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# Effect of Wet Distillers Grain Feeding Supplemented with Vitamin E on Case Life of Beef

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period after short-term and long-term aging.

Statistical analysis was performed as described by Senaratne et al. (2009 *Nebraska Beef Report*, pp. 113-115) using the GLIMMIX procedure of SAS (version 9.1, Cary, N.C., 2002).

## Summary

Aged (7 and 28 days) strip loins (m. *Longissimus lumborum*) from 90 yearling steers were used to assess the effect of supplemental vitamin E in diets containing wet distillers grains (WDG) with or without distillers solubles on surface discoloration of steaks during retail display. The greatest negative effects occurred as a result of aging, followed by the presence of solubles and then by the level of WDG. As discoloration increased, the importance of vitamin E in reducing discoloration also increased. Feeding WDG diets supplemented with vitamin E mitigates the surface discoloration of aged beef strip loin steaks during retail display.

## Introduction

Consumers prefer to purchase the freshest meat at meat stores, and bright red color of meat is the gauge for consumers to determine the freshness of meat. Meat containing more polyunsaturated fatty acids (PUFA) is prone to oxidization, which causes a deterioration of sensory characteristics, color and shelf life of meat. Many studies have shown that feeding wet distillers grains (WDG) to cattle increases the PUFA content of beef, which reduces the shelf life of meat due to rapid oxidation (Senaratne et al., 2009 *Nebraska Beef Report*, pp. 110-112; de Mello et al., 2008 *Nebraska Beef Report*, pp. 108-109; 110-111).

Therefore, this study was designed to determine whether vitamin E (E) supplementation with WDG diets could delay the surface discoloration of strip loin (m. *Longissimus lumborum*) steaks during a retail display

## Procedure

Ninety crossbred steers were randomly allotted to one of 10 diets containing 0%, 20%, 40 % WDG (DM basis) with or without vitamin E supplementation and distillers solubles as described by Senaratne et al. (2009 *Nebraska Beef Report*, pp. 113-115). All the conditions at feeding, slaughter and meat fabrication were similar to procedures mentioned by Senaratne et al. Short loins were removed from 48-hour-chilled carcasses, vacuum-packed and transported under refrigeration to Loeffel Meat Laboratory at the University of Nebraska–Lincoln. Strip loin steaks (m. *Longissimus lumborum*) were cut (1-inch thick) after seven and 28 days of aging at 32 ± 3°F. Steaks were packaged aerobically on Styrofoam trays and placed on a table in a cooler maintained at 32 ± 36°F under continuous 1000–1800 lux warm white fluorescence lighting for seven days to provide simulated retail display conditions. The subjective percentage surface discoloration of each steak was evaluated every day by a panel of three.

