# THE IMPACTS OF WHOLESALE PRICE ANNOUNCEMENTS AND TRADING ACTIVITIES ON DAIRY PRODUCT VOLATILITIES

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## ABSTRACT

*This study shows that the weekly National Dairy Products Sales Report (NDPSR) influences dairy futures prices and reduces volatility. Our results demonstrate that volatility diminishes when a futures contract approaches expiration for all dairy commodities, including class III milk, cheese, butter, and dry whey. Dairy futures volatility is significantly correlated with pricing information released in NDPSR. Trading volume and open interest also contribute to the diminishing volatility. Macroeconomic variables, such as short-term interest rate, dollar index, futures market index, and S&P500 index do not impact dairy volatility significantly. The vector autoregression (VAR) results show no significant interdependence among dairy volatilities. Our results are robust to different models and seasonality effects.*

***Keywords****: Dairy Futures; GARCH Volatility; NDPSR Announcements; Information Uncertainty*

## 1. INTRODUCTION

Dairy commodities and fluid milk prices (class III milk) have experienced dramatic price swings since the early 1990s. Nguyen and Prokopczuk (2019) reported that butter and milk price exhibit the highest price jump among 29 different commodity futures, including gas, gold, and oil. Dairy industry has undergone a massive restructuring to respond to the increasing price volatility. Small family operated dairy farms are exiting at an alarming rate (Shields, 2009; Zhang & Ding 2018; Staugaitis, 2019). The Economic Resource Service (USDA-ERS) reports that 2014 was the last year a typical dairy farm was profitable. Manchester and Blayney (2001) suggest that unpredictable price volatility creates difficulty for farmers to manage risk.

To understand the volatility pattern of dairy commodities, we need to consider the unique characteristics of dairy commodities, such as their low liquidity, higher fragmentation and heavy governmental regulation. Although price volatility has been a driving force in shaping the dairy industry, there are not many researches focusing on the volatilities of a complete market-basket of dairy commodities. Białkowski and Koeman (2018) emphasize the importance of a well-defined spot market for the success of dairy futures markets, noting that New Zealand's dairy futures offer more effective hedging than those in the US. Du and Dong (2016) report that Class III milk futures display varying volatility as contracts near maturity. Fernandez-Perez et al. (2019) develop a dairy-implied volatility index (DVIX) with strong predictive power, while their 2022 study shows milk powder futures help protect New Zealand dairy farm profits. In the US, the Federal Milk Marketing Order (FMMO) influences dairy futures, with Fan et al. (2023, 2024) finding reduced volatility as contracts mature and low volatility connectedness across dairy commodities.

In this paper, we focus on how dairy futures price volatilities respond to the National Dairy Products Sales Report (NDPSR) under the FMMO pricing scheme (See Fan et al. (2023) for FMMO pricing details). As one of the most important government regulations, the FMMO uses wholesale prices and volumes reported by the NDPSR, to compute the price of dairy products and the price of milk. These commodity prices, in turn, are used to determine the minimum milk price paid to dairy farmers. These prices are also used as the final settlement prices for the cash-settled dairy futures contracts each month at the Chicago Mercantile Exchange (CME). At the end of a contract, dairy futures contract cash-settles to the FMMO price. Because dairy futures settlement prices are determined by the NDPSR weekly wholesale price and volume, we expect that dairy futures prices will respond to the weekly updates.