EFFECTS OF VARIOUS CONCENTRATED FEED ON CARCASS QUALITY OF THE TAIWANESE BUFFALO

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Abstract – The purpose of this study was to examine the effects of fattening methods on the carcass quality of buffalo castrated at 2.5 years of age in Taiwan. The analyzed items included carcass quality and proximate analysis of the meat. Comparisons were made among buffalo finished on 1.8 and 2.2% concentrated feed and free range. The buffalo group with the higher concentrated feed had heavier live weight, slaughter weight, and higher dressing, lean, skeleton and skin percentage. The carcasses from buffalo fattened with 2.2% feed were lower in moisture and higher in protein, fat, ash and calorie content. The results of the study suggest that carcass quality might be considerably improved by different buffalo fattening methods.
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Key Words – Buffalo, Fattening, Meat quality

I. INTRODUCTION

In Taiwan, buffalo meat is traditionally produced from old animals when their productive life is over. Therefore, the meat quality of the spent buffalo is dry and tough. Beef production has become an increasingly important livestock industry in Taiwan. Indigenous breeds have generally been utilized for meat production purposes. However, the traditional feeding performance including slaughter traits, physical evaluation and sensory evaluation of buffalo has not satisfied the demands of both beef producers and consumers.

Horng *et al*. [1] pointed out that most Taiwanese buffalo are used for draft purposes. Increasing farm mechanization and a growing demand for fresh beef has encouraged many farmers to raise them for slaughter. Despite the potential superiority of buffalo over cattle in a harsh tropical climate, the species has largely been neglected. Kandeepan *et al*. [2] indicated that buffalo meat has gained importance in recent years because of its domestic use and export potential. Further, its use in meat processing is increasing because of its higher content of lean meat and lower fat. This dark meat has good binding properties and is useful in product manufacturing.

The aim of this work was to examine the carcass quality including meat proximate analysis of buffalo fattened with concentrated feed compared with free range in order to make the meat attractive to consumers, with the goal of increasing the consumption of buffalo meat.

Despite the significant contribution of buffalo to the total meat production in Taiwan, their potential in the processed meat sector has not been thoroughly explored.

II. MATERIALS AND METHODS

Sample preparation
The study was executed in triplicate, three groups of three per group. All groups were fed grass hay *ad libitum* in this study. The amount of concentrated feed offered to the buffalo was determined according to the live weight obtained throughout the trial. This feeding regime was maintained throughout the feeding phase until the animals were slaughtered. Some feed compositions are shown in Table 1. Each group of three buffalo was obtained from castrated buffalo (2.5 years old) intensively reared by a commercial abattoir.

Buffalo meat was obtained from buffalo bulls intensively reared at a local slaughterhouse. The samples were collected from the *Longissimus dorsi* (*L. dorsi*) muscle of the carcasses. The meat was obtained 24 h after slaughter in a chilled room, packed in low density polyethylene bags (LDPE) and kept at $4\pm1\,^\circ$C for about 24 h.

Then, the fat and connective tissue were removed and the meat samples were portioned, packed in LDPE bags and transferred to a freezer maintained

at -20±1˚C until extraction with petroleum ether [3]. Calories were calculated by multiplying the raw amount of each input by its energy intensity factor.

Statistical analysis
Data were analyzed using a general linear model in the SAS system. The significant differences among the samples were analyzed using Least Squares Means method. Significance was reported at the $P<0.05$ level.

III.   RESULTS AND DISCUSSION

Slaughter traits
The results related to slaughter traits are shown in Table 2. The buffalo fattened with 2.2% concentrated feed showed a higher live weight, slaughter weight, dressing percentage, lean percentage, skeleton and skin percentage than the free range treatment. Live weight, slaughter weight, dressing percentage, lean percentage and skin percentage of the buffalo fattened with 2.2% concentrated feed were significantly higher than those of free range buffalo ($P<0.05$). The previous results for buffalo fattened with 2.2% concentrated feed might be attributed to the higher energy supply and better nutrients. Özlütürk *et al*. [4] showed that fattened calves had greater weight and higher dressing percentage. Ban-Tokuda *et al*. [5] also indicated that body weight significantly increased with fattening in both cattle and buffalo.