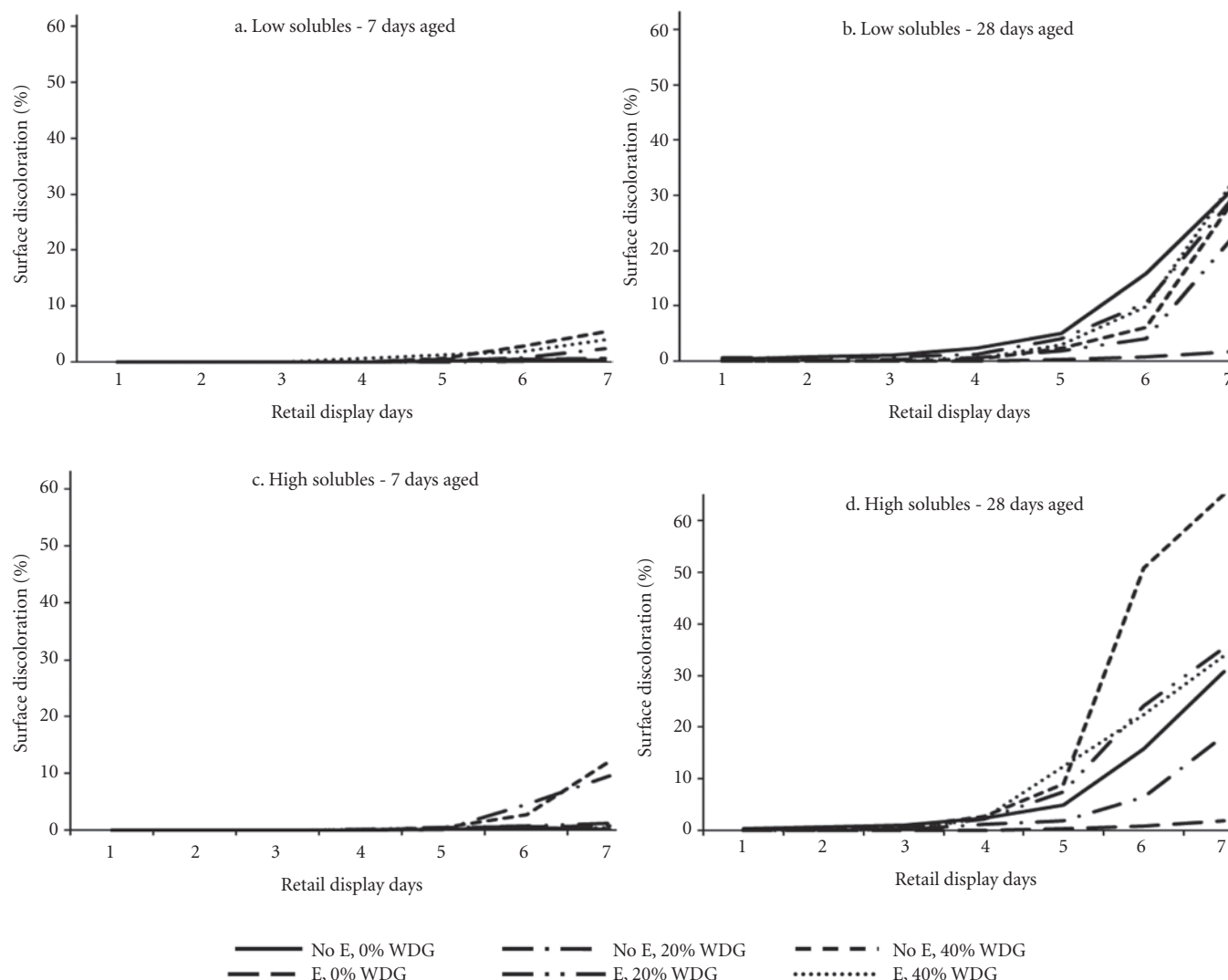
## Results

Because there was a five-way interaction ( $P < 0.0001$ ) among amount of WDG, level of vitamin E, level of solubles, aging period and length of retail display for surface discoloration of strip steaks (Table 1), significant main effects and other interactions were neglected. Generally, there were few meaningful differences among steaks aged seven days — all treatments were acceptable in terms of discoloration. However, higher levels of WDG and higher levels of solubles resulted in greater discoloration, regardless of aging period (Figure 1). The effect of WDG was likely due to a significant linear increment of PUFA levels, as shown by Senaratne et al. (2009 *Nebraska Beef Report*, pp. 110-112). It should be noted that the level of added distillers solubles was well above current industry practice.

Steaks from beef aged for 28 days discolored at a more rapid rate than those from beef aged seven days,

**Table 1. Significant ( $P < 0.05$ ) main effects and their interactions on percentage discoloration of strip steaks during retail display.**

Effects	P-value
Solubles	0.02
Aging	< .0001
Retail display days	< .0001
Solubles × aging	0.03
Solubles × retail display days	< .0001
WDG × retail display days	0.0002
Aging × retail display days	< .0001
Vit E × WDG × solubles	0.04
WDG × aging × retail display days	< .0001
Solubles × aging × retail display days	< .0001
Vit E × WDG × solubles × aging	0.04
Wdg × solubles × aging × retail display days	< .0001
Vit E × WDG × aging × retail display days	< .0001
Vit E × WDG × solubles × aging × retail display days	< .0001
WDG × solubles × aging × retail display days	< .0001



**Figure 1.** Mean percentage surface discoloration during retail display of 7- and 28-day aged strip steaks (*m. Longissimus lumborum*) from steers fed WDG with or without E and distillers solubles.

likely due to a decline in the protective activities of some enzymes against oxidation and destruction of cell integrity, thereby increasing susceptibility of PUFA to oxidation. After 28 days of aging, the increase in discoloration as a result of higher levels of WDG was of greater magnitude than after seven days of aging (Figure 1 b and d). This was also true for the effect of distillers solubles. The presence of vitamin E reduced the extent of discoloration, especially after 28 days of aging. Steaks from cattle fed

20% or 40% WDG without E showed significantly higher surface discoloration compared to steaks from animals fed WDG with E (Figure 1).

Generally, steaks with 20% surface discoloration are deemed unacceptable by consumers. Figure 1 indicates that steaks from cattle fed high levels of WDG, without supplemental vitamin E, and aged 28 days were likely to discolor at a more rapid rate. The presence of distillers solubles exacerbated the problem. In this study, the greatest negative effects occurred as a

result of aging, followed by the presence of solubles and then by the level of WDG. As discoloration increased, the significance of vitamin E also increased.

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