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Theatre presentation Ph 12.4 - Abstract No. 84

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Porcine muscle satellite cell growth in response to estrogens and isoflavones

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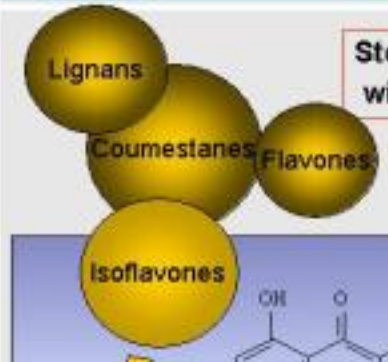
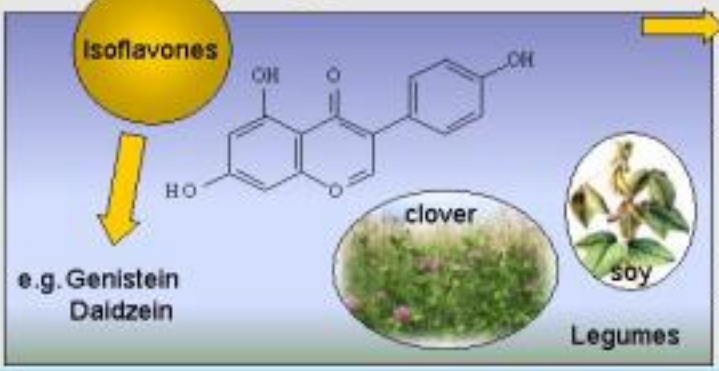
1. Phytoestrogens



Steroid-like plant-derived dietary compounds with weak estrogenic or anti-estrogenic effects



Effects on humans:

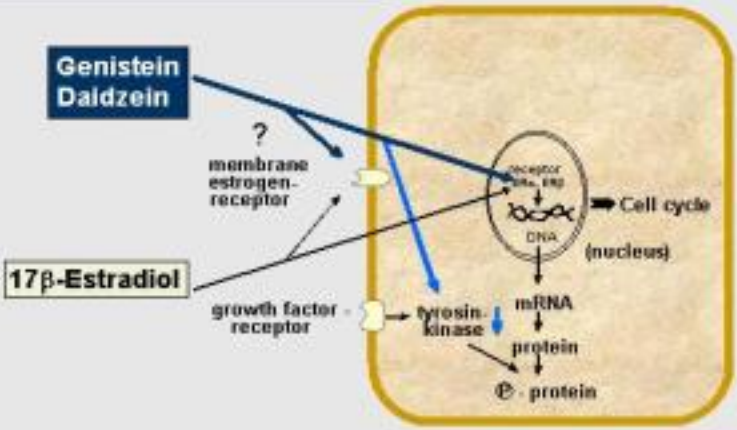
- inhibit tumor growth
- osteoporosis protection

Effects on pigs:

