PE7.10 Effects of supplemental Chinese traditional herbal medicine complex on the carcass characteristics and meat quality of male Holstein calves 119.00

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Abstract This study was conducted with thirty-two male Holstein calves (initial weight about 173 ¡Ó 3 kg) which were randomly divided into control and Chinese traditional herbal medicine (CHM) supplementation (20g/d) groups with 3 replicates. About 18 kg corn silage and 3 kg concentrate were intake daily per head, with free access to water. The study lasted for 98 days. The carcass fat ratio and water holding capacity of the meat were increased, while the meat shear force was decreased in the CHM supplementation group, in comparison to in the control group (P < 0.05). The meat of the CHM group contained higher levels of flavonoids and total phenol than did the control group. Thus, the CHM group's meat displayed greater trolox equivalent antioxidant capacity (P < 0.05) than did the control group. For that reason, the panel test result showed that the CHM group meat had better tenderness, flavor, juiciness and total acceptance than did the control group (P < 0.05).

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Index Terms Chinese traditional herbal medicine,carcass characteristics, meat quality, calves

I. INTRODUCTION

Oxidative processes in meat are the most important factors responsible for quality deterioration, including losses in flavor, color and nutritional value [1, 2]. Thus, prevention of lipid oxidation during feeding, processing and storing of meat is essential for the maintenance of both quality and safety [3]. A number of measures have been taken in order to prevent oxidative rancidity and off-flavors in processed meats 2 (Nissen et al., 2004). Adding antioxidants to the feed can protect fat from oxidative deterioration and improve the antioxidant status of animal tissue, thus preventing or reducing oxidation both in vivo and postmortem. The effects of natural dietary compounds with antioxidant properties, such as flavonoids and polyphenols on the oxidative status of meat is being increasingly investigated by researchers exploring plant-based materials as sources of natural polyphenol or flavonoid antioxidants [2]. However, most research has looked at the natural antioxidant effect on stored meats; few studies have investigated the effects of natural antioxidants on fresh meat quality. Thus, the effect of Chinese herbal medicine on the carcass characteristics and meat quality of male Holstein calves was investigated in this study.

II. MATERIALS AND METHODS

A. Animals Treatment

Thirty-two male Holstein calves (6-months old, initial weight was 173 ¡Ó 3 kg) were used in the study, blocking was according to body weight, and then randomly divided into two dietary groups with three replicates (6 heads/pen), control and Chinese herbal medicine (CHM) complex supplemented group (Lonicera japonica, Glycyrrhiza glabra, salvia Officinalis, Rosmarinus officinalis L. Ocimum sanctum, Tarazacum mongolicum Hand-Mazz, Salvia plebeian R. Brown, Solanum nigrum L., Cirsium spicalum Matsum and Cenrella Asiatic. These herbs were supplied by Bioking Tech. Co., Taiwan). CHM was added in the concentrate at a level of 20 g/d/head. Corn silage was supplied at a ratio of about 8% of body weight daily and 3 kg/d/head of concentrate feed, while water was supplied ad libitum. The study was conducted for 98 consecutive days, when the calves had body weight of about 290 kg. At the final experiment, 6 calves in each group (2 heads per replicate) were sacrificed in order to measure the carcass traits and the dressing percentage; lean and fat ratio was determined, and the longissimus muscle sample taken for meat quality examination. Meat (5 g) was added to DW 20 mL and homogenized, centrifuged by 1499 ¡Ñg for 10 min, and the supernatant taken for analysis.

B. Analyzed Traits and Methods

CHM components analysis (including calorie, crude protein, crude fat and ash) of the Chinese herbal complex medicines was based on the methods of AOAC [4]. CHM and meat flavonoid contents were

determined following the method described by Jia et al. [5]. CHM and meat total phenol contents were examined using the methods of Kahkonen [6].

C. Meat Quality Analysis

The pH value of meat was measured by a pH meter. Trolox equivalent antioxidant capacity was measured in triplicate, following Erel¡¦s [7] procedure. The scavenging DPPH (a,a-diphenyl-£]-picrylhydrazyl) radical ability was determined in triplicate, following the method reported by Chung et al. [8]. TBARS (2-thiobarbituric acid reactive substance) value was examined in triplicate based on the procedure described by Faustman et al. [9]. Water holding capacity (WHC) was determined in triplicate, using the Pan [10] method. The panel evaluation of the meat was performed by 10 persons who judged such characteristics as: flavor, tenderness, juiciness and overall-acceptance. Each item was ranked on 1~7 scale, in which 7 was the highest grade.

D. Statistical Analysis

Data variances between groups were analyzed using SAS software. The significant differences between treatments were then determined by t test [11].

III. RESULTS AND DISCUSSION

The Chinese herbal medicine is rich in total phenol and flavonoids (Table 1). These two components may be the effective ingredients of the Chinese herbal medicine complex. Carcass Characteristic The carcass characteristics of calves showed no differences in dressing percentage and lean ratio between groups. However, the fat ratio showed that the CHM supplemented group was better than the control group ($P < 0.05$)(Table 2). Thus, supplementation of CHM has a positive effect on carcass characteristics. Meat Quality The meat water holding capacity and shear force showed that the CHM supplemented group was better than the control group ($P < 0.05$)(Table 3). Thus, supplementation of CHM has a positive effect on meat quality. In this study, the meat from the CHM group had better water holding capacity which may be related to the high pH value of the CHM group compared to the control. The meat flavonoid and total phenol contents in CHM group were higher than in the control group as well as in the trolox equivalent antioxidant capacity ($P < 0.05$). The scavenged DPPH ability in CHM group also had a higher potency than in control group ($P = 0.07$)(Table 4). Flavonoids and phenol compounds are natural phytochemical antioxidants. Flavonoids contain 3 OH-groups which can supply H atoms to quench free radicals, making it a strong antioxidant [12,13]. In this study, the meat from the CHM group had a higher flavonoid and total phenol contents than the control group did, which may be the result of the antioxidants in the CHM supplementation; and from the trolox and scavenging of DPPH ability, demonstrated that dietary supplementation with CHM could deposit the flavonoids and phenol components in meat and display an antioxidant ability. Panel Evaluation The CHM group showed better tenderness, flavor, juiciness and overall-acceptance than did the control group ($P < 0.05$)(Table 5). Deposition of more fats in meat is related to the flavor, tenderness and juiciness of the meat [14]. The CHM group meat had more water holding capacity which, in turn, could also contribute to better juiciness compared to the control group. The meat in the CHM group showed less shear force, which may also be related to increased tenderness

IV. CONCLUSION

This study indicated that supplementation of Chinese herbal medicine complex in the diet of male Holstein calves had beneficial effects on carcass characteristics and meat quality.

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