



## National Agricultural Statistics Service

### Crop Acreage and Production Reports

#### Presentation for ISU Students

**Greg Thessen**

Director, Iowa Field Office  
USDA-NASS



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## The History of NASS

- The USDA was founded by Lincoln in 1862.
- NASS, formerly known as the Division of Statistics and then the Bureau of Statistics, was founded in 1863.



Bureau of Statistics employees working on crop estimates, circa 1910.

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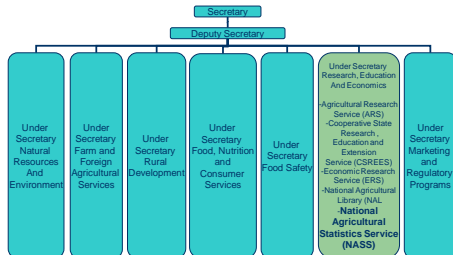
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## USDA Organizational Chart



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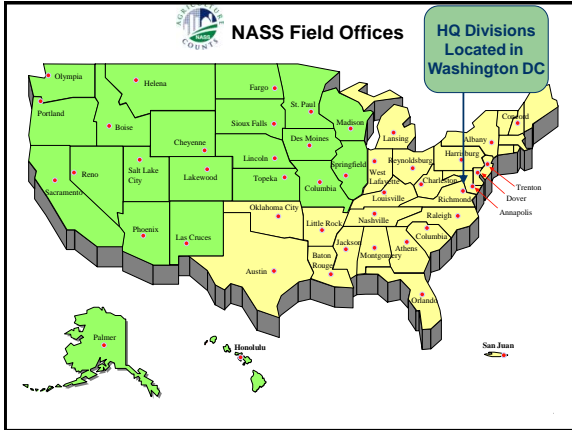
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**AGRICULTURE COUNTS**

## The NASS Mission

- To provide timely, accurate, and useful statistics in service to U.S. agriculture

NASS issues about 500 statistical reports each year and about 9,000 reports and news releases from its 46 field offices.

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**AGRICULTURE COUNTS**

## What Does NASS Do?

- Administer USDA's Statistical Estimating Program and the 5-year Census of Agriculture
- Supply the statistics necessary to manage and improve the efficiency of USDA programs
- Coordinate Federal/State agricultural statistics needs
- Conduct statistical research for other Federal/State or private organizations and other countries
- Outreach to promote our data collection efforts

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## What Doesn't NASS Do?

- Set policy
- Regulate activities (non-regulatory)
- Permit influence, including political influence
- Disclose individual reports
- Favor any group above others
- Proprietary survey work

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## NASS Principles

- Safeguard Confidentiality of individual's data
  - Protected by law from any court or legislative action (U.S. Code, Title 7, Chapter 55, Section 2276)
- Independent and Impartial Analysis
  - No political influence in estimates and forecasts
- Timeliness
- Security
  - Release reports to all users at same time

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## Program Areas

- Commodities
  - Crops, Livestock, Poultry, Cold Storage
- Economics
  - Agricultural Prices, Ag Labor, Farm Production Expenditures
- Environmental
  - Pesticide usage
- Census of Agriculture
  - Uniform & comprehensive data for every county
- Reimbursable Surveys

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## Where do the official statistics come from?

- Sample Surveys – Voluntary Reporting [Confidentiality Pledge]
- Agriculture Census – Mandatory Reporting
- Administrative Data

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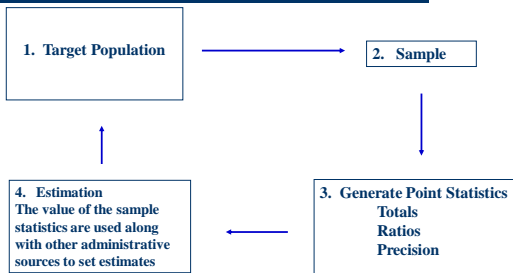
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## Sample Survey Process




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## Methodology

- Sampling Frames (target population)
  - Area Frame
  - List Frame
- Estimators (indications)
- Advantages - Disadvantages

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## Methodology – Area Frame

- All land area in Iowa
- Sample blocks of land called segments
- Collect agricultural data from the block of land