- fetal growth promotion ?
- reduction of enterocyte proliferation

1.1. Mechanisms of action

estrogenic / anti-estrogenic effects



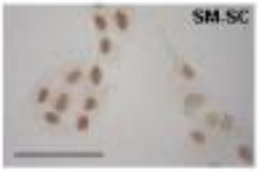
Inhibition of tyrosin kinases

1.2. Estrogen receptors and growth factor receptors

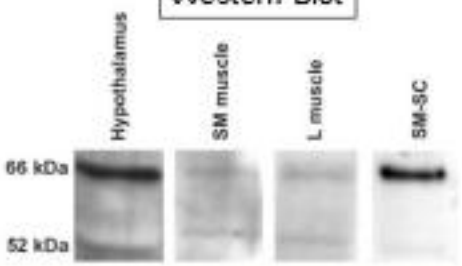
ERα

Kalbe et al., Histochem. Cell. Biol., 2006

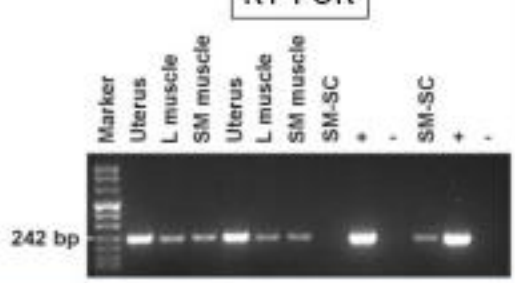
Immunocytochemistry



Western-Blot



