Understanding USDA Crop Production & WASDE Forecasts

K-State Farm Management Program Focus Team

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USDA Crop Production & Supply-Demand Estimates

- The USDA publishes monthly crop supply & demand estimates for the Nation & the world
  - These benchmark estimates provide grain markets with objective, timely & comprehensive supply-demand info
    - Crop Production Reports
    - World Agricultural Supply-Demand Estimates (WASDE)
- USDA crop & WASDE reports have broad impact as they define the fundamental supply-demand conditions in commodity markets
  - Important to understand the estimating procedures used & the nature and limitations of USDA crop estimates

National Agricultural Statistics Service (USDA NASS)

- Winter Wheat & Rye Seedings Report - early January
- Planting Intentions Report - March
- Acreage Report - late June
- Monthly yield & production forecasts
  - Winter wheat – starting in May
  - Spring wheat and other small grains – starting in July
  - Other spring-planted crops – starting in August
  - Final crop estimates - end of the harvesting season
- Quarterly Stocks Reports
  - Grain & soybeans stored on & off farms (July, Sept., Dec., March)

World Agricultural Outlook Board (USDA WAOB)

- Interagency process, with monthly forecasts of U.S. & world supply & demand for major crops
- **A balance-sheet approach**
  - **Supply**: Beginning stocks, Production & Imports
  - **Use**: Food, seed & industrial use, Exports, Feed+Residual
  - **Ending Stocks** or carryout stocks
  - **Prices**: U.S. average cash price projections (by marketing year)
- **USDA Agencies Involved**
  - U.S. crop production & stocks by *USDA NASS*
  - U.S. & foreign S-D forecasts developed jointly by *Interagency Commodity Estimate Committees (ICECs)*

Monthly Crop Production & WASDE Reports

- USDA **Crop Production (NASS)** & **WASDE (WAOB)** reports are prepared simultaneously in a secured area & released at 8:30 a.m. Eastern Time between the 9th & 12th day of each month
  - NASS production forecasts to be incorporated into U.S. crop supply-demand estimates
- WASDE estimates use crop information from the **Foreign Agricultural Service (USDA FAS)** & the **Economic Research Service (USDA ERS)**
  - Foreign country-level data published by all USDA agencies **must be consistent** with the supply & demand numbers released by NASS & WAOB

Preparing NASS Crop Production Forecasts

- **Crop production forecasts** have **two components**
  1) acres to be harvested
  2) expected yield per acre
     - **Example**: preliminary corn & soybean acreage estimates are made using data obtained from a survey of farmers conducted during the first 2 weeks in June
- **Expected corn & soybean yields** are obtained monthly, August through November, from two different types of yield surveys
  - Yield surveys reflect conditions as of the 1st of the month
    - Data are collected during the last week of the previous month & the first 2 or 3 days of the current month

Crop Forecasts ⇨ "Normal" Weather

- **Crop production forecasts** based on conditions as of the survey reference date & projected assuming normal conditions for the remainder of the season
  - "Normal conditions" = temperatures & precipitation at historic averages for the remainder of growing season
- **Assume: 1st killing frost on historic average date**
  - Crop maturity evaluated against time till expected frost
    - If 1/3 of the crop will not reach maturity until the frost date has passed, it is assumed that some frost damage will result
- **Long-range weather projections** are **not** used as a factor or indicator in determining final crop yield

How Later Than Normal Crop Maturity Impacts Yield Forecasts

- **Yield forecast accuracy** depends on…
  a) Crop maturity at the time of the forecast
  b) Future weather until crop maturity
- **When crop maturity lags normal seasonal patterns**, the number of pods, ears, etc., is based on plant #s & development rather than # ears, heads, pods, etc.
  - When maturity lags, yield forecasts become more variable because the expected # of fruit can differ from the final #
- **Impact of Late Maturity on Grain Test Weights**
  - Main source of forecast error with late crop maturity is from low test weights

Crop Yield Forecast Reference Point = 1st of Month

- **1st of the month** = usually mid-point of data collection
- **Forecast Errors** for both grower-reported average yields & objective-measurement modeled yields
  - Forecast errors based on historic differences between these survey estimates & the final end-of-season yield
- **What If a Killing Frost, Heat Damage, or Helpful Rains Occur after 1st of Month?**
  - The USDA may adjust away from survey averages, but still will try to reflect the current crop conditions within the ranges provided by the data

Annual USDA June Ag Survey

Largest USDA Survey Each Year

- **Survey done in 1st two weeks in June…**
  - ≈ 2,400 interviewers contact > 125,000 farmers
    - Either by phone or in person
  - Info on crop acreages, grain stocks & livestock inventories.
- **U.S. Crop & Livestock Producers asked to report**
  - Acreage of each crop either planted or intend to plant
  - Acreage they expect to harvest as grain
  - Stocks of grain in on farm storage
  - Livestock inventories
- **Sampling "Frames":** "Areas" vs "Lists of Farmers"

Monthly NASS Crop Yield Forecasts

- **Farmer Surveys** (from list of farmers)
  - Subsample of farmers responding to June Ag Survey are selected to provide monthly crop yield projections
  - Sampled farmers are asked what they expect their crops to yield before harvest
    - ***Their actual yields*** obtained later at harvest
    - All farmer yield data are weighted by the farm's harvested acres
- **Objective Yield Surveys** (by cropping area)
  - Conducted monthly in States contributing most heavily to total U.S. production of major crops
    - Provide crop yield forecasts based on counts, measurements & weights from 2 randomly sampled small plots per field
  - Winter wheat area samples – Fall area survey

