In the thesis we analyze sixteen commodity futures markets belonging to four families (energy type, grains, metals and other agricultural commodities) utilizing futures prices of front, back and roll futures contracts. As the tests for cointegration between front and back futures prices give us contradictory results we concentrate on roll contracts defined as the difference between front and back commodity futures contracts. We found that all commodity roll futures except natural gas and wheat futures exhibit long memory, which is usually connected with the fractal market hypothesis. Further, we employ specific ARMA and ARFIMA models and rolling window one-day-ahead technique to predict roll futures contract prices. Based on analysis of relation between resulting predictability and liquidity of roll futures contracts we concluded that lowest predictability is linked with the lowest liquidity among all commodities except metals and found evidence that predictability is positively dependent on liquidity among all commodities except metals, lumber, soybean oil and soybeans. The revealed dependence is strongest for energy type commodities. The relations and dependencies on the commodity futures markets are of high importance for all market participants such as hedge managers, investors, speculators and also for regulators.