RT-PCR

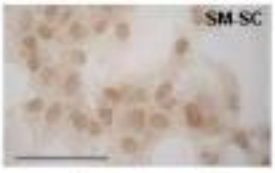


1.2. Estrogen receptors and growth factor receptors

ERβ

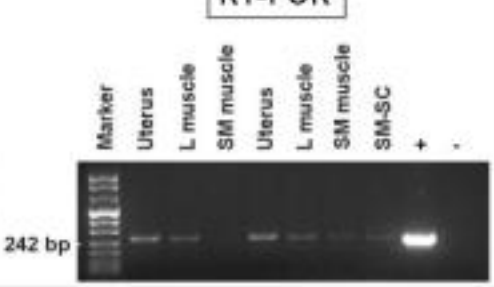
Kalbe et al., Histochem. Cell. Biol., 2006

Immunocytochemistry



Western-Blot

RT-PCR



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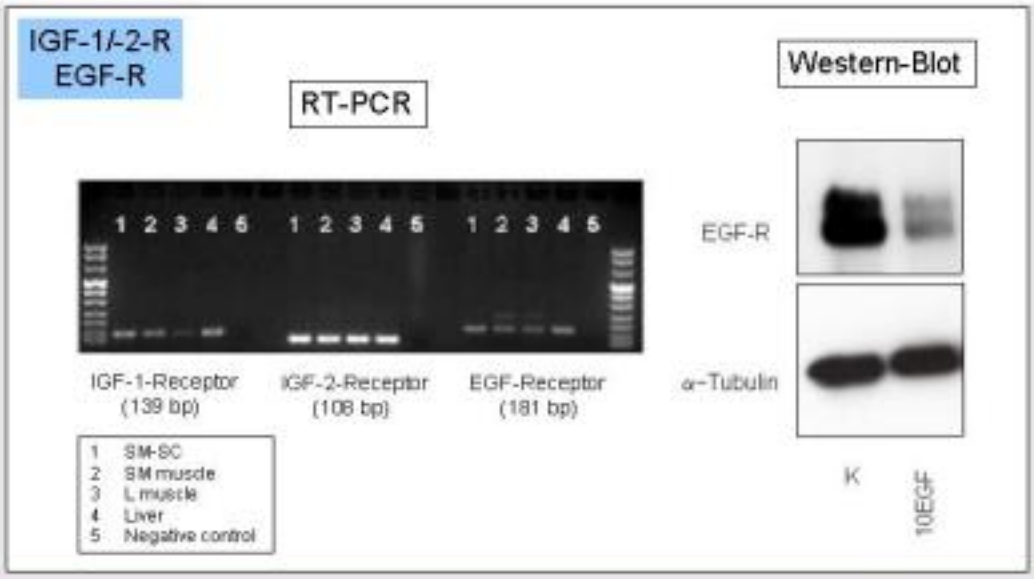
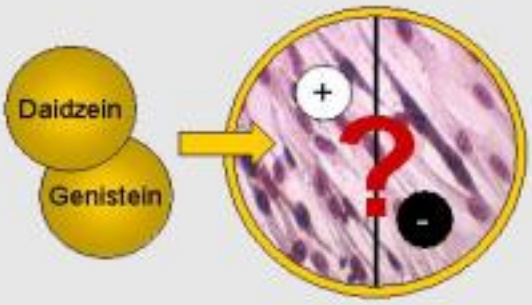
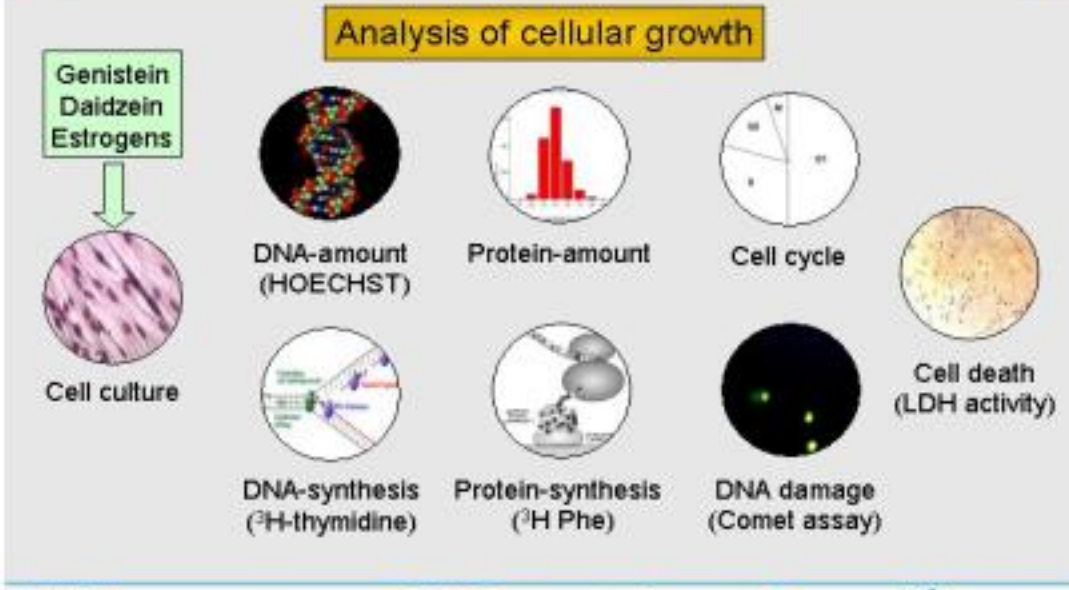


