Effect of dietary non-protein energy source (starch vs. fat) on total bile acid pool size and composition of rainbow trout (*Oncorhynchus mykiss*)

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Bile acids play a key role in digestion and absorption of dietary fat. Synthesis of primary bile acids occurs in the liver, by oxidation of cholesterol and conjugation with either taurine or glycine. Bile acids are actively secreted into bile and stored in the gallbladder. The majority of bile acids is actively reabsorbed within the ileum, after which it returns to the liver for reuse. Under homeostatic conditions, the total bile acid pool size and composition is maintained relatively constant, compensating faecal bile acid loss with de novo synthesis. The process described above is known as enterohepatic circulation of bile acids (EHC). Diet macronutrient composition can affect both the rate of EHC and bile acid synthesis. The level of gallbladder contraction (i.e., rate of EHC) in response to a meal has been shown to affect the bile acid pool size and composition in humans, with a low-fat diet decreasing the rate of contraction and increasing the bile acid pool size. Furthermore, less secondary bile acids are produced in response to decreased EHC. Dietary fat level has also been shown to influence bile acid synthesis. Feeding a diet high in fat stimulated bile acid synthesis (CYP7A1), while a low-fat diet decreased bile acid synthesis in rats. Data on the effect of diet macronutrient composition on bile acid pool size and composition of fish are lacking. Therefore, this study investigated in rainbow trout (*Oncorhynchus mykiss*) if the type of dietary non-protein energy source (starch vs. fat) influences the size and composition of the total bile acid pool. Two diets were formulated with similar digestible protein to digestible energy ratio, but differing in inclusion of either maize starch or rapeseed oil as the main non-protein source. Fish were fed to satiation for 44 days. Feed, feces and fish samples were analyzed for proximate composition and bile acid content. The fat diet resulted in a lower total bile acid pool size compared to the Starch diet. Diet (i.e., type of non-protein energy source) does affect total bile acid pool size of rainbow trout, but does not affect bile acid pool composition. The daily fecal bile acid losses in rainbow trout are 2.0 ± 0.3 % of the total body pool and are not affected by dietary non-protein energy source.