



Transcriptomic differences of genes in the avian target of rapamycin (avTOR) pathway in a divergent line of meat-type chickens selected for feed efficiency

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Genet. Mol. Res. 15 (2): [gmr.15027120](https://doi.org/10.4238/gmr.15027120)

Received June 30, 2015

Accepted September 4, 2015

Published June 30, 2016

DOI <http://dx.doi.org/10.4238/gmr.15027120>

ABSTRACT. Avian target of rapamycin (avTOR) is a highly conserved serine-threonine kinase that serves as an intracellular energy and nutrient sensor and regulates cell division, growth, and apoptosis. The role of avTOR in mediating feed intake and growth in poultry is unknown. We studied avTOR signaling activities in duodenum and liver tissues at days 35 and 42 in chickens divergently selected for low (LRFI) or high (HRFI) residual feed intake. The differential expression of genes involved in the avTOR pathway was assayed using real-time polymerase chain reaction. In the duodenum, avTOR was up-regulated in the LRFI chickens at both time points as compared with the HRFI chickens. Other genes found to be differentially expressed at day 35 included v-akt murine thymoma viral oncogene homolog, eukaryotic translation elongation factor 2, eukaryotic translation initiation factor 4E binding protein 1, 3-phosphoinositide dependent protein kinase-1, ribosomal protein S6 kinase, 70 kDa, polypeptide 1 (RPS6KP1), avTOR associated protein, LST8 homolog, ghrelin, phosphoinositide-

3-kinase (PI3K), forkhead box O1, and p53 E3 ubiquitin protein ligase homolog (MDM2). At day 42, there was no change in the expression of the avTOR target RPS6KP1 or MDM2. In the liver, changes in the expression of components of the avTOR pathway primarily occurred at day 42, and differential gene expression suggests that avTOR complex 1 (avTORC1) affects feed efficiency at day 42. avTORC1 may be activated in the duodenum of feed-efficient birds to increase nutrient mobilization to other peripheral tissues. Furthermore, activation of avTOR in relation to feed efficiency may be tissue specific and may depend on the tissue's need for growth and nutrient transport. Genetic markers in key genes involved in the avTOR/PI3K pathway could be developed to improve feed efficiency in meat-type chickens.

Key words: Feed efficiency; avTOR; Gene expression; Chickens