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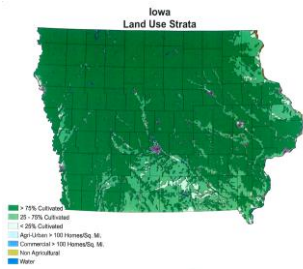
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## Methodology – Area Frame

- State is stratified based on percent of the land cultivated
- Strata are divided into “segments” (about 1 sq. mile)




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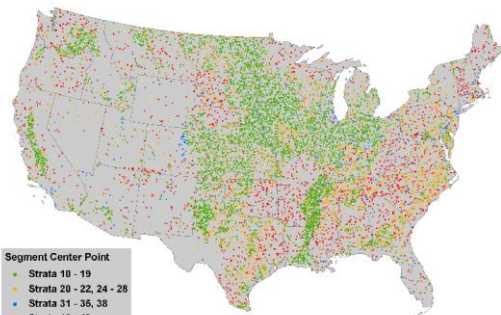
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USDA

2009 JAS Segment Center Points by Stratum




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## Advantages & Disadvantages

- Area Frame
  - Complete
  - Reduced non-sampling errors
  - Good for common commodities
  - Low maintenance
- Area Frame
  - Sensitive to outliers
  - Not good for rare commodities
  - Need physical boundaries
  - Costly data collection

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## Methodology – List Frame

- List of farms/farmers w/ associated information
- Sample a name
- Collect agricultural data from the name on the list for the farm(s) he/she operates

Name, Address	Cropland	Capacity
Abraham Lincoln 1555 Fifth Avenue Lincoln, IA 55626	500	0
Ima Farmer 321 Cherry Street Iowa City, IA 52240	1000	50,000
Farmer Brown 985 Oak Street Adel, IA 52240	2000	100,000
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## Methodology – List Frame

- Stratified based on size/type of farm
- Sample size varies by stratum
- Larger operations usually sampled at a higher rate

Quarterly Crop/Stocks Survey			
Stratum	Boundaries	Population	Sample
62	Cropland 200 - 599	5,184	152
65	Capacity 1 – 14,999	17,628	585
66	Cropland 600 - 1,599	2,068	129
72	Capacity 15,000 - 49,999	17,931	751
73	Capacity 50,000 – 299,999	8,318	450
78	Cropland 1,600 - 4,999	2,137	212
79	Capacity 300,000 – 999,999	229	26
95	Cropland 5,000+	66	66
97	Capacity 1,00,000+	11	11
<b>Total</b>		<b>53,572</b>	<b>2,382</b>

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## Advantages & Disadvantages

- List Frame
  - Inexpensive data collection
  - Can target commodities
  - Reduced sampling variability
  - Cost efficient
- List Frame
  - Not complete
  - Increased non-sampling errors
  - Goes out of date quickly
  - High maintenance

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## Methodology – Multiple Frame

- Combines the Strength of Each Sampling Frame
  - List
    - Less Costly Data Collection
    - Rare & Specialty Commodities
  - Area
    - Complete Coverage

Estimator – Multiple Frame Expansion:  
 Current Total =  
 List frame expansion +  
 Area frame expansion for farms  
 not on the list (NOL)

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## Advantages & Disadvantages

- Multiple Frame
  - Complete
  - Can control sampling variability
  - Can control costs
  - Can target commodities
- Multiple Frame
  - Overlap determination errors
  - Must maintain list and area frames separately

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## Methodology – Administrative Data Farm Service Agency

- FSA certified planted acreage data
- Have access to county totals
  - Aggregate to State level
  - Considered a minimum (not all farmers certify)
- Not complete and available until October

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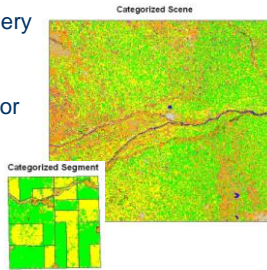
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## Methodology – Remote Sensing, Cropland Data Layer

- Uses Satellite Imagery
- NASS Area Frame and Farm Service Agency data used for ground truth
- Regression-based acreage estimator




