# Beef Day 2021

## Nose color of Charolais × British crossbred beef steers alters marbling score and body weight at a common degree of fatness in steers reared under similar management from birth through finishing

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### Objective

The objective of this study was to determine if cattle could be sorted and performance could be predicted by nose color (Pink or Black) when carcass traits and body weight were evaluated at a common endpoint in Charolais x British crossbred beef steers. Pink nosed cattle were assumed to be progeny of Red Angus dams and black nosed cattle were assumed to be progeny of Black Angus dams.

### Study Description

Steers (n=180) were received at the Ruminant Nutrition Center (RNC) from a single ranch in Western South Dakota. These steers arrived at the RNC on October 23, 2019 and were harvested 244 days later. While at the RNC these steers were group housed in concrete pens and were administered a steroidal implant 14 days post-arrival and a terminal implant 132 days before harvest. Steers were shipped on the same day when they were appraised to have 0.50 in of rib fat. At harvest, hot carcass weight, longissimus muscle area, rib fat, kidney-pelvic-heart fat, and USDA marbling scores were recorded.

### Take Home Points

Black nosed steers had greater rib fat depth and marbling score compared to their pink nosed counter parts. Black nosed steers also had a greater numerical yield grade while no differences were in final shrunk body weight. Pink nosed steers could potentially be worth more than their black nosed counterparts ($cwt) when purchased at lighter weights allowing for greater live weight gain.

### Introduction

Feeder cattle in the United States can be classified by differences in carcass quality, yield grade, mature size, growth performance, and efficiency (Gentry et al., 2020: Smith et al., 2020). It is important in the feedlot industry to sort cattle into groups of similar type and performance potential to avoid discounts at the time of harvest. This can often be done by using cattle frame size; however, frame size can be misleading depending on age and body weight of the individual. Using nose color as a predictor of genotype and potential production indicator could lead to a new way to sort and manage cattle in feedlots to promote consistency amongst groups.

### Experimental Procedures

Cattle were received at the Ruminant Nutrition Center at approximately 6 months of age and were group housed in concrete pens for 244 days. Upon arrival cattle were vaccinated for infectious bovine rhinotracheitis, bovine viral diarrhea 1 and 2, parainfluenza 3, and bovine respiratory syncytial virus (Bovi-Shield Gold 5,

Zoetis, Parsippany, NJ) and clostridials (Ultrabac 7/Somubac, Zoetis). Steers were also administered a pour-on moxidectin upon arrival according to label directions (Cydectin, Bayer, Shawnee Mission, KS). Two weeks after arriving at the RNC steers were administered a steroidal implant containing 200 mg of progesterone and 20 mg of estradiol benzoate (Synovex-S, Zoetis). They were later administered a second implant 132 days prior to harvest that contained 200 mg trenbolone acetate and 28 mg of estradiol benzoate (Synovex-PLUS, Zoetis). All steers were shipped on the same day when they were appraised to have approximately 0.50 in of rib fat. Steers were harvested in Dakota City, NE at Tyson Fresh Meats Plant where carcass data and weight were collected. Empty body fat percentage (EBF) was calculated using these carcass measurements according to (Guiroy et al., 2002). Marbling score and backfat depth were used to calculate the mRatio which acts as an indicator of the relationship between marbling and subcutaneous fat accumulation (Mohrhauser et al., 2015).

## Results and Discussion

Descriptive statistics of the overall population of Charolais × British crossbred steers are located in Table 1. Body weight and carcass trait responses can be found in Table 2. Weaning body weight (BW) differed ($P$ = 0.05) by 2.1% between black and pink nose steers. Final shrunk BW, HCW, DP, LM area, and mRatio was not different ($P \geq 0.16$) between black nosed or pink nosed steers. Rib fat depth was 11.9% greater ($P$ = 0.01) for black nosed steers compared to pink nosed steers. Measures for kidney-pelvic-heart fat tended to increase by 2.2% ($P$ = 0.07) in black nosed steers compared to pink nosed steers. Marbling score was 7.0% greater ($P$ = 0.01) in black nosed steers compared to pink nosed steers. Steers with black noses had greater ($P$ = 0.01) numerical yield grade (8.8%) and lower ($P$ = 0.01) retail yield (1.0%) compared to steers with pink noses. Black nosed steers had greater ($P$ = 0.01) estimated EBF by 3.8% compared to pink nosed steers and tended ($P$ = 0.07) to have decreased BW at 28% EBF by 2.1% compared to pink nosed steers. Distribution of USDA Yield Grades did not differ ($P$ = 0.16) between black and pink nosed steers. The distribution of USDA Quality Grades tended ($P$ = 0.10) to differ between nose classification with fewer USDA Select graded carcasses and greater USDA High Choice graded carcasses in black nosed steers compared to pink nosed steers. These results correspond to the thought that black hided cattle will have greater marbling potential (McCabe et al., 2019). However, Red Angus influenced calves could warrant a premium at weaning as a result of their lower weaning weight and larger frame size allowing for elevated growth potential. The Red Angus influenced steers could have potentially graded similar to the black nosed steers if they had been fed for additional days on feed.

