Winter 2006 SEMINAR SERIES

F21C Bioprocessing & Biosensing Center

• DIVISION OF FOOD SYSTEMS & BIOENGINEERING •

PRESENTER: **Dr. Matthew Dumit, Associate Professor**
Department of Meat Science and Muscle Biology
Michigan State University

TITLE: **Satellite cell proliferation and differentiation**

ABSTRACT:
Postnatal skeletal muscle growth is associated with increases in muscle DNA content. Since myofiber nuclei are incapable of DNA synthesis, increases in myofiber nuclei result from satellite cell proliferation, differentiation and fusion with adjacent myofibers. Satellite cell differentiation controls the production of new myonuclei, as well as the number of satellite cells that remain capable of proliferation. Regulation of satellite cell proliferation and differentiation is complex due to the plethora of growth factors, binding proteins, receptors, enzymes, signaling molecules and transcription factors that modulate these events. Cultured satellite cells have been extensively used to elucidate regulatory mechanisms that control satellite cell activity. Quantification of *in vivo* satellite cell activity requires the ability to distinguish satellite cells from non-myogenic cells present in skeletal muscle, coupled with measurement of cell proliferation or differentiation. We have used immunostaining for proliferating cell nuclear antigen (PCNA) and myogenin as indices of satellite cell proliferation and differentiation, respectively, in growing pigs and cattle. Satellite cells were isolated from semitendinosus muscles of pigs at 1, 7, 14 and 21 weeks of age and cattle weighing 200 t0 500 kg. Positive staining for neural cell adhesion molecule (NCAM) distinguished satellite cells from non-myogenic cells. Greater than 73% of NCAM-positive cells were PCNA-positive in both species. Myogenin-positive porcine satellite cells decreased ($P<0.05$) from 30% in 1-week-old pigs to 14% in 7-week-old pigs and remained constant thereafter. The reduced proportion of myogenin-positive cells may reflect accelerated incorporation of myogenin-positive cells into myofibers, or a decrease in the proportion of differentiating satellite cells in older pigs. The latter would result in a large satellite cell population, which appears to explain a faster rate of muscle DNA accumulation observed in pigs from 7 to 21 weeks of age compared with that of young pigs.

DATE • TIME • LOCATION:

Tuesday, April 4, 4:00pm
Ag Eng Bldg 105 • Refreshments