

Differential expression of adipogenic genes in fetus *longissimus dorsi* during Hanwoo gestation periods

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INTRODUCTION

Adipogenesis starts at mid gestation and persists after the birth of the calves, and the formation of adipocytes is directly and indirectly influenced by the expression and regulation of various genes. Gene expression is influenced by genetic and environmental factors, and is differentially expressed in the growth period. Understanding adipocytes formation and the expression patterns of adipogenic genes in the growing stages of fetus and distinguishing the main genes is necessary for improving the productivity of beef cattle. Thus, this study was conducted to investigate the mRNA expression of adipogenic genes and adipocytes formation in Hanwoo fetus during the pregnancy periods.

MATERIALS AND METHODS

Eighteen Hanwoo cows (Average body weight : 561 ± 90.1 kg, Parity : 4.4±2.6) were used for experimental animals. All the experimental animals were performed artificial insemination after estrus synchronization, and fed with concentrate feed and rice straw before slaughter.

Table 1. Chemical composition of concentrate feed and rice straw (as-basis, %)

Item	Dry matter	Crude protein	Ether extract	Crude ash	Crude fiber
Concentrate feed	89.14±0.25	14.15±0.11	3.92±0.48	5.95±0.05	9.91±0.24
Rice straw	88.13±0.22	3.95±0.25	1.70±0.05	6.43±0.59	25.59±0.73

Pregnant cows were slaughtered at 3 gestation periods. 3 cows were slaughtered at 3 months of gestation (3 MO), 6 cows at 6 months of gestation (6 MO), and 9 cows at 9 months of gestation (9 MO). After exsanguination, fetus was removed immediately by collecting the gravid uterus. After measuring the body weight and length of the fetus, sample of fetal *longissimus dorsi* (LD) were collected for mRNA expression and histological analysis.

The relative level of mRNA expression for peroxisome proliferator-activated receptor γ (PPAR γ), stearoyl-CoA desaturase (SCD), CCAAT/ enhancer-binding proteins β (C/EBP β) were measured by real-time quantitative PCR. Data were analyzed using the GLM procedure, and compared using Tukey's method at $\alpha = 0.05$.

Table 2. Primers for genes analyzed by real-time quantitative PCR

Gene	Abbreviation	Accession No.	Forward sequence	Reverse sequence
CCAAT/enhancer binding protein β	C/EBP β	NM_176788	CCAGAAGAAGGTGGAGCAACTG	TCGGGCAGCGTCTTGAAC
Peroxisome proliferator activated receptor γ	PPAR γ	NM_181024	ATCTGCTGCAAGCCTTGGGA	TGGAGCAGCTTGGCAAAGA
Stearoyl-CoA desaturase	SCD	AB075020	TGCCACCACAAGTTTTTCAG	GCCAACCCACGTGAGAGAAG

RESULTS

- The body weight and length of the fetus continued to increase as the fetus grew ($p < 0.01$), and it was confirmed that the growth rate progressed rapidly between the 6 and 9 month of the fetus.
- The adipocyte were observed from the age of 6 months of fetus, and were mainly formed around blood vessels.
- The level of PPAR γ ($p < 0.02$) and SCD ($p < 0.01$) mRNA expression in LD were highest at 6 months of fetus, and the C/EBP β expression was significantly increased as the fetus grew ($p < 0.01$).