## Implications

Total live weight gain was compromised in the black nosed steers if all steers would have been harvested at an equal chemical maturity. Greater potential live weight gain and lighter weights at the time of purchase indicate that pink nosed steers could potentially be worth more ($/cwt) as feeders than their black nosed counterparts. More of this type of research should be conducted in order to ascertain real value discounts that should be applied to feeder cattle populations or varying genotype and phenotype.

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## References

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## Tables

**Table 1.** Descriptive statistics for body weight (BW) and carcass traits of Charolais × British crossbred steers (n = 180).

| Item | Mean | Standard deviation |
|---|---|---|
| Weaning BW, lb | 617 | 40.1 |
| Final shrunk (4%) BW, lb | 1448 | 93.7 |
| HCW, lb | 935 | 64.6 |
| DP, %[1] | 64.57 | 1.973 |
| Longissimus muscle area, in$^2$ | 15.3 | 1.09 |
| Rib fat, in | 0.51 | 0.128 |
| Kidney-pelvic-heart fat, % | 1.78 | 0.142 |
| Marbling score[2] | 494 | 77.9 |
| Calculated Yield Grade[3] | 2.90 | 0.572 |
| Retail Yield, %[4] | 50.98 | 1.176 |
| Estimated empty body fat (EBF), %[5] | 30.32 | 2.151 |
| BW at 28% EBF, lb[5] | 1378 | 94.1 |

[1] Calculated as: HCW/final BW pencil shrunk 4%.
[2] 400 = small$^{00}$ (USDA Low Choice).
[3] Calculated according to the USDA regression Equation (USDA, 1997).
[4] Closely trimmed retail cuts from the round, loin, rib, and chuck according to Murphey et al. 1960.
[5] Calculated according to Guiroy et al. 2002.

**Table 2.** Least squares means for body weight (BW) and carcass traits of Charolais crossbred steers with black or pink noses.

| Item | Nose color | | SEM | P - value |
|---|---|---|---|---|
| | Black | Pink | | |
| Steers, n | 46 | 134 | - | - |
| Weaning BW, lb | 628 | 615 | 6.6 | 0.05 |
| Final shrunk (4%) BW, lb | 1466 | 1442 | 15.96 | 0.16 |
| HCW, lb | 941 | 933 | 11.0 | 0.46 |
| DP, %[1] | 64.21 | 64.68 | 0.332 | 0.40 |
| *Longissimus* muscle area, in[2] | 15.2 | 15.4 | 0.18 | 0.47 |
| Rib fat, in | 0.56 | 0.50 | 0.019 | 0.01 |
| Kidney-pelvic-heart fat, % | 1.81 | 1.77 | 0.024 | 0.07 |
| Marbling score[2] | 520 | 485 | 13.1 | 0.01 |
| Calculated Yield Grade[3] | 3.09 | 2.83 | 0.096 | 0.01 |
| Retail Yield, %[4] | 50.59 | 51.11 | 0.198 | 0.01 |
| Estimated empty body fat (EBF), %[5] | 31.19 | 30.03 | 0.358 | 0.01 |
| BW at 28% EBF, lb[5] | 1358 | 1387 | 7.3 | 0.07 |
| mRatio | -0.023 | 0.024 | 0.1988 | 0.81 |
| **USDA Yield Distribution, %** | | | | |
| 1 | 0.0 | 4.4 | - | 0.16 |
| 2 | 45.6 | 57.8 | - | - |
| 3 | 50.0 | 34.8 | - | - |
| 4 | 4.4 | 3.0 | - | - |
| 5 | 0.0 | 0.0 | - | - |
| **USDA Quality Grade Distribution, %** | | | | |
| Select | 4.4 | 12.4 | - | 0.10 |
| Low Choice | 43.4 | 50.1 | - | - |
| Average Choice | 34.8 | 30.3 | - | - |
| High Choice | 15.2 | 7.2 | - | - |
| Prime | 2.2 | 0.0 | - | - |

[1] Calculated as: HCW/final BW pencil shrunk 4%.
[2] 400 = small[00] (USDA Low Choice).
[3] Calculated according to the USDA regression Equation (USDA, 1997).
[4] Closely trimmed retail cuts from the round, loin, rib, and chuck according to Murphey et al. 1960.
[5] Calculated according to Guiroy et al. 2002.
[6] $\left[\frac{(Observed\ Variable1 - Variable1\ mean)}{Variable1\ standard\ deviation}\right] - \left[\frac{(Observed\ Variable2 - Variable2\ mean)}{Variable2\ standard\ deviation}\right]$ Where Variable 1 was marbling and variable 2 was rib fat depth.