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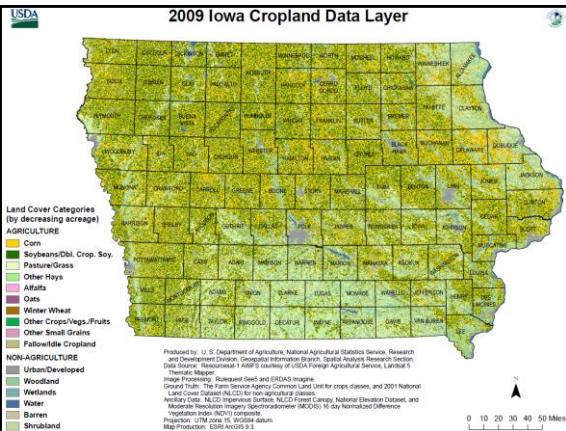
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## Acreage & Yield Data Collection

Crop  
Production  
Cycle

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NASS Survey,  
Estimation, and  
Publication Cycle

When farmers are planning... estimate planting intentions.	 <div style="display: inline-block; vertical-align: middle; text-align: left;">Prospective Plantings</div>
After farmers have planted... estimate acreage.	 <div style="display: inline-block; vertical-align: middle; text-align: left;">Acreage</div>
Throughout growing season... forecast yield & production.	 <div style="display: inline-block; vertical-align: middle; text-align: left;">Crop Production</div>
At end of season... estimate final acreage, yield, production.	 <div style="display: inline-block; vertical-align: middle; text-align: left;"> <b>Crop Production 2007 Summary</b> January 2008         </div>

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## March Intentions Data Collection

### March Crops/Stocks Survey

Data Collection	Feb. 26 – March 15
Sample Size	Approx 86,000 farms ~3,100 in Iowa
Collection Methods	phone, mail, internet, personal interview
Data Items	Acres planted and <u>to be planted</u> to specific crops, quantities of grains and oilseed stored on-farm

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## June Acreage Data Collection

	<u>June C/S Survey</u>	<u>June Area Survey</u>
Data Collection	May 29 – June 15	May 29 – June 15
Sample Size	Approx 73,500 farms ~3,000 in Iowa	Approx 11,000 segments 418 in Iowa
Collection Methods	phone, mail, internet, personal interview	Personal interview
Data Items	Acres planted to specific crops, acres expected to be harvested, quantities of grains and oilseed stored on-farm	Information on land use within segment and quantities of grains and oilseed stored on entire farm

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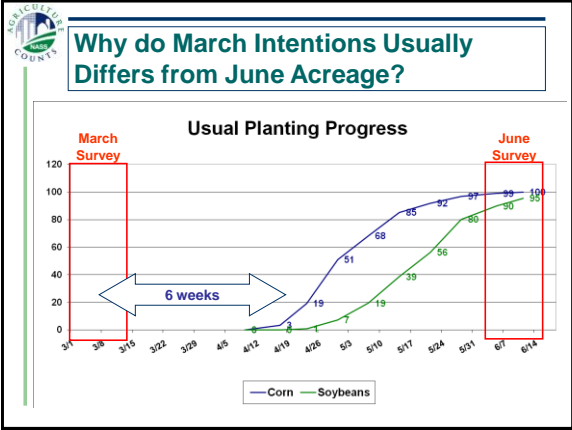
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### Determining Production

**Production =**

Harvested acres	X	Yield
<p>June Crops/Stocks Survey and Area Survey – updated as needed to reflect current growing conditions based on survey, satellite and FSA acreage data</p>	FORECAST	<p>Agricultural Yield Surveys</p> <p>Objective Yield Surveys</p>
<p>December Crops/Stocks</p> <p>Satellite Imagery</p> <p>FSA Acreage Data</p>	FINAL	<p>December Crops/Stocks Survey</p> <p>Obj. Yield Survey</p>

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### Determining Production

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## Crop Yield Surveys

- NASS conducts two surveys for yield
  - Agriculture Yield Survey
    - List frame survey conducted in all States (May – November)
  - Objective Yield Survey (Corn & Soybeans)
    - Area frame survey conducted in major States (Aug. – Dec.)

