

# COMPARISONS OF SKELETAL MUSCLE CELLS ISOLATED FROM DIFFERENT PIG SPECIES: FOCUS ON CELL GROWTH AND RELATED GENE EXPRESSION

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## I. INTRODUCTION

Global pork consumption seeing an increasing trend, it is expected that meat production will decrease in the future due to growing populations [1]. Cultivated meat has gained popularity as an alternative food source. Landrace, Yorkshire, and Duroc (LYD) is a breed consumed worldwide, and Woori Black (WB) is a breed of black pig crossbred in South Korea [2,3]. In this experiment, we conducted genetic analysis of muscle and fat tissues from LYD and WB, and analyzed muscle satellite cell proliferation rates.

## II. MATERIALS AND METHODS

A total of 24 pigs were sacrificed when their body weight reached approximately 50, 75, 100, and 120 kg. The muscle and fat tissues were isolated from the middle and subcutaneous part of the *femoris* of hind legs, respectively. The expression levels of genes, including MyoD, Pax3, MSTN, CEBP- $\beta$ , PPAR- $\gamma$ , and FASN, were analyzed using RT-PCR. All statistical analysis was performed using Prism 9.4.0 (GraphPad). Significant differences were considered by  $p < 0.05$ .

## III. RESULTS AND DISCUSSION

Figure 1 shows the proliferation growth rate of porcine muscle satellite cells by weight. There was no significant difference between 50, 75, and 100 kg, but a significant difference was observed at 120 kg ( $p < 0.001$ ). Figure 2 shows the gene expression results, which indicate that the downregulation of Pax3 via MSTN induced the reduction in myogenesis in muscle tissues of WB. Figure 3 show the expression of adipose genes, including CEBP- $\beta$  and FASN, which affect the growth, development, and accumulation of fat, was higher in WB than in LYD. Interestingly, PPAR- $\gamma$ , which regulates the differentiation of adipose tissue, was expressed lower in WB compared to LYD.

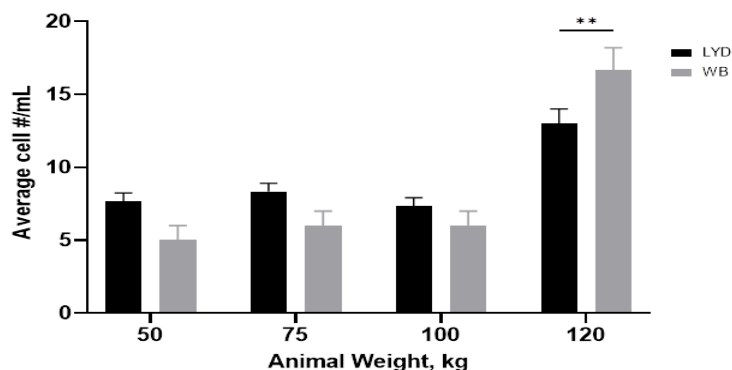


Figure 1. Porcine muscle satellite cells proliferation between LYD and WB. (\*\* $p < 0.001$ )

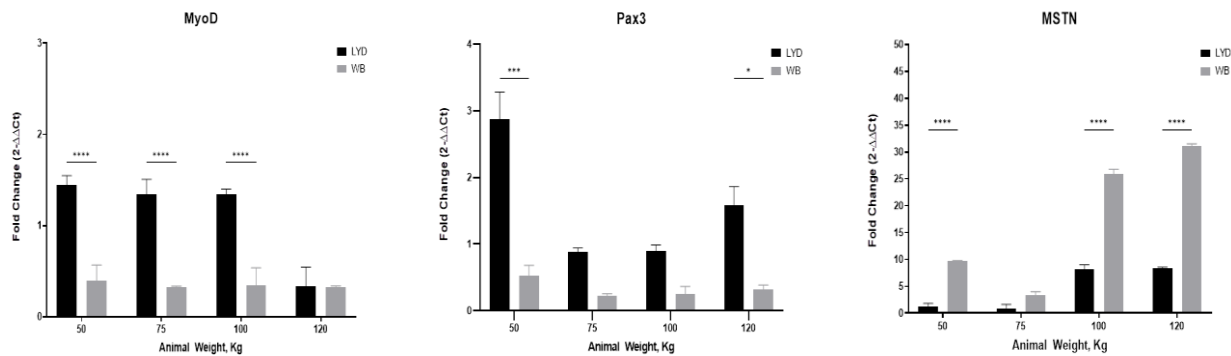


Figure 2. Relative gene expression of LYD and WB muscle tissues were analyzed by RT-PCR. The results were expressed as Mean±SD (n=3), (\*p<0.01, \*\*p<0.001, \*\*\*p<0.0001, and \*\*\*\*p<0.0001)

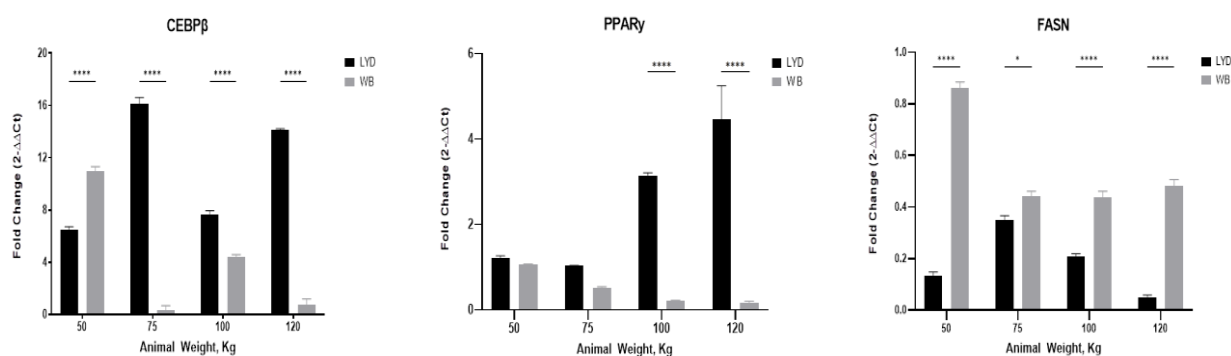


Figure 3. Relative gene expression of LYD and WB adipose tissues were analyzed by RT-PCR. The results were expressed as Mean±SD (n=3), (\*p<0.01, \*\*p<0.001, \*\*\*p<0.0001, and \*\*\*\*p<0.0001)

#### IV. CONCLUSION

Concomitant to cell growth results, cells from LYD showed the greater expression levels of Pax3 and MyoD, which are positively related to cell growth. Cells from WB, however, had higher gene expression playing roles in growth inhibition (MSTN) and fatty acid synthesis (FASN). Further investigation is needed to identify additional factors affecting muscle growth and development in 3D cell culture condition for the production of cultivated meat in the future.

#### ACKNOWLEDGEMENTS

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