



# ANALYSIS AND COMMENTS

Livestock Marketing Information Center

State Extension Services in Cooperation with USDA

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## SEASONALITY IN THE US HOG INDUSTRY

The hog industry is a very seasonal. Three time dimensions are often used in market analysis. Those time dimensions are trend, cycle and seasonal. It is the intention of this paper to quantify seasonality of supplies and prices in the hog industry. Seasonality refers to patterns that tend to repeat within the year.

Timing of when hogs are born contributes to when hogs are seasonally available for slaughter. At the same time, natural seasonal aspects such as temperature and precipitation likely combine with management decisions based on slaughter hog availability to cause weights to move in a seasonal pattern. Seasonal changes in slaughter and dressed weights contribute to seasonal changes in pork production. Seasonal changes in pork production combined with a number of other factors contribute to seasonal price movements. All of these factors need to be considered when developing expectations for the hog market.

### Calculation Process

Typically, seasonality is documented on a crop year basis for grains and on a calendar year basis for livestock and meat items. To quantify seasonality, centered moving average indices were calculated. These indices can be interpreted as a percentage of the time period average (year).

Prior to calculating seasonal indexes, data were detrended. All data was detrended by a three-step process. The first step involved regressing the data against a trend variable. The resulting regressand was multiplied by the corresponding trend variable. The result was subtracted from the observed variable.

### Pig Crop

The first supply component to be examined was the pig crop. Although the size of the breeding herd and the productivity of the sows in the breeding herd determines the pig crop, the pig crop itself is probably the best early indicator of slaughter two quarters subsequent. One problem encountered in this examination was the fact that the monthly pig crop data is only available since December 1995.

Based on the centered moving average method of calculating seasonality, the monthly pig crop time series limits the seasonality calculations to a 4-year average (1997-2000). Most would argue that data from a complete supply and pricing cycle should be used when calculating seasonality. However, the only data that there is sufficient history for is the near quarterly data (December through February, March through May, June through August, and September through November) on pig crop. For expository purposes, a 10-year quarterly seasonal index and a 4-year

monthly seasonal index were calculated here.

During the detrending process, it was determined that the pig crop was increasing by an average rate of 51.8 thousand head per quarter. The monthly pig crop was found to be increasing at about half that rate at 7.85 thousand head per month.

The 4-period centered moving average seasonal index using 10 years of quarterly data indicated that, at 95.1 percent of the annual average of the quarterly pig crop, the pig crop is seasonally smallest in the first quarter (December through February). The pig crop is seasonally largest in the second quarter (March through April) at 106.1 percent of the annual average of the quarterly data. This suggests slaughter should be seasonally smallest in the third quarter and seasonally largest in the fourth quarter.

The 12-period (monthly) centered moving average seasonal index over the 4 years of monthly data supports the pattern of the quarterly index. The months with the seasonally smallest pig crop tend to be December and January at 96.1 percent of the annual average of the monthly pig crop, respectively. The indices indicating a seasonal peak were for April and May and were each calculated at 103.3 percent of the annual average of the monthly pig crop. This suggests slaughter should be seasonally smallest late in the second quarter or early in the third quarter and seasonally largest in the fourth quarter.

### **Slaughter Pattern**

To keep slaughter on a somewhat comparable basis with the pig crop findings, quarterly and monthly indices were calculated. But, to keep all indices in the remainder of the article on a comparable basis, both the quarterly and monthly indices here were calculated using 10 years of data. Also, the quarterly slaughter data was based on traditional quarters (January through March, April through June, July through September, and October through December). Finally, due to variability in the

number of slaughter days in a month, slaughter was converted to a daily average basis by dividing the monthly slaughter by the number of slaughter days in a month.

The detrending process on the quarterly data indicated that hog slaughter increased at an average rate of 1.11 thousand head per day per quarter (70.8 thousand head per quarter). The detrending process of the monthly data indicated hog slaughter had increased an average 356 head per day per month, less than half the quarterly rate indicated.