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## Crop Yield Surveys

- *Agricultural Yield*
- *Objective Yield*

### Sample Selected From:

List Frame - June Crop/Stocks Survey

- crops of interest
- rotated out reps
- exclude extreme ops
- exclude NOL

Fields recorded on the June Area Survey

- crops of interest
- Each acre has equal chance of selection
- More than 1 sample may fall in same field

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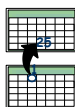
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## Agricultural Yield Survey

- Acres Harvested (or to be harvested)
- Expected Yield (based on farmers assessment of yield prospects until harvest)
- Reference date – 1<sup>st</sup> of the month
- Mail, phone, internet

Yields to reflect conditions as of 1<sup>st</sup> of month



Data collection starts 25<sup>th</sup> of previous month

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## Agricultural Yield Survey

Agricultural Yield Survey Sample Size (approximate)		
Month	U.S.	Iowa
August	28,000	800
September	13,000	400
October	15,000	400
November	11,000	400

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## Objective Yield Surveys

- Randomly selected fields
  - Initial interview to update/verify acreage, ask permission
- 2 Randomly located plots per field
- Objective measurements made in the fields
  - Measure Row Width
  - Count Plants (or stalks)
  - Count Fruit (pods, ears, or proxy early in season)
  - Weigh Fruit (pods, ears, or proxy early in season)
  - Gleanings (harvest loss)

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## Objective Yield Survey

- Data collected from about 25<sup>th</sup> of previous month through the 3<sup>rd</sup> of the survey month
- Return to the same plots for several months until crop is mature or harvested
- Personal interviews and field visits




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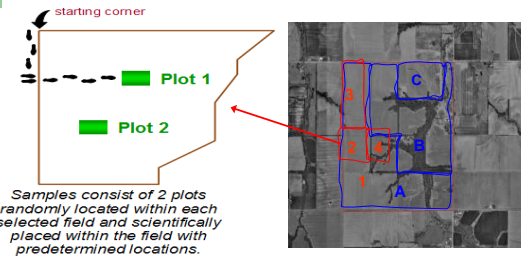
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## Objective Yield Surveys




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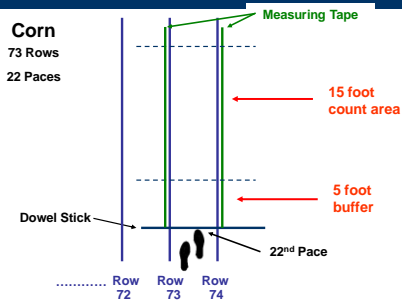
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## CORN Objective Yield Sample Plot Location




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## Objective Yield Surveys

### Soybeans

- Enumerators use a *frame* when laying out soybean sample plots




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## Objective Yield Surveys



number of fruit per acre x weight per fruit - harvest loss per acre

*net yield*

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## Objective Yield Components and Forecast Variables

Crop	Component	Forecast Variable
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 - main stem nodes - lateral branches - blooms, dried flowers & pods - pods with beans
	pod weight	- historical average - pods with beans

Variables used to measure the number of fruit and weight vary each month based on the stage of maturity

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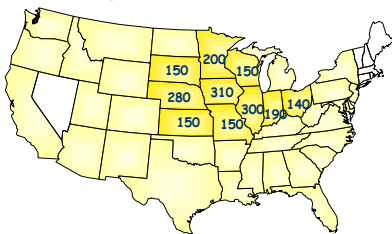
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## Objective Yield Survey

- CORN n=2020 (only half completed in August)
- 10 states average ~85% of U.S. corn production




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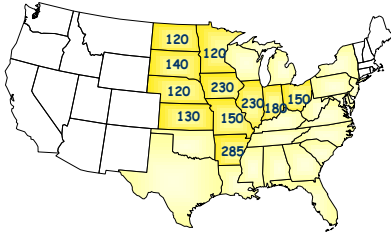
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## Objective Yield Survey

- SOYBEANS n=1855 (only half completed in August)
- 11 states average ~85% of U.S. soybean production




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## Interpreting the Survey Indications

- Indications include direct measures and ratios
  - Normally have more than one indication to set forecast
- Guiding principles for setting yield forecasts
  - Reference period = 1<sup>st</sup> of the month
  - Do not extrapolate beyond data collection period
  - Assume normal conditions the remainder of the season

### Two Questions:

- Historically, how well have the indications performed?
- Is there a consistent bias in the indications?  
Tools – difference tables, charts, supporting analysis

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## Interpreting the Survey Indications