Proximate analysis
The carcasses from buffalo meat fattened with 2.2% feed were lower in moisture ($P<0.05$) and higher in protein, ash and calorie content than those of free range buffalo (Table 3). In general, the values related to chemical composition were found to be within the same range as the findings by Lin *et al*. [6] and Özlütürk *et al*. [4].

IV.   CONCLUSION

The slaughter traits and meat approximate analysis of fattened castrated buffalo in Taiwan were analyzed in the study. Buffalo fattened with higher concentrated feed showed better slaughter traits. The carcasses from buffalo fattened with 2.2% feed were lower in moisture and higher in protein, ash and calorie content. These traits were well perceived by consumers, and they appreciated the quality of the buffalo meat. Buffalo meat is comparable to beef in many of its physicochemical, nutritional and functional properties and sensory attributes.

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Table 1 Analyzed values of feed and hay for experimental water buffalo

Items	Concentrated	Pangola grass hay	Items	Concentrated	Pangola grass hay
Nutriment composition			Mineral content (Dry matter basis)		
Moisture (%)	11.0	13.5	Dry matter (%)	90.0	86.5
Gross energy (kcal/kg)	4094.0	-	Total nitrogen (%)	2.23	1.10
Crude protein (%)	13.2	5.92	Total phosphorus (%)	0.67	0.09
Crude fat (%)	4.96	-	Potassium (%)	1.05	0.62
Crude fiber (%)	22.4	-	Copper (ppm)	78.7	ND[2]
Acid detergent fiber (%)	17.1	41.8	Zinc (ppm)	114.0	17.4
Neutral detergent fiber (%)	35.0	75.9	Iron (ppm)	86.6	875.0
Calcium (%)	0.78	-	Manganese (ppm)	150.0	32.3
Total phosphorus (%)	0.61	-	Lead (ppm)	0.10	0.17
Lysine (%)	0.77	-	Cadmium (ppm)	0.04	0.03
Methionine (%)	0.22	-	Chromium (ppm)	0.86	29.1
Methionine + Cystine (%)	0.35	-			
Total amino acid (%)	12.4	-			
IVDMD[1] (%)	64.2	-			

[1] IVDMD = *In vitro* dry matter digestibility.   [2] ND = Not detection.

Table 2 Effects of buffalo fattening on slaughter traits

Items	Fattening with 2.2 % feed	Fattening with 1.8 % feed	Free range	S.E.
Live weight (kg)	400.0[a]	367.0[ab]	352.0[b]	11.0
Slaughter weight (kg)	237.3[a]	184.0[ab]	161.0[b]	17.4
Dressing percentage (%)	59.3[a]	50.1[ab]	45.7[b]	3.10
Lean percentage (%)	37.5[a]	33.3[ab]	29.0[b]	1.90
Back fat thickness (cm)	0.48[a]	0.40[ab]	0.30[b]	0.04
Skeleton percentage (%)	36.7[a]	33.5[b]	36.5[a]	0.80
Skin percentage (%)	24.3[a]	23.8[a]	20.4[b]	0.95

[a,b] Means in the same row without the same superscript are significantly different ($P<0.05$).

Table 3 Effects of buffalo fattening on proximate analysis

Items	Fattening with 2.2 % feed	Fattening with 1.8 % feed	Free range	S.E.
Moisture (%)	73.2[b]	75.0[a]	74.7[a]	0.27
Protein (%)	24.0[a]	23.4[b]	23.5[ab]	0.19
Fat (%)	1.36	0.94	1.05	0.20
Ash (%)	1.02[a]	1.05[a]	0.95[b]	0.02
Calorie (kcal/100 g)	109.3[a]	103.5[b]	104.0[b]	1.68

[a, b] Means in the same row without the same superscript are significantly different ($P<0.05$).