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Effect of low voltage electrical stimulation and suspension method on tenderness and quality parameters of buffalo meat (#493)

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Introduction

Buffalo (*Bubalus bubalis*) is an important alternative to cattle in several countries, as it presents advantages in terms of adaptation to certain climates, utilization of low value fibers, resistance to several diseases and parasites. Buffalo meat is one of the healthier red meats known for human consumption because of high lean percentage and low cholesterol. However, consumer's complaint regarding toughness of buffalo meat remains a major concern for processors and retailers. Considering different post-slaughter technologies, Electrical Stimulation (ES) is a standard meat processing technology in beef and mutton industry in order to reduce cold-shortening by accelerating rate of pH fall, to augment tenderness and improve color. While, Pelvic Suspension (PS) method increases the sarcomere length of hind-quarter muscles which in turn produces tender meat. The purpose of following study was to assess the effect of Low Voltage ES and PS on quality parameters of buffalo meat as there has been no such study reported so far on buffalo meat.

Methods

Four treatments were randomly applied on carcasses of 18 months old buffalo bulls that had carcass weight of 130±10Kg and were reared under same conditions (n=6 per treatment). Treatments included Non-Electrical Stimulation and Achilles Suspension, Non-Electrical Stimulation and Pelvic Suspension, Electrical Stimulation (120V, 15Hz, 30s pulse duration) and Achilles Suspension, and Electrical Stimulation (120V, 15Hz, 30s pulse duration) and Pelvic Suspension. After dressing, carcasses were split into two sagittal halves. One half was hung from obturator foramen (PS), while, Achilles tendon (AS) was used for hanging the other half. Carcass pH was taken at 0, 1, 3, 5, 7, 9, 11 and 24 hours Post-Mortem (pm). At 24 h pm, *Longissimus lumborum* (LL) of both sides were excised and cut into n=06 steaks having 3cm thickness each. Color measurements (CIE L*, a* and b*) and purge-loss were measured at 24 h pm. Samples were cooked in water bath to the core temperature of 72°C. Cooking loss and Warner-Bratzler Shear Force (WBSF; strips of 1cm^2 cross-sectional area) were evaluated after cooking. Animals served as the experimental unit and data were analyzed using PROC General Linear Model (SAS V9.1).

Results

Rate of pH fall was highest (P<0.05) for ES buffalo carcasses, while, suspension method did not have affect on pH decline (Figure 1). In case of ES-AS and ES-PS, pH dropped below 6.2 (threshold for cold shortening) 4 hours earlier than NES-AS and NES-PS, reducing the probability of cold shortening occurrence in young buffalo bulls. Ultimate pH of ES carcasses was 0.28 units less than NES. ES and PS resulted in tender buffalo meat (P<0.05) compared to NES and AS. Interaction effect indicated that ES-PS produced most tender meat (P<0.05) followed by ES-AS and NES-PS, respectively. NES-AS meat found to be toughest among four treatments (Figure 2). An overall treatment effect showed that ES significantly improved CIE L*, a*, b* (P<0.05) of buffalo meat at 24 hour pm. Suspension method did affect CIE L*, a*, b* values. Purge and cooking loss were indifferent among all four treatments (P>0.05).

Conclusion

ES and PS individually and when applied in combination, synergistically, enhances tenderness of buffalo meat. Additionally, ES hastens the rate of pH fall compared to NES. Based on known cold shortening conditions (pH and time to reach 10°C), ES in combination with PS has commercial potential to reduce cold shortening effects in young buffalo bulls. ES also improves color parameters (L*, a*, b*) 24 hour post-mortem.

Notes

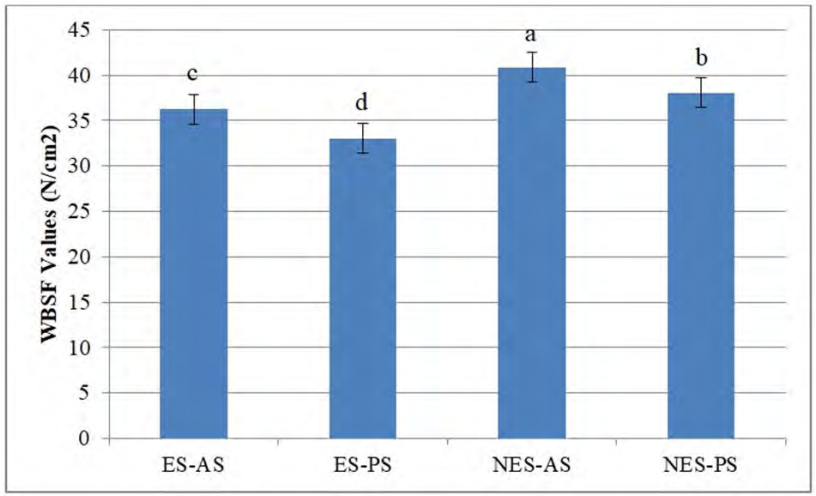

Figure 2. Effect of treatment on WBFS values

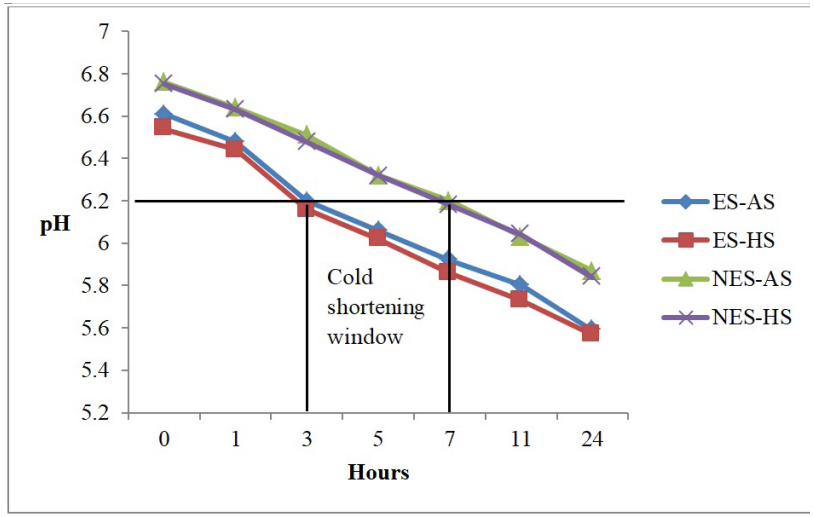

Figure 1. Trend of pH decline as affected by treatment

Notes