



# Evaluation of Eyelid Pigmentation and Udder Traits in Hereford Cross Cattle

Lauren L. Hulsman Hanna<sup>1</sup> and David Riley<sup>2</sup>

<sup>1</sup>Department of Animal Sciences, North Dakota State University, Fargo, ND

<sup>2</sup>Department of Animal Science, Texas A&M University, College Station, TX

## Introduction

Hereford cattle, along with other breeds with white pigmented faces, have increased risk of bovine ocular squamous cell carcinoma (aka cancer eye). Older studies have shown that Hereford cattle with more eyelid pigmentation had less chance of developing cancer eye (e.g., Anderson, 1991). Recent work has investigated how to quantify eyelid pigmentation in Hereford and Hereford cross cattle (Davis et al., 2015), but additional sample sizes are needed to take this a step further for genetic characterization.

Although cancer eye could be a reason a Hereford or Hereford cross cow could leave the herd, udder quality traits are also an important factor. Newborn calves need to nurse unassisted, particularly in range conditions where assisting those calves may not be feasible. Calves have difficulty nursing when the dams have poor udder attachment or teat sizes of either extreme (Wythe, 1970; Edwards, 1982; Ventorp and Michanek, 1992). Calf mortality rates were higher when dams had large teats and pendulous udder suspension (Frisch, 1982). Thus, improving udder quality can be beneficial to producers by reducing the amount of labor associated with assisting calves to nurse and increasing the number of calves weaned per cow, an important measure of efficiency. Furthermore, by improving udder quality, cows remained in the herd longer, resulting in the need for fewer replacement heifers (e.g., Greer et al., 1980; Frisch, 1982), thereby reducing replacement costs. Little current literature has investigated genetic inheritance of udder quality traits or tried to map genomic regions of influence in Hereford or Hereford cross cattle.

The objective of this project is to 1) collect face and eyelid pigmentation photographs of Hereford cross calves and 2) collect udder photographs and scores for udder support and teat size. Data collected will be shared and utilized in a multistate project investigating genetic inheritance of eyelid pigmentation and udder quality.

## Materials & Methods

**Animals.** Data was collected on calves at weaning age from Central Grasslands Research Extension Center (CGREC) that were either sired by Hereford or whose dam was sired by Hereford and possessed a white face. White-faced heifers retained or that will be retained at CGREC for breeding were also utilized for the years they are present at CGREC and produce calves. All procedures involving animals were approved by the North Dakota State University Institutional Animal Care and Use Committee.

**Data Collection and Traits.** White-faced calves at weaning were used to capture facial and eye photos following Davis et al. (2015). Each calf had blood drawn via jugular venipuncture for white blood cell extraction. White blood cell pellets have been stored long term in an ultralow freezer until funding becomes available for DNA extraction and genotyping. White-faced heifers that were retained for breeding and produced calves had photographs of body and udder taken as well as udder suspension and teat size recorded at calving, mid-lactation and weaning time following Beef Improvement Federation (2018) recommendations.

## Results & Discussion

The number of calves used for eyelid study and females with scores captured since 2015 are shown in Table 1. White-faced females that had udder characteristics scored on their first calf were culled from the CGREC cow herd due to reproductive

**Table 1.** Number of animals captured in photographs for eyelid and face pigmentation as well as udder traits scored and photographed since 2015.

Year captured	Year born	Eyelid and face		Udder traits <sup>1</sup>
		Male	Female	
2015	2015	26	23	--
2016	2015	--	--	--
	2016	36	29	--
2017	2015	--	--	19
	2016	--	--	--
	2017	56	39	--
2018	2015	--	--	18
	2016	--	--	14
	2017	--	--	--
	2018	3	7	--
Total records		121	98	51

<sup>1</sup>Udder traits included udder suspension and teat size according to Beef Improvement Federation (2018) recommendations. Scores and photographs were captured at calving, mid-lactation and weaning. Numbers present in this column are individual cow per year, where cows are repeated across years if retained by CGREC.



**Figure 1.** Udder photos captured at mid-lactation in 2018 on 2015 and 2016 white-faced cows.

failure rather than udder characteristics (see Table 1 2015 born females). Udder types are diverse (Figure 1), which will add nicely to the multistate data set for genetic characterization. Hereford sires were used heavily in the 2018 breeding season; therefore, additional white-faced calves are being produced ( $n \geq 100$ ) and will be used for eyelid and face pigmentation photographs in fall 2019.



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