1.3. Hypothesis

Isoflavones influence the growth of porcine skeletal muscle cells.

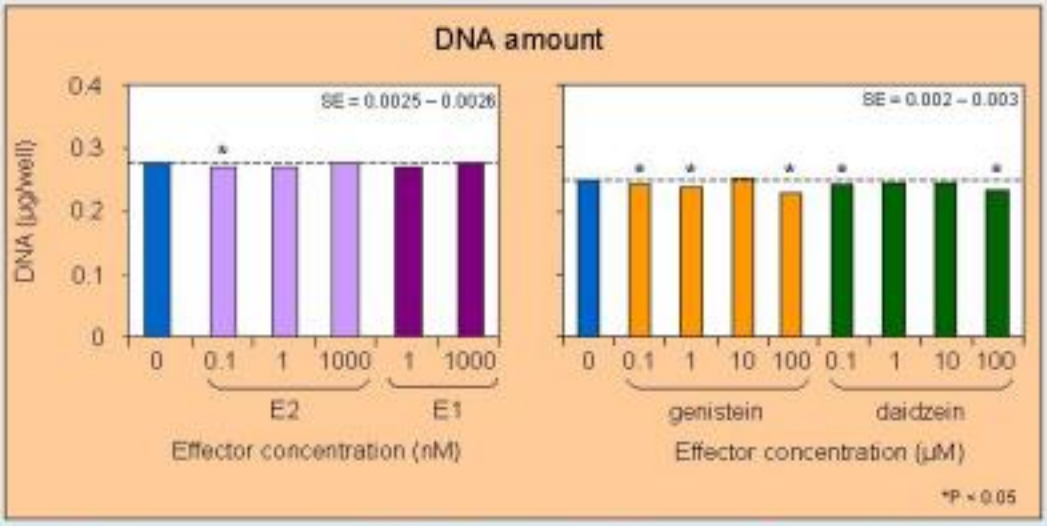


2. Experimental Design



3. Results

3.1. Short-term effects on DNA synthesis



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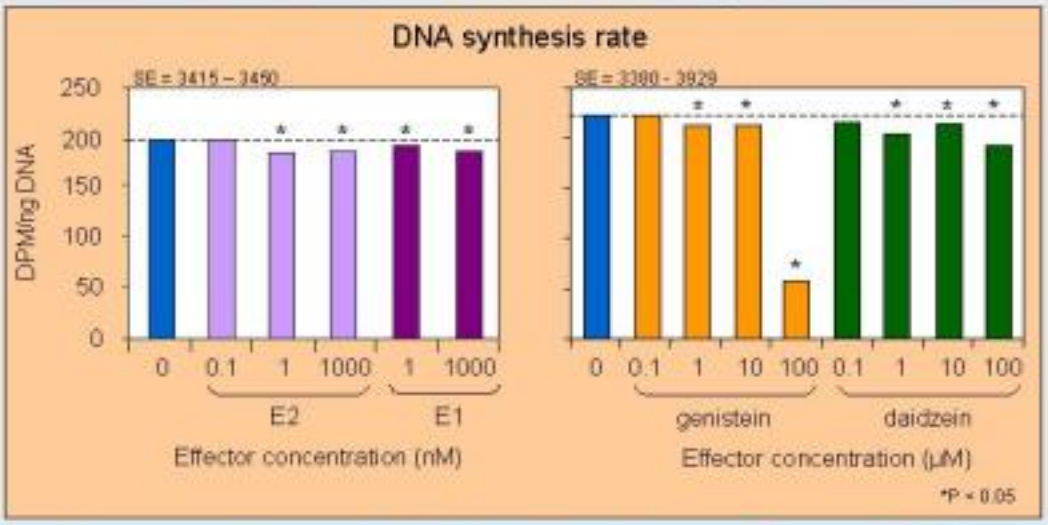
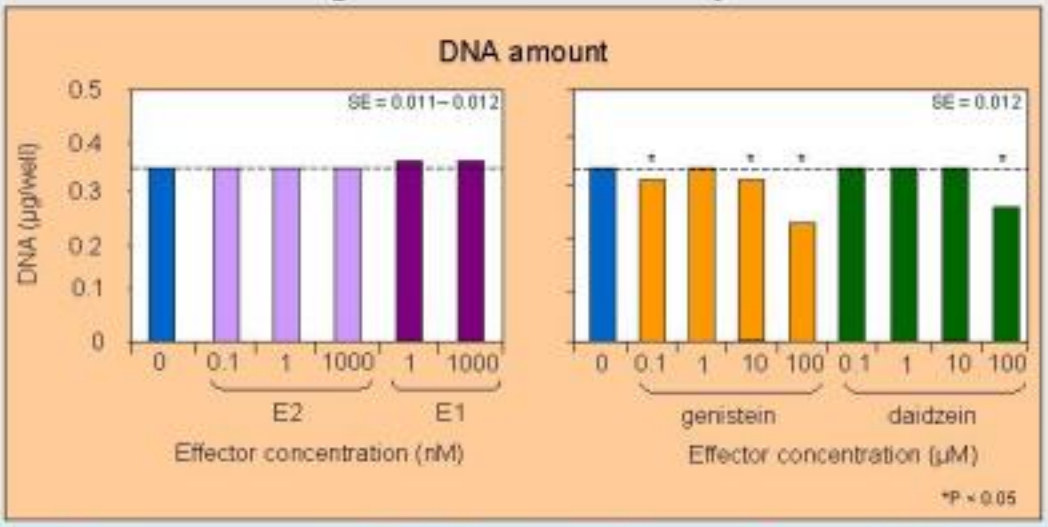