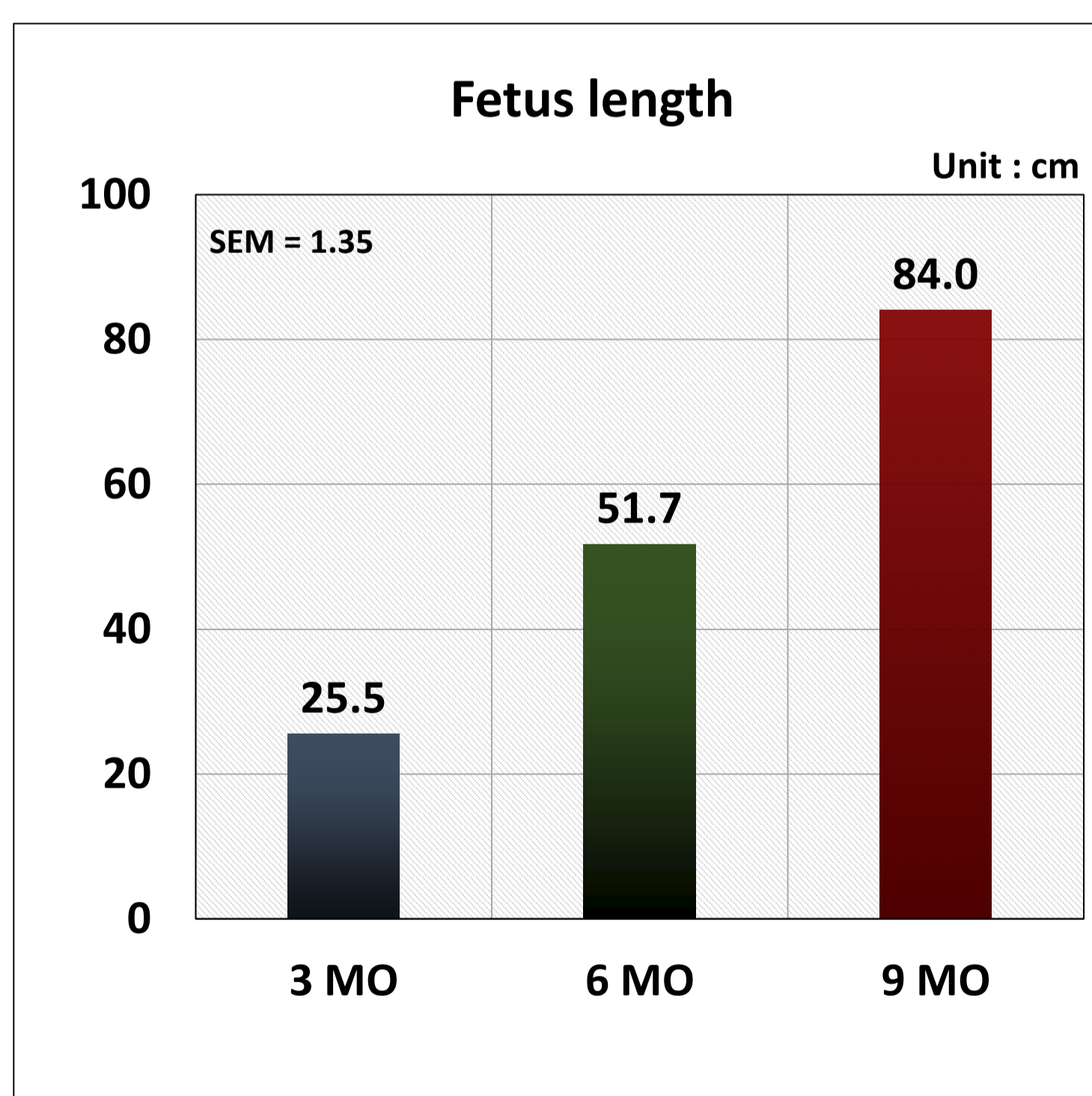