The 4-period centered moving average index for the daily average of quarterly slaughter indicated that slaughter did peak seasonally in the fourth quarter, averaging 107.2 percent of the annual average. That was in line with expectations from the quarterly and monthly seasonal indices based on the pig crop. The seasonal peak in slaughter was in the second quarter when daily average slaughter averaged 94.8 percent of the annual average. That was a little different from expectations from the quarterly pig crop index but might be in line with expectations from the monthly pig crop index.

The 12-period (monthly) centered moving average index for the daily average of monthly slaughter data showed that the seasonal peak in slaughter typically comes in November at 109.3 percent of the annual average. That peak is 6 and 7 months after the seasonal peak in the pig crop. June was the seasonal low in slaughter at 91.6 percent of the annual average of the daily average of monthly slaughter. July came in at a close second with 92.7 percent of the annual average of the daily average of monthly slaughter. At 5- to 7-months after the seasonal low in pig crop, the June and July low slaughter hold with expectations from the seasonal pig crop.

### **Seasonal Dressed Weight**

Average hog dressed weights over the years have become a greater component of the pork production picture as they have trended upward. With continued

advances in genetics, feeding programs and introduction of growth products such as Paylean, dressed weights will likely continue to be a much watched component of production. Dressed weights historically follow a seasonal pattern of peaking in the fall and bottoming out in the summer.

The detrending process on the monthly data indicated that monthly average hog dressed weights increased an average 0.11 pounds per month since 1990. Average barrow and gilt dressed weights increased an average 0.13 pounds per month. Average sow and stag and boar dressed weights increased an average 0.07 and 0.03 pounds per month, respectively, since 1990.

The 12-period (monthly) centered moving average index calculated for dressed weight data indicated that most of the seasonal pattern in hog weights comes from barrow and gilt weights. For average hog dressed weights, the seasonal peak typically comes in November at 101.1 percent of the annual average dressed weight with December and January following closely at 100.9 and 100.7 percent of the annual average weights respectively. The seasonal peak for average barrow and gilt dressed weights is also in November with December and January following closely at 101.2, 101.0 and 101.0 percent of the annual average weights, respectively.

The seasonal low for average hog dressed weights is typically August with an average dressed weight that is 98.3 percent of the annual average dressed weight. Average barrow and gilt dressed weights usually hit the seasonal bottom in August also at 98.0 percent of the annual average. The general seasonal pattern of average hog dressed weights and average barrow and gilt dressed weights are very similar.

In contrast, the seasonal peak for average sow dressed weights is June at 100.7 percent of the annual average. The seasonal low for average sow dressed weights is April at 99.2 percent of the annual average. Average stag and boar dressed weights seasonally peak in September at 102.8 percent of the annual

average and bottom in March at 97.3 percent of the annual average.

The seasonal high in average hog dressed weights in November corresponds to the seasonal high in hog slaughter, also in November. This suggests that seasonal high pork production should occur in November. Seasonal low dressed weights in August follows the seasonal low slaughter of June. However, the variability around weights is not as great as the variability around slaughter. This suggests that pork production should seasonally trough in June.

### **Pork Production**

To reduce variability due to differing numbers of slaughter days, monthly pork production was converted to average daily production for the month by dividing the production data by the number of days in the month. Detrending the data indicated that pork production from 1990 through early 2001 increased at an average rate of 356 pounds per day per month (7.6 thousand pounds per month).

The 12-period centered moving average index for daily average of monthly pork production was very much as expected. Seasonally, pork production typically peaks in November at an average 109.3 percent of the annual average of monthly production. Pork production usually bottoms seasonally in June at an average 91.6 percent of the annual average. Overall, the seasonality in slaughter has a greater impact on production than the seasonality of weights.

If demand were constant throughout the year, it should be expected that pork prices should follow a seasonal trend just opposite of the seasonal pork production. That is, the monthly average pork cutout value should peak in June and bottom in November.