3. Results

3.2. Long-term effects on DNA synthesis



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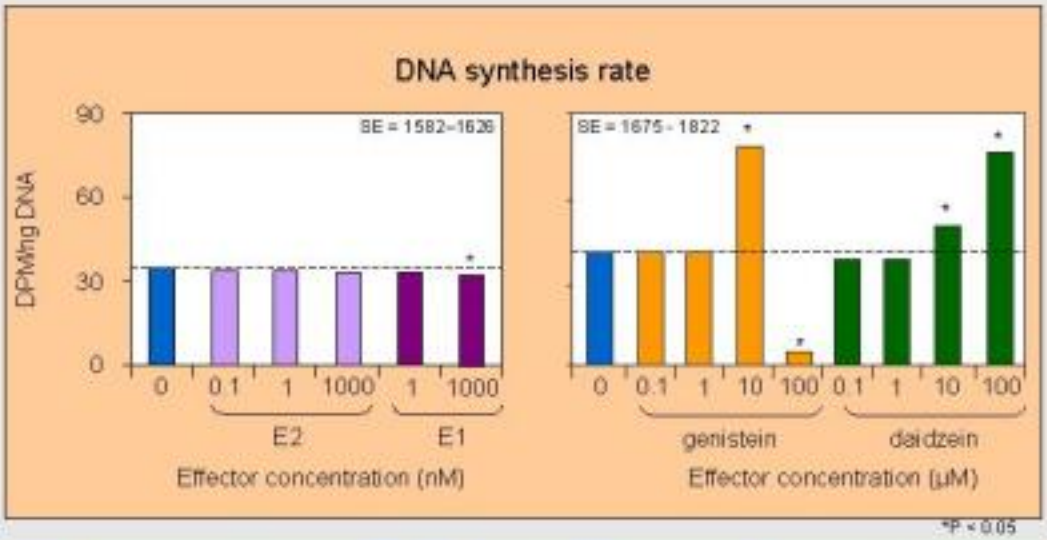

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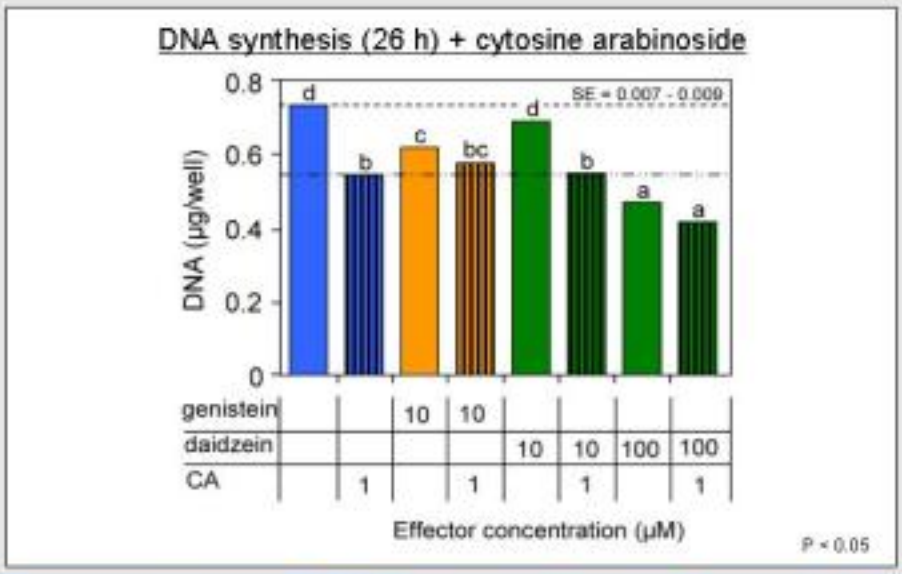
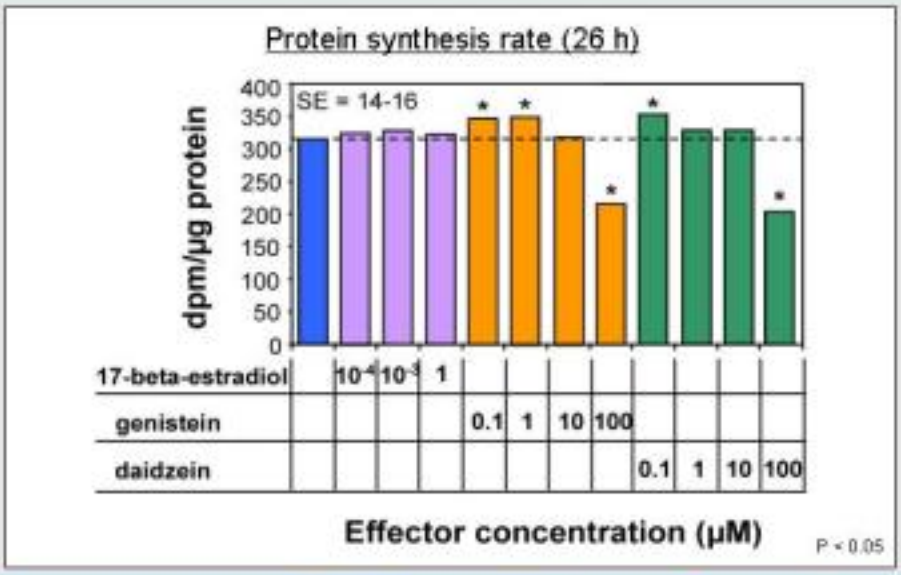