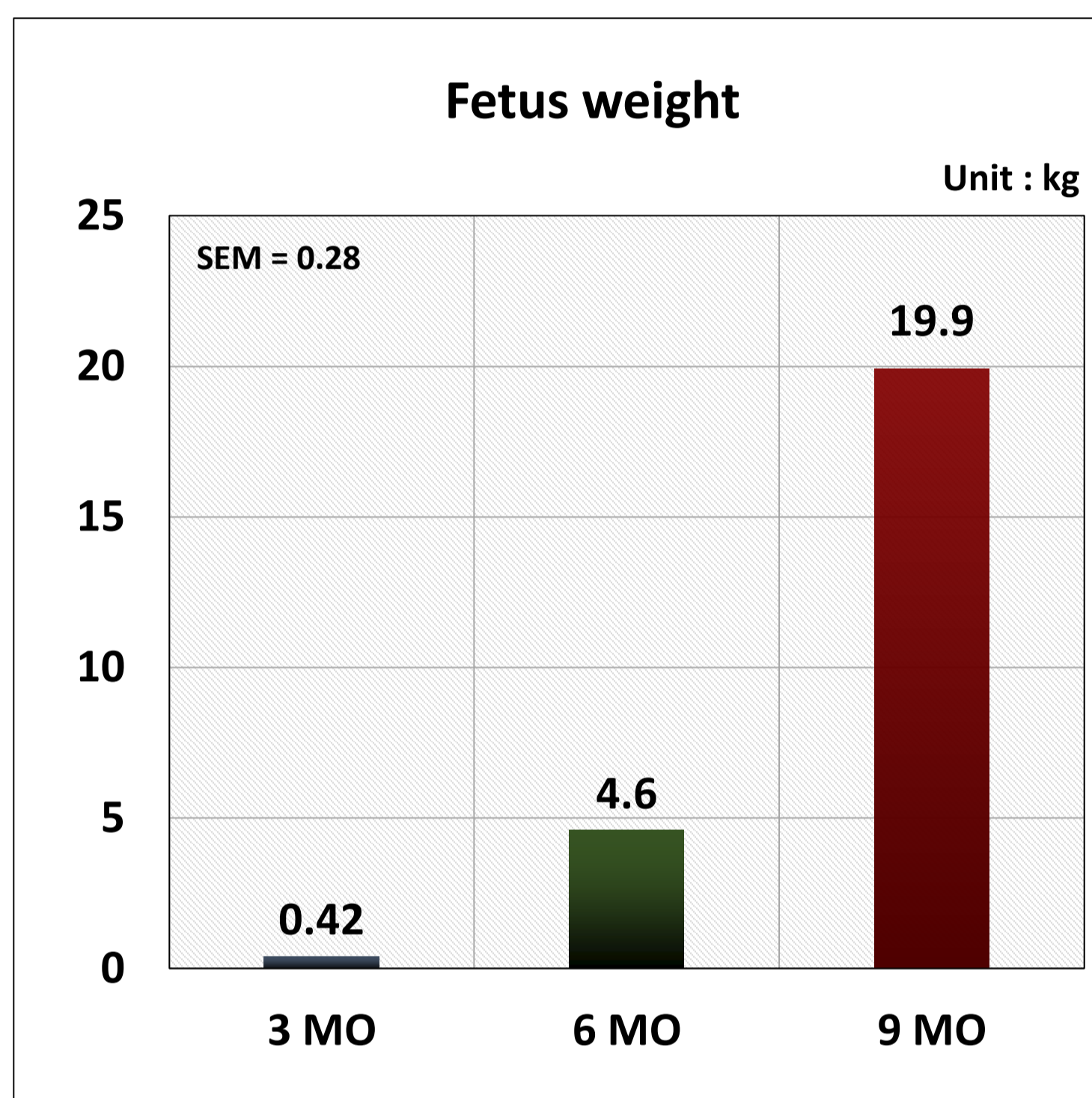


