GEORGE MORRIS CENTRE

SPECIAL REPORT: CHICKEN MARKET SEASONALITY AND PRICE DETERMINATION

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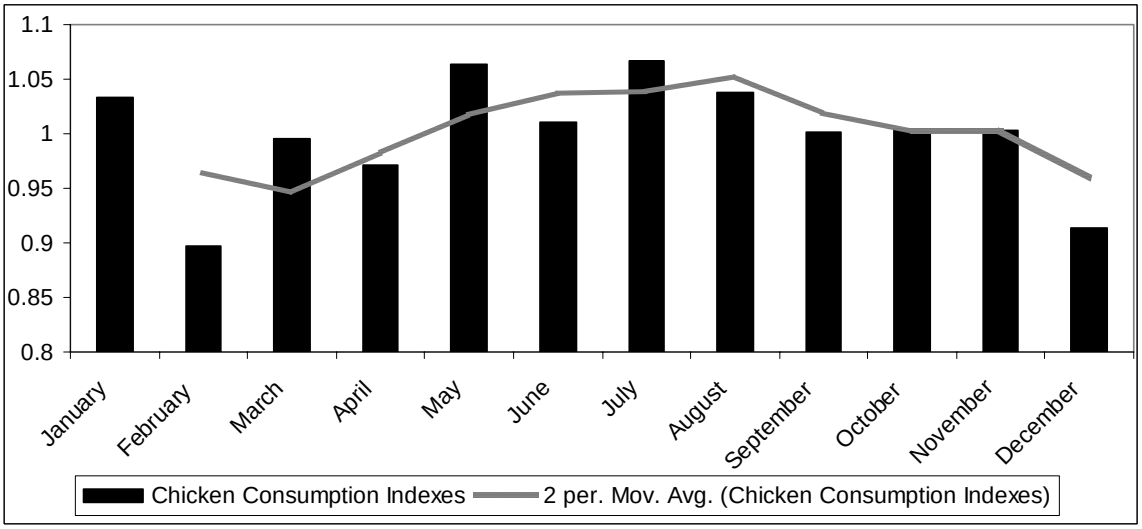
Even though current chicken production and marketing technologies tend to reduce seasonality issues, the relationship between the supply and demand of monthly chicken quantities is still an important factor in price determination. This article presents some observations on the seasonality of the Canadian chicken market, the relationship between supply-demand and prices, along with possible implications.

Seasonality reflecting people's preferences in chicken consumption during the year is a nationally specific, stable, and important feature of the Canadian chicken market. Generally, based on 1996-2006 average results, chicken consumption is high in January and during the summer months, fairly stable in the fall, and low in February and December. The monthly seasonality of consumption is illustrated in Figure 1 below. The vertical bars on the graph show the monthly share for each month within the year. The two-period moving average (gray line) generalizes this information and presents a pattern of the changing chicken consumption during the year. In particular, it shows general chicken consumption increases from February to July-August and then decreases until January.

Figure 1. Monthly Chicken Consumption Indexes (1996-2005 average)

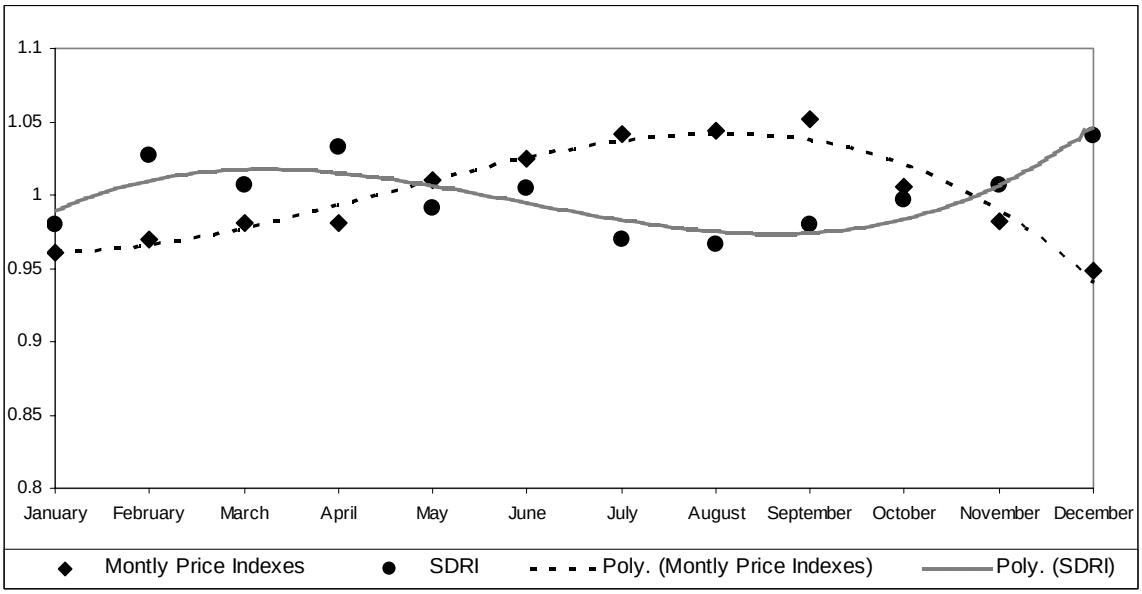


Source: Chicken Farmers of Canada.

This trend has many implications, especially in serving as a benchmark for Canadian chicken supply management and, therefore, chicken market regulation. Not surprisingly, the Chicken Farmers of Canada production allocation schedule closely approximates the seasonal chicken consumption pattern.