### **Prices: Wholesale and Live**

The detrending process indicated that the monthly U.S. pork cutout (wholesale) value trended down at a rate of 0.04 cents per pound per month from

January 1990 through July 2001. The Iowa – Southern Minnesota live hog price on a carcass basis trended down an average 0.11 cents per pound per month. The difference could be due to a number of factors that were not examined. It is possible that the offal values have declined, costs of transformation have increased, transportation costs have increased, etc. This might be a subject for discussion elsewhere.

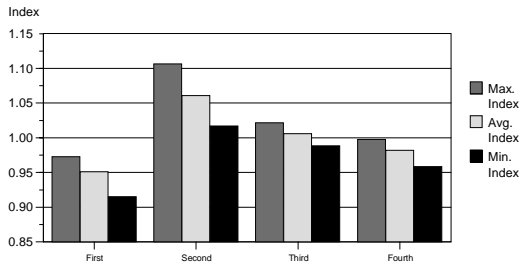
The 12-month centered moving average index for the monthly average pork cutout value indicates that, on average, wholesale value peaks in August at an average 107.3 percent of the annual average. The cutout value typically seasonally bottoms in December at 93.2 percent of the annual average.

The seasonal peak and trough in cutout values are two months subsequent to expectations based on the seasonal production pattern. Further, there is greater variability around the pork cutout average

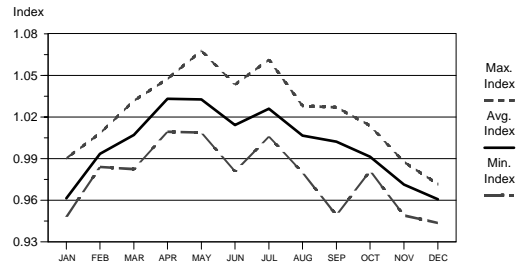
seasonal index than around the pork production average seasonal index. These facts suggest that besides production, other factors contribute to seasonal movement in the cutout value. The major other factor is seasonal differences in demand for pork.

The 12-month centered moving average index for the monthly Iowa – Southern Minnesota average live hog price indicates a pattern almost opposite of the seasonal pattern of the daily average of monthly hog slaughter. The live hog prices, on average, seasonally peak in June at 109.7 percent of the annual average price. The seasonal bottom for live hog prices is usually in November at 89.3 percent of the annual average price. This suggests that seasonal availability of hogs on a daily average basis does contribute a large portion to the seasonal price variation of live hogs. But the large variability around the live hog average index suggests that other factors such as seasonal demand definitely influence seasonal price movement.

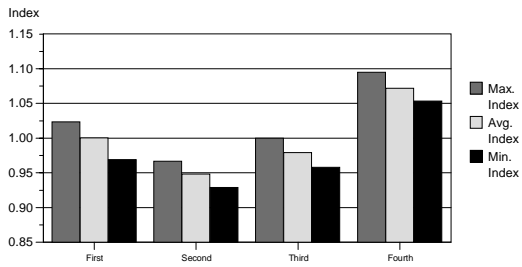
**SEASONAL SUPPLY INDEX -- PIG CROP**  
U.S., Quarterly, 1991-2000



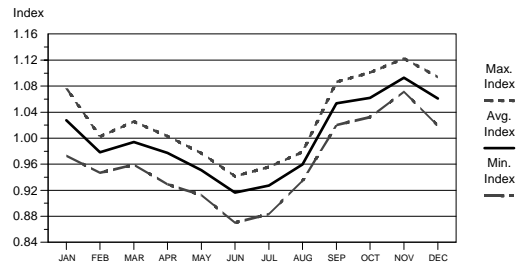
**SEASONAL SUPPLY INDEX -- PIG CROP**  
U.S., Monthly, 1997-2000



