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Meat and Muscle Biology™

Variation in Meat Quality Characteristics of Whitetail Deer (Odocoileus Virginianus) in Ohio

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Objectives

Consumption of venison from whitetail deer is increasing. However, due to certain hunting practices including improper exsanguination from marksmanship failures, inadequate postmortem temperature decline, and unhygienic conditions in the designated hunting areas, there is a potential for meat quality issues in venison. Therefore, the purpose of this research was to survey venison meat quality to provide characterization data for our meat processing partners from animals harvested during firearm season.

Materials and Methods

Whole, boneless shoulders from 41 whitetail deer harvested from November 2015 to January 2016 were obtained from three separate venison processors. Shoulders were ground and a portion was frozen at –80°C for biochemical testing of pH, muscle pigment (myoglobin and hemoglobin) concentration, lactate, residual carbohydrate (glycogen + glucose + glucose 6-phosphate), and glycolytic potential. The remainder of the raw venison was mixed with a 15% NaCl solution at a 10:1 ratio (wt./vol.), formed into 70 g patties, vacuum sealed, and frozen at –20°C. After thawing overnight at 4°C, the patties were allowed to bloom at room temperature for 10 min and analyzed for Minolta color (L*, a*, and b*) and thaw loss. The patties were then cooked until an internal temperature of 71°C was achieved (~2.5 min) and cooking loss, shrinkage, and Warner-Bratzler shear force were determined. Data are reported as mean ± SE with the minimum and maximum values from each analysis.

Results

In general, venison meat quality varied dramatically (Table 1). Of the 41 samples, 15% (6/41) were classified as dark cutters (ultimate pH ≥ 6.0). The high prevalence of dark cutters could be due to antemortem stress and/or limited exsanguination allowing lactate transport out of the muscle prior to death. Despite a high degree of variability, ultimate pH was correlated to a number of biochemical and quality characteristics. The meat pH was negatively correlated with lactate (R^2 = 0.51; P < 0.0001), residual carbohydrate (R^2 = 0.28; P = 0.0002), and glycolytic potential (R^2 = 0.37; P < 0.0001). The meat pH was also positively correlated with a* (R^2 = 0.22; P = 0.0012) which suggests that pH affects meat color in whitetail deer which is consistent with other species.

Conclusion

These data indicate that venison meat quality from whitetail deer harvested during firearm season in Ohio is highly variable.

Table 1. Fresh meat quality characteristics of whitetail deer

Measurement	Min	Max	Mean ± SE
pH	5.58	6.42	5.81 ± 0.020
Lactate, µmol/g	32.60	64.70	49.40 ± 1.20
Residual carbohydrate, µmol/g	3.50	78.30	35.80 ± 3.00
Glycolytic potential	42.60	210.90	121.00 ± 6.60
Muscle pigment, mg/g	7.50	14.90	10.80 ± 0.30
Lightness, L*	31.72	42.95	36.22 ± 0.39
Redness, a*	8.42	16.90	11.70 ± 0.35
Yellowness, b*	3.05	8.66	5.75 ± 0.22
Thaw loss, %	0.25	3.86	1.45 ± 0.15
Cooking loss, %	8.42	30.49	21.47 ± 0.74
Shrinkage, %	5.10	26.90	12.4 ± 0.60
WBSF, kg	0.89	2.65	1.53 ± 0.07