often end up injuring themselves leading to a decrease in marketability and an increase in morbidity. If symptoms are recognized early, vision loss can be controlled, and profit loss can be prevented.

Trends exhibited between successional age groups suggest that the retina significantly degrades as a bovine matures. Further studies are needed to define any differences that exist in Age-Related Macular Degeneration.

Acknowledgements

Literature Cited

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