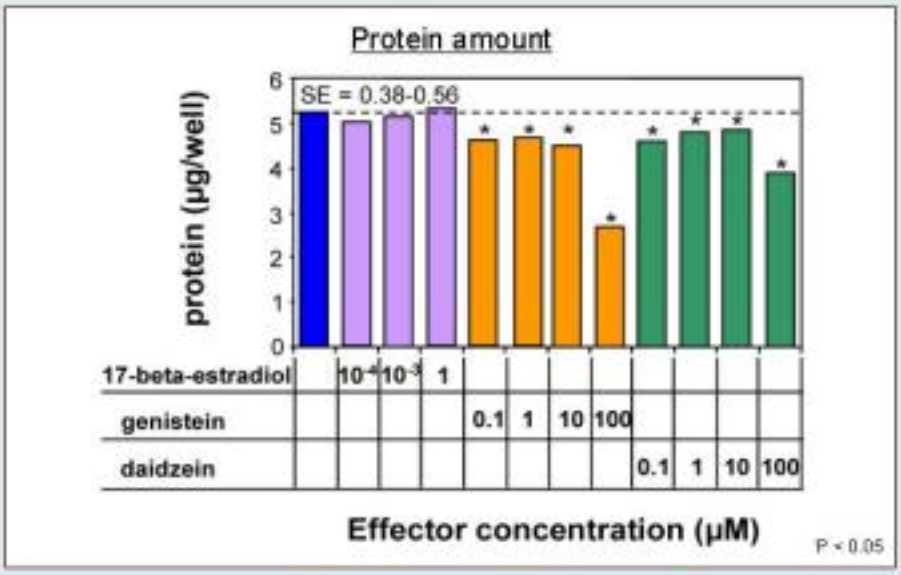
3. Results

3.3. Long-term effects on protein synthesis



3. Results

3.3. Long-term effects on protein synthesis



3. Results

3.4. Cell cycle analysis

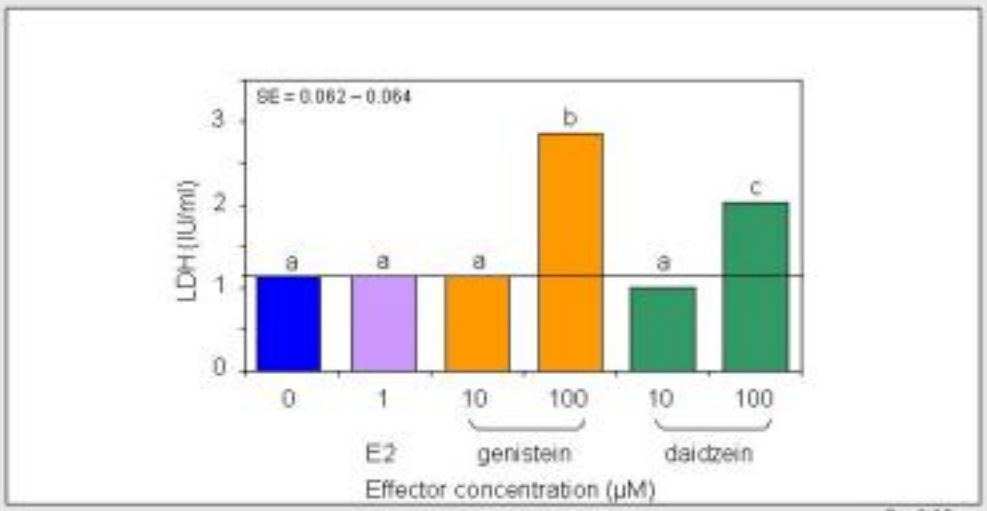
Cell cycle distribution (% of viable cells)