Fig 1. Weight and length of fetus

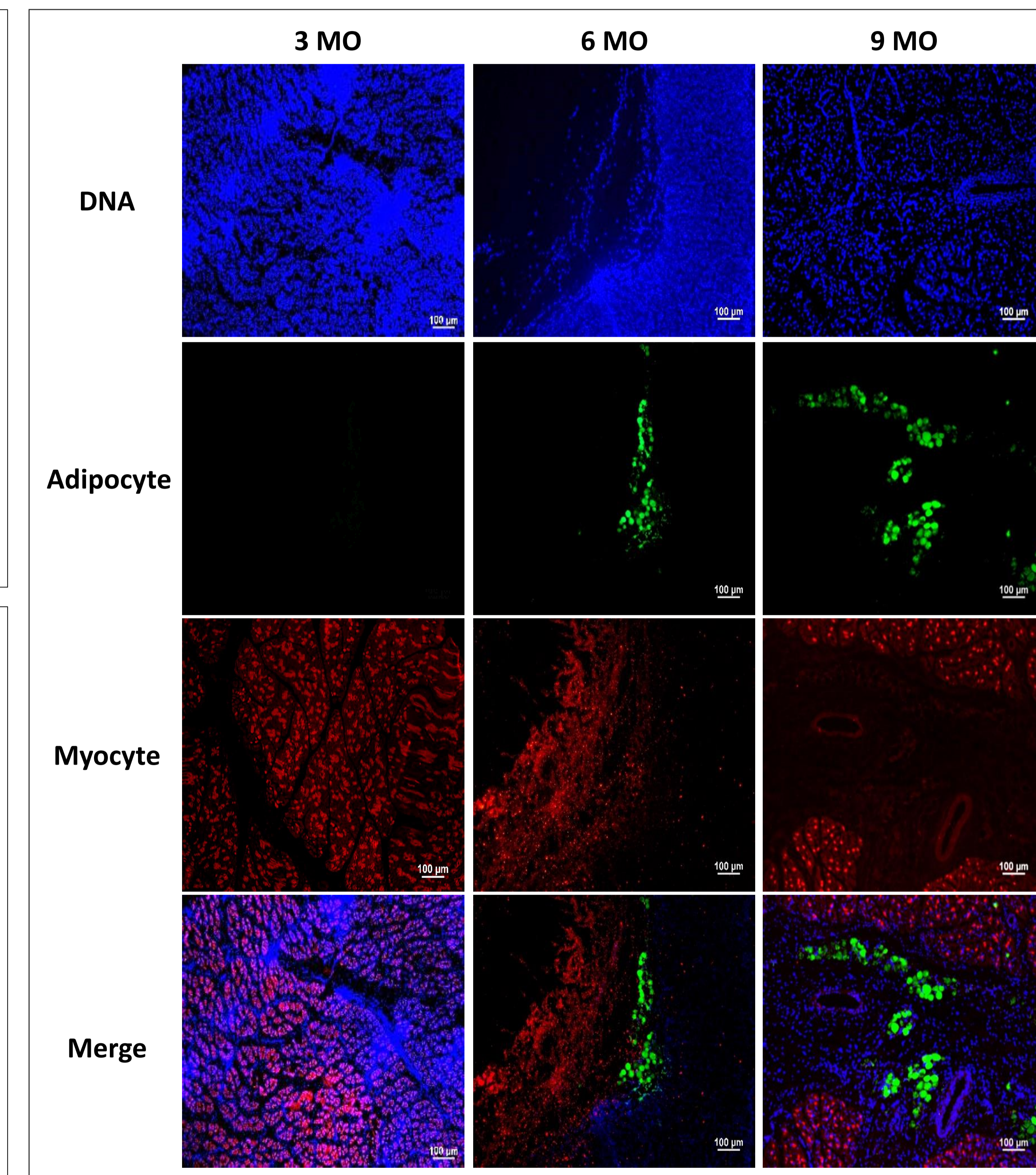


Fig 2. Immunofluorescence staining of fetus *longissimus dorsi*