Calculating Harvested Crop Yields

- **Harvested yield** = biological (gross) yield less harvest loss
  - Counts, measurements & other observations from sample plots are used in statistical models based on historical data to predict final yield & final weight per unit
- **Gross yield** = yield (units) by weight per unit
- **Plant characteristics** used as prediction variables change as the crop maturity progresses
  - **Early crop stages:** Plant counts may be the only data available for forecasting the number of mature fruit
  - **Later crop stages**: Actual yield counts can be used

CROP	Component	Forecast Variable[1]
Corn	ears	stalks ears & ear shoots ears with kernels
	ear weight	historic average length over husk kernel row length ear diameter
Soybeans	plants pods per plant	plants mainstem nodes lateral branches blooms, dried flowers & pods pods with beans
	pod weight	historical average pods with beans

Corn Objective Yield Survey Counts

- **Corn objective yield survey forecasts** are based on estimates of number of ears and average ear weight
- **Ear count forecasts** are accurate early in the season
- **When the crop is late developing**, the August projection of ears is based on a model using plant population
- **Historical average ear weights** are used until ears are present to measure
  - Kernel row length models are then used to project ear weight until crop maturity.

Soybean Objective Yield Survey Counts

- **Soybean pods per acre** is usually very consistent from month to month & accurate when the bloom period has ended
  - Record pod counts have been occurring in recent years as a result of a shift to narrower rows
  - Pod count forecasts usually stabilize with the September survey
- **Average pod weights prior to crop maturity** are based on historical averages
- **In normal years**, much of the soybean crop has matured by the October survey, so current-year pod weights are used

Cotton	bolls	squares blooms small bolls large bolls open bolls
	boll weight	historical average large boll weight
Wheat	heads	stalks heads in boot emerged heads
	head weight	historic average fertile spikelets grains per head

Wheat Objective Yield Survey Counts

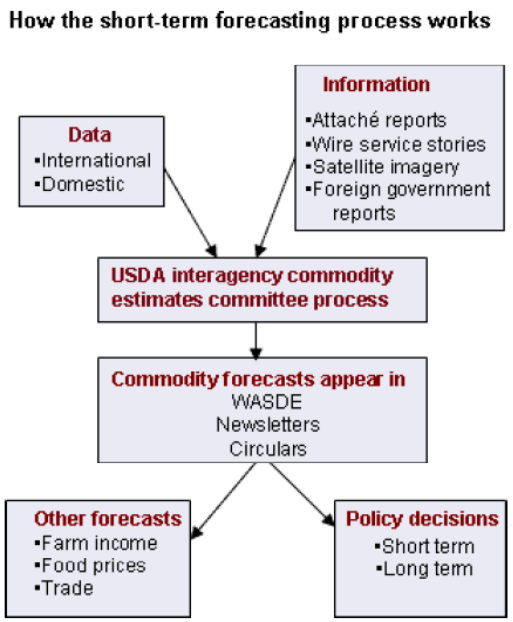
- **Winter Wheat & Spring Wheat Yield Forecasts**
  - Identical procedures are used to forecast yields for both
- **Number of head forecasts** are based on different models depending upon crop maturity.
  - These models have a considerable forecast error until emerged heads are present to count
- **Historical average head weights** are used until fertile spikelets and actual filled grains are available to be counted.

WASDE Projections:
Interagency Committees Develop S-D Projections

- **USDA agencies involved in WASDE Projections**
  - Agricultural Marketing Service (AMS)
  - Economic Research Service (ERS)
  - Foreign Agricultural Service (FAS)
  - Farm Service Agency (FSA)
- **World Agricultural Outlook Board (WAOB)**
  - Coordinates the process, chairs the interagency committees for each commodity & issues the WASDE report
- **NASS** does not participate in interagency committees
  - Provides most of the U.S. crop production forecasts & data for livestock production forecasts
  - NASS also provides monthly-historical prices & other data

How the WASDE Forecast Process Works

- The process combines data and information.
- Analysts use…
  - Survey results from NASS
  - Market news reports from AMS
  - Trade data from the U.S. Deparment of Commerce
  - Foreign attache reports and satellite imagery from FAS
  - Recent weather information analyzed by WAOB meteorologists
  - Farm program information & data from FSA
  - Other commodity-specific sources



Elements of WASDE Forecast Process

- The monthly projections process combines….
- **Data**
  - Results of producer and industry surveys conducted by NASS, AMS & other agencies
- **Economic Models & Statistical Analysis**
  - Analysis conducted by agencies regarding all aspects of the balance sheet
- **Expert Judgment**
  - Context & experience brought to the process

Sources of Information

- **National Agricultural Statistical Service**
  - http://www.nass.usda.gov/
- **"Understanding USDA Crop Forecasts"**
  - http://www.nass.usda.gov/Education_and_Outreach/Understanding_Statistics/pub1554.pdf
- **World Agricultural Supply & Demand Estimates**
  - http://usda.mannlib.cornell.edu/MannUsda/viewDocumentInfo.do?documentID=1194
- **"Outlook Reports: USDA Outlook Process"**
  - http://www.ers.usda.gov/publications/outlook/process.htm