Also not surprisingly, the relationship between quantity supplied and quantity demanded plays an important role in chicken wholesale price determination. In order to illustrate this, as a starting point the ratio of supply to demand can be tabulated as the monthly quantities supplied and consumed (demanded). This can be referred to as the Supply-Demand Ratio (SDR).[1] The supply-demand ratio can then be compared to the annual average in an index so that the SDR Index (SDRI) is the monthly SDR divided by the year's average SDR.[2] An index of wholesale chicken prices can be developed in a similar manner. Chicken Price Index here is calculated as a ratio of monthly price to year average price. Utilizing these indexes, based on the 1996-2006 average, there is a strong relationship (close to reciprocal) between the ratio of supply to demand and chicken wholesale price indexes. This relationship can be seen in Figure 2.

Figure 2. SDRI and Chicken Wholesale Price Indexes (1996-2005 average)



Source: CFC, data; GMC, analysis

Thus, the highest SDRI corresponds to the lowest price index and vice versa. Mathematically, this relationship in general form can be expressed as follows:

$$Price\ Index = \frac{1}{SDRI} \qquad \textbf{(Formula 1)}$$

As can be expected, the chicken wholesale price shows a negative relationship to SDRI. That is, the higher the supply-demand ratio, the lower the price. It is interesting to note that this fact can be used for approximating the chicken price for a particular month based

[1] For example, if the chicken supply in November is 121,741 tons and chicken consumption (demand) is 84,846 tons, then SDR = 121741/84846 = 1.43.

[2] For example, if year average SDR is 1.401, then SDRI for November is 1.435/1.401 = 1.024.

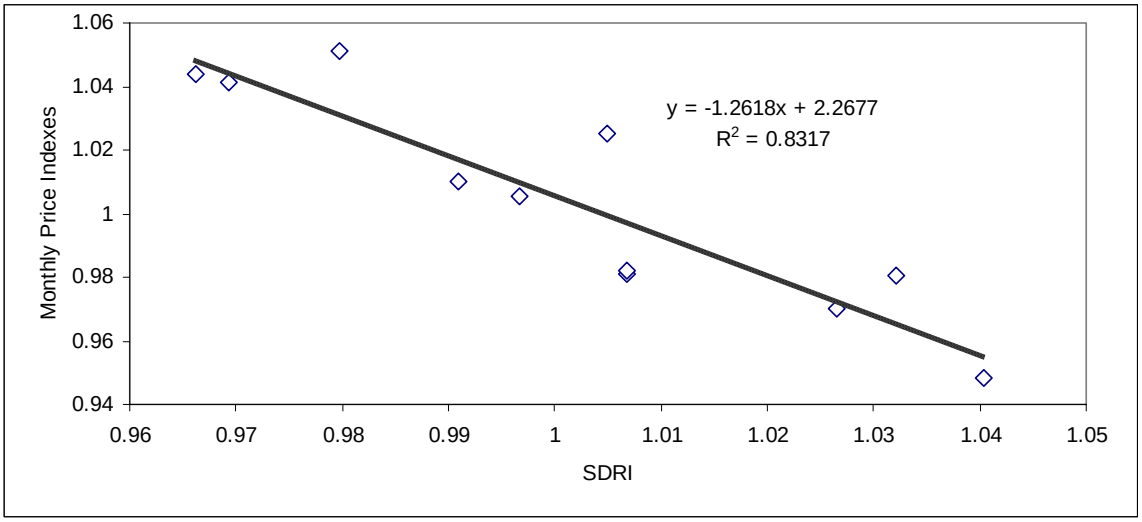
on the SDRI. In particular, the wholesale chicken price can be simulated by taking the reciprocal of SDRI and multiplying it by the year's average price[3].

Alternatively, the chicken price can be approximated directly from SDRI by using the following formula:

*Monthly Price = (-1.2618*Monthly SDRI + 2.2677)*Year Average Price* **(Formula 2)**

This formula presents the linearization of the non-linear relationship between chicken price and SDRI. This linear relationship is presented in Figure 3. Assuming that quantity supplied is reasonably predictable and that the quantity demanded can be approximated from monthly consumption indexes, then the established formula[4] is useful for a rough-and-ready price approximation. The formula explains 83.2% of the variation in prices due to variation in SDRI. The remaining 26.8% of the variation is affected by other factors, in particular by the price of competing meats (beef, pork, turkey), and US chicken prices, among others.

Figure 3. Price Indexes and SDRI (1996-2005 average)



Source: CFC, data; GMC, analysis

Taking those other factors into account requires more advanced analytical tools. One such tool is the Canadian Chicken Wholesale Price Simulation Model, developed by the George Morris Centre[5].

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[3] For example, if in November the SDRI is 1.024 and if the year average price is \$2.71/kg, then the price for November may approximated as follows: Price = $\frac{1}{1.024} * 2.71 = \$2.65 / kg$.

[4] We recommend treating January as a special case and calculating the relative price based on the specific index (0.98) that presents the 1996-2005 average relationship between January SDRI and chicken price. For example, if the expected January SDRI is 0.979 and year average price is \$2.71/kg, then the price in January is 0.979*0.98*2.71 = \$2.60/kg.

[5] This model simulates the monthly wholesale chicken price based on expected quantity supplied, quantity demanded and US wholesale chicken price.

To summarize, the monthly variation in chicken consumption is an important factor governing the supply management system. Furthermore, SDRI reflecting monthly seasonality in consumption and chicken supply can be used as a predictive variable for market price simulation purposes. Combining this approach with other analytical tools has the potential to significantly increase the accuracy of price prediction and enhance the supply-demand analytical framework in the context of market analysis.

The George Morris Centre provides a monthly chicken market analysis report called the Canadian Chicken Market Review. If you are interested in a free two month trial subscription to this report, or any other of the Centre's meat and livestock market analysis reports, please visit www.georgemorris.org or e-mail Pat Dares at pat@georgemorris.org.