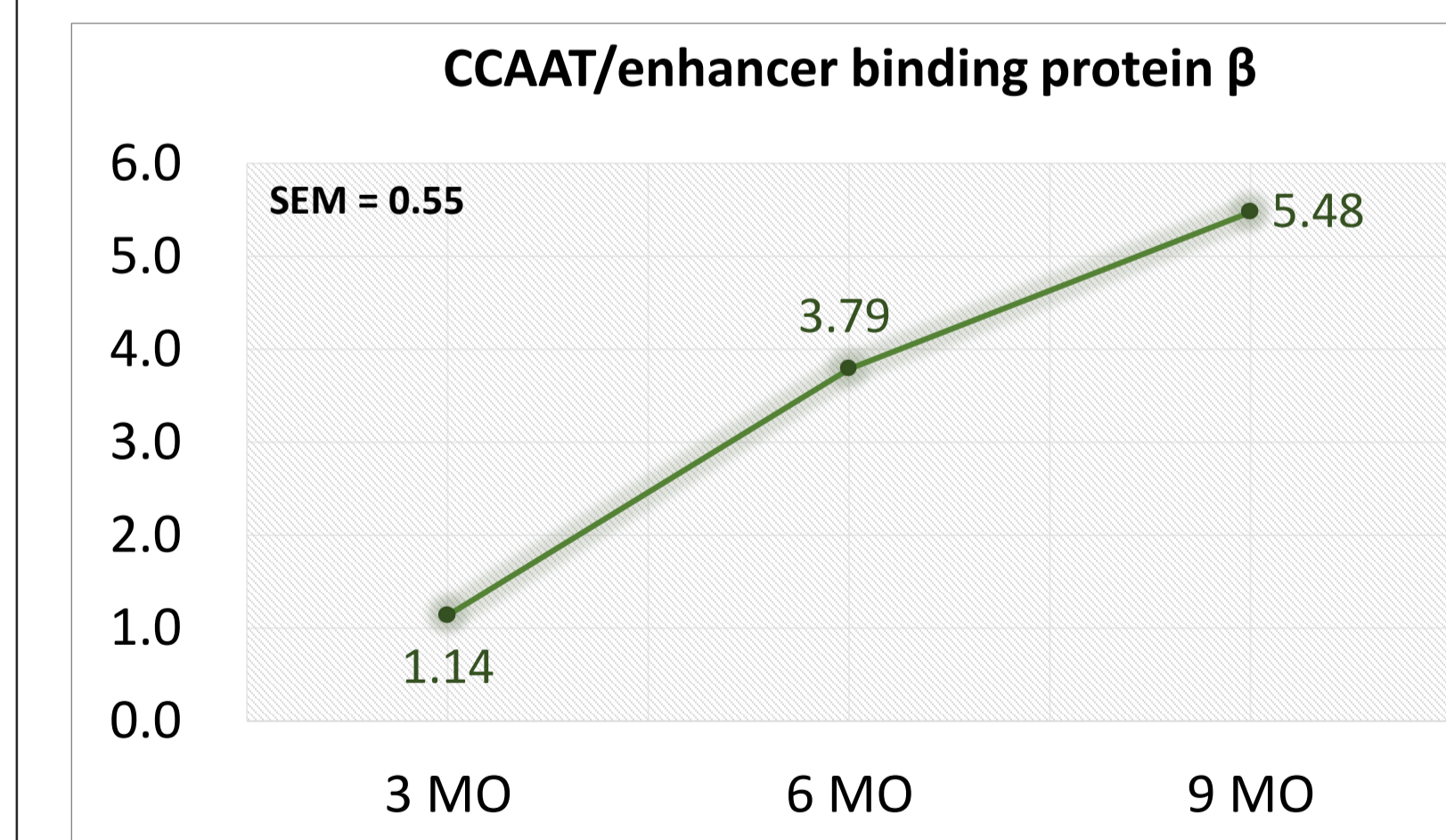
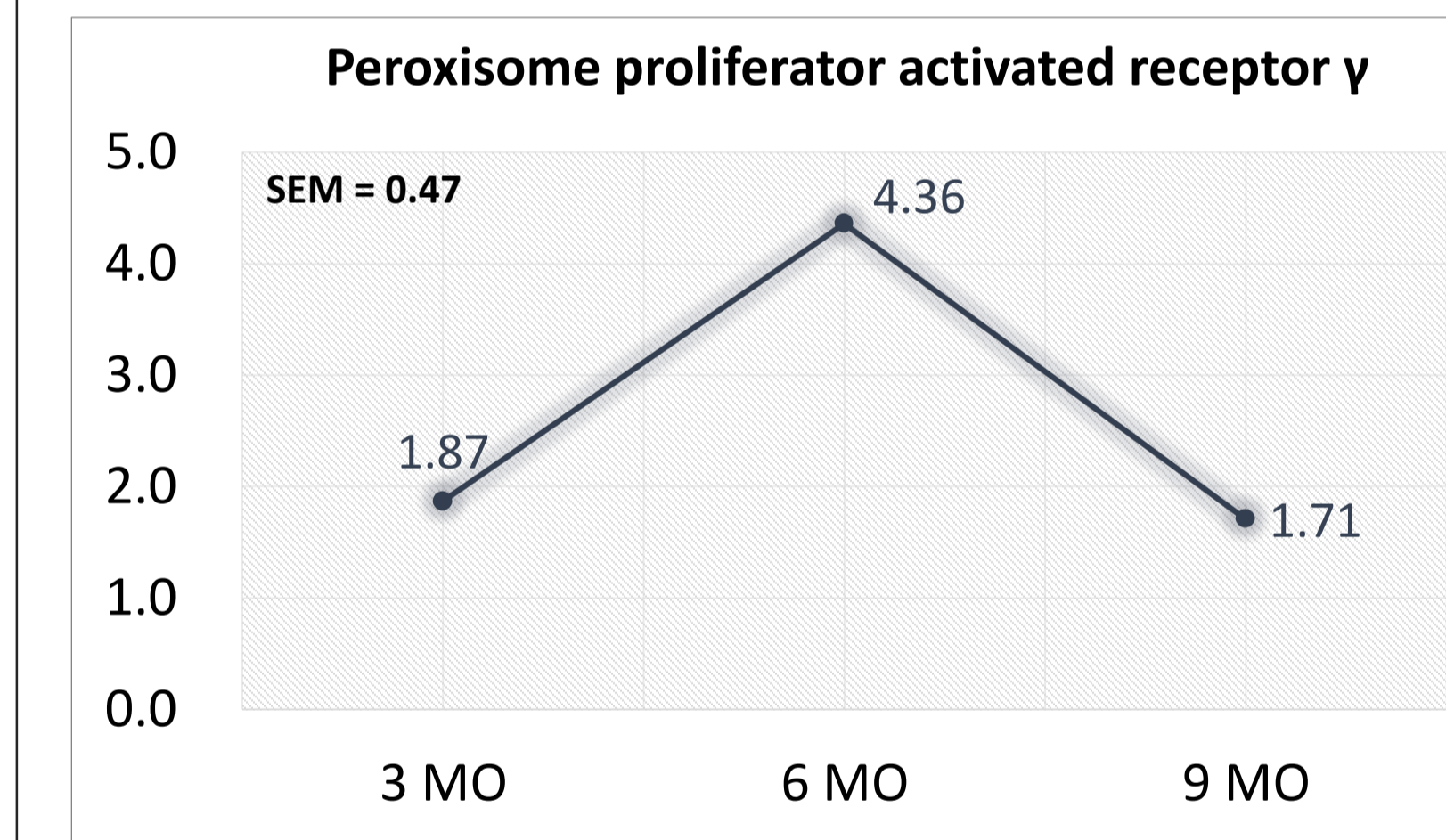
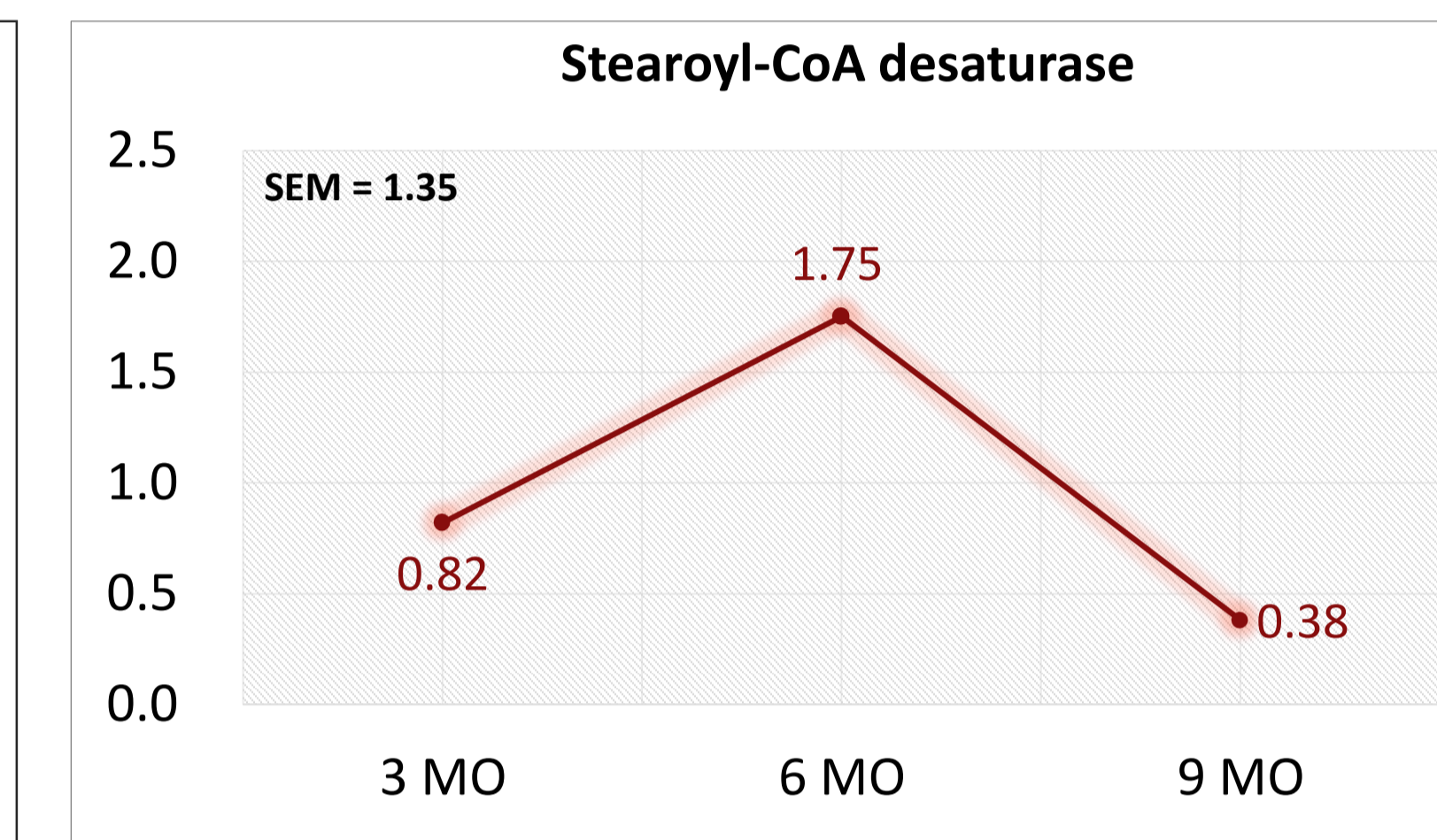


Fig 3. mRNA expression level

CONCLUSION

As a result of this study, it was confirmed that not only the adipocyte in LD of the fetus was formed at least after 3 months of gestation, but also the adipogenic genes was differentially expressed during the growth stage of the fetus.