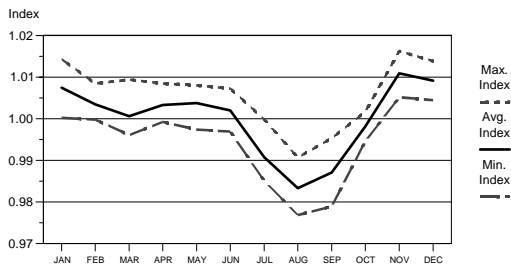
**SEASONAL SUPPLY INDEX -- HOG SLAUGHTER**  
U.S., Quarterly, 1991-2000



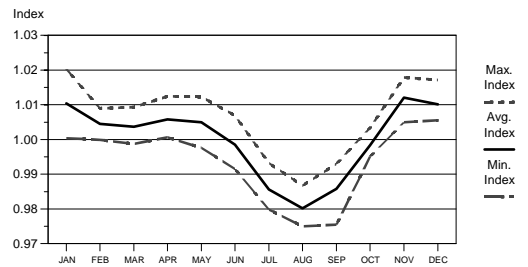
**SEASONAL SUPPLY INDEX -- HOG SLAUGHTER**  
U.S., Monthly, 1991-2000



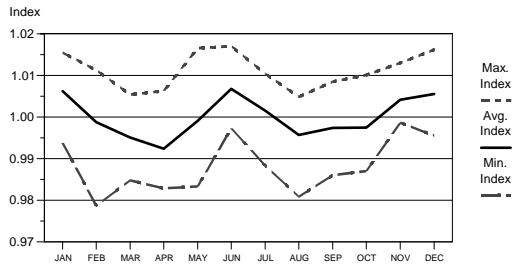
**SEASONAL SUPPLY INDEX -- DRESSED WEIGHTS**  
Hogs, U.S., Monthly, 1991-2000



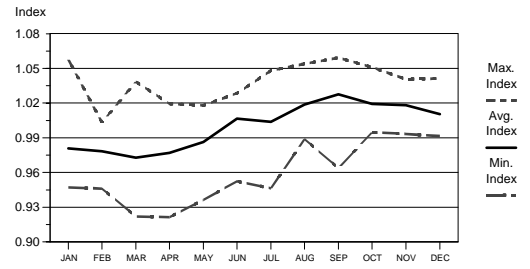
**SEASONAL SUPPLY INDEX -- DRESSED WEIGHTS**  
Barrows & Gilts, U.S., Monthly, 1991-2000



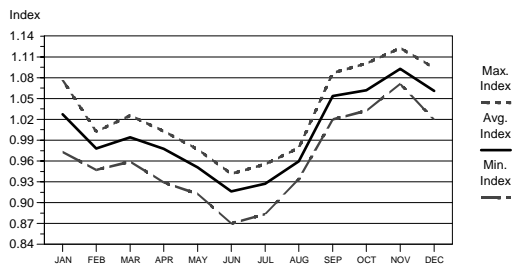
**SEASONAL SUPPLY INDEX -- DRESSED WEIGHTS**  
Sows, U.S., Monthly, 1991-2000



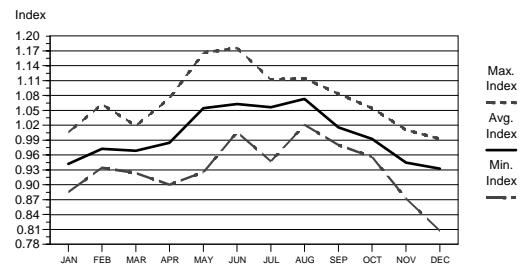
**SEASONAL SUPPLY INDEX -- DRESSED WEIGHTS**  
Stags & Boars, U.S., Monthly, 1991-2000



**SEASONAL SUPPLY INDEX -- PORK PRODUCTION**  
U.S., Monthly, 1991-2000



**SEASONAL PRICE INDEX -- PORK CUTOUT VALUE**  
U.S., Monthly, 1991-2000



**SEASONAL PRICE INDEX -- SLAUGHTER HOGS**  
Iowa - S. Minnesota, Monthly, 1991-2000

