PREDICTION OF PRIMAL CUTS WEIGHT OF LYD PIG CARCASS USING VCS2000 EQUIPMENT

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I. INTRODUCTION

In Korea, the number of pigs raised continues to increase from 10,366,779 in 2016 to 11,216,566 in 2021. Therefore, the number of pigs being slaughtered increased from 16,545,492 in 2016 to 18,382,767 in 2021 [1]. Currently, large slaughterhouse can slaughter 400-500 or more pig carcasses per hour. Since pig carcass is graded by humans, it is difficult to grade a large number of pig carcasses [2]. Overseas countries have already used automatic grading machine judgment devices to analyse characteristics of pig carcasses [3]. Among automatic grading machine judging device, VCS2000 using photographic technology was launched in Korea. Therefore, the purpose of this study was to investigate the verification of reproducibility by comparing the measured values of the VCS2000 used in Korea with the dissected values.

II. MATERIALS AND METHODS

There were 50 pigs used for calibration, and they were LYD (Landrace x Yorkshire, F1 x Duroc) crossbred pigs. Pigs were slaughtered from May 19, 2022 to May 20, 2022. A VCS2000 equipment (E+V Technology GmbH, Germany) consists of a total of three cameras: one black and white camera and two-colour cameras. All these statistical processes were performed using the SPSS program version 26.0 (SPSS Inc., Chicago, IL, USA)

III. RESULTS AND DISCUSSION

Error rates between VCS2000 measurements and dissected values are shown in Table 1. The average error between the VCS2000 measured value and the dissected value was less than 1 kg for all primal parts except for the belly (Table 1). Error rates for ham, shoulder picnic, and shoulder blade were all less than 5%. Belly and Loin are parts of pork with a lot of fat [4, 5]. Furnols et al. [6] have suggested that a larger amount of fat can make it more difficult to dissect, leading to a greater error. It could be seen that the error rate of the fat-rich among pork parts was relatively high.

Table 1. Error values between VCS2000 Measured Values and dissected values

Primal cuts	Error Mean (kg)[1]	Error Rate(%)	
		Dissected[2]	VCS2000[3]
Ham	0.98 ± 0.65	5.3	5.1
Shoulder picnic	0.42 ± 0.37	3.6	3.7
Belly	1.09 ± 0.94	6.7	6.4
Loin	0.64 ± 0.43	6.7	6.3
Shoulder blade	0.28 ± 0.24	4.8	4.8

[1] $\sqrt{\sum}(X_{dissected} - X_{VCS2000})^2/50$; [2] (Error/dissected value) X100; [3] (Error/VCS2000) X100; Error mean ± standard deviation; n=50.

Correlations between VCS2000 measured values and dissected values were analyzed. Results are shown in Table 2. According to the correlation coefficient, the correlation level was defined (weak correlation, correlation coefficient in the range of 0.10-0.39; medium correlation, correlation coefficient in the range of 0.40-0.69; and strong correlation, correlation coefficient in the range of 0.70-0.89) [7]. Correlation coefficients for ham, shoulder picnic, and loin were 0.77 - 0.83, indicating high correlations between VCS2000 measured values and dissected values. Correlation coefficients for belly and shoulder blade were 0.67 and 0.66, respectively, indicating medium correlations between VCS2000 measured values and dissected values. For the overall correlation of the 5 primal cuts, the correlation coefficient between VCS2000 measured value and dissected value was 0.927 ($p < 0.01$), which was the highest value of Coefficient for VCS2000 mesured value and dissected value.

Table 2. Correlation coefficients between VCS2000 measured value and dissected value

Primal cuts	Correlation coefficient	p-value
Ham	0.8319**	<0.01
Shoulder picnic	0.8316**	<0.01
Belly	0.6708**	<0.01
Loin	0.7747**	<0.01
Shoulder blade	0.6606**	<0.01
Total[1)]	0.9270**	<0.01

**: p<0.01; n=50; [1)] Total: Ham+Shoulder picnic+Belly+Loin+Shoulder blade

IV. CONCLUSION

Error rates between VCS2000 measured value and dissected value were around 5% for 5 primal cuts. Among the correlation coefficient between VCS2000 measured value and dissected value, the lowest value was 0.66 in the shoulder blade and the others showed higher correlation coefficients than that of shoulder blade. Therefore, measurement of Korean pig carcasses using VCS2000 shows a high reliability about pig carcasses characteristics.

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