Exposure time		Control	Genistein (100 µM)	Daidzein (100 µM)
26 h	G_0/G_1	72.4	55.0*	71.9
	S	13.9	16.1	12.3
	G_2 / M	13.7	28.9*	16.2*
50 h	G_0/G_1	81.9	58.0*	74.9*
	S	4.9	16.6*	9.4*
	G_2 / M	13.2	25.3*	15.6

* $P < 0.05$; * $P < 0.1$

3. Results

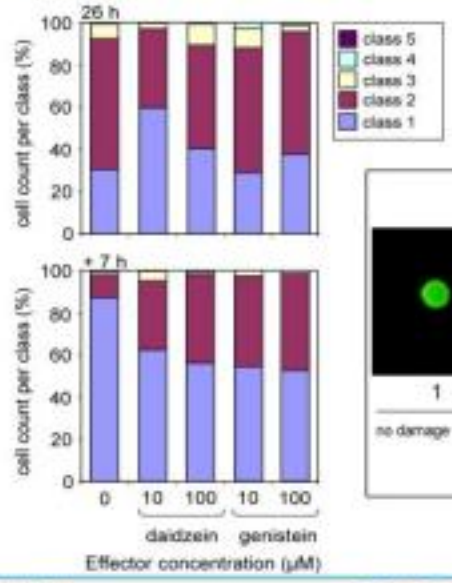
3.5. LDH activity – Marker of cell death



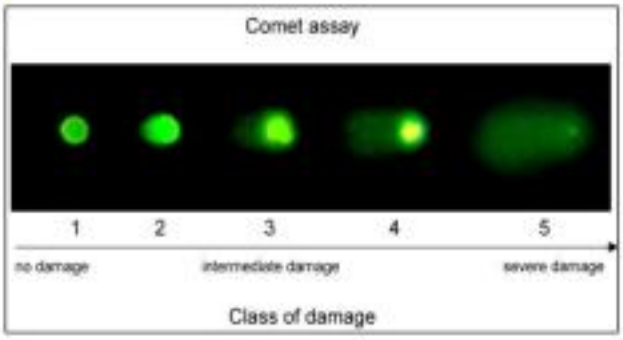
P < 0.05

3. Results

3.6. DNA damage and repair



n = 400 viable cells per sample



4. Conclusions

- The estrogen receptors α and ß are weakly expressed in porcine skeletal muscle and derived satellite cells.
- Estrogens exhibit almost no effects on cell proliferation at physiological and rather detrimental effects at non-physiological concentrations.
- Short-term exposure (7 h) to genistein and daidzein from 1 to 100 µM decreases DNA synthesis rate and/or DNA accumulation.
- Increased DNA synthesis rate in response to long-term exposure (26 h) to 10 µM genistein and 100 µM daidzein is rather the result of greater DNA repair activity in impaired cells than of increased *de novo* DNA synthesis.
- At high concentrations (100 µM), genistein and daidzein act as toxins and inhibitors of porcine muscle cell growth. They cause cell cycle arrest in the G_2/M phase and cell death with greater effects seen with genistein.
- The isoflavones genistein and daidzein act mainly as inhibitors of porcine myoblast growth with the effects being time- and dose-dependent.