Difference Table: Corn, Yield, Objective Yield Survey by month

Year	Board	Aug	Diff	Sept	Diff	Oct	Diff	Nov	Diff
2003	126.0	144.0	-18.0	141.7	-15.7	142.2	-16.2	140.2	-14.2
2004	136.0	144.1	-8.1	147.0	-11.0	145.8	-9.8	142.6	-6.6
2005	137.0	149.8	-12.8	147.7	-10.7	144.9	-7.9	143.8	-6.8
2006	122.0	145.5	-23.5	136.5	-14.5	134.4	-12.4	131.0	-9.0
2007	148.0	163.3	-15.3	164.5	-16.5	160.9	-12.9	152.8	-4.8
2008	162.0	172.6	-10.6	178.3	-16.3	170.2	-8.2	164.4	-2.4
2009		162.3		169.5		168.2		164.8	
Diff 10-yr			-16.1		-15.4		-10.3		-6.1
Diff 5-yr			-14.0		-13.8		-10.2		-5.9
std err		14.7		12.9		7.4		4.1	

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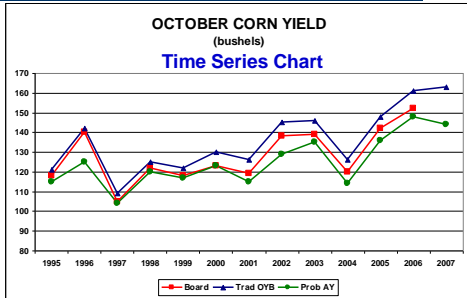
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## Interpreting the Survey Indications




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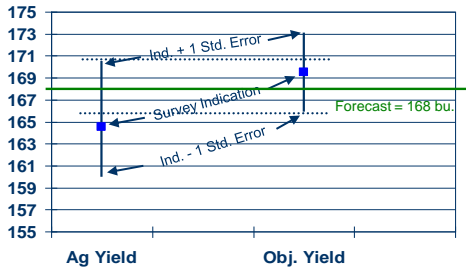
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## Interpreting the Survey Indications




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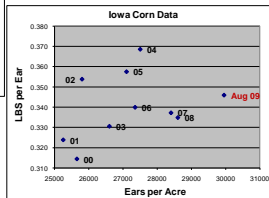
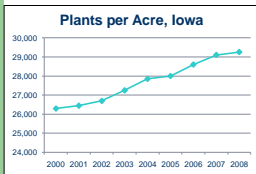
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## Other Analysis - Objective Yield Survey Components




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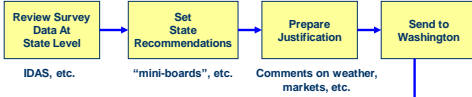
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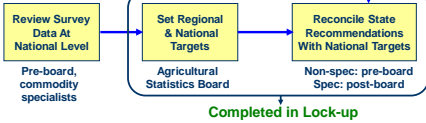


## Yield/Production Forecasts - Work Flow

### Field Offices



### Headquarters




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## Agricultural Statistics Board




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## Agricultural Statistics Board (ASB) - Security

- Since 1905, the ASB has secured its data to prevent leaks from influencing speculative trading markets
- Armed guards stand watch outside of the lock-up area to prevent disclosures



Secretary Johanns and an aide sign-in with security to attend the Crop Report briefing.

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## Agricultural Statistics Board (ASB) - Security

- Window shades are secured and phones are disconnected
- The computer system is disconnected from computers outside of lock-up



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## Agricultural Statistics Board

- The ASB is comprised of commodity experts who set regional and national yield and production estimates



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## Agricultural Statistics Board

- The Crop Reports are released at 8:30 am ET on specified dates.



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## Agricultural Statistics Board

- The Secretary of Agriculture or his designee attends the briefing and signs the report




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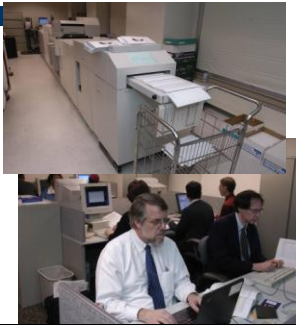
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## Agricultural Statistics Board

- Reports are printed inside the lock-up area
- Reporters are allowed inside lock-up to prepare their news articles for release at 8:30 am ET.




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## FINAL Acreage, Yield, & Production

*Production =*

<i>Harvested acres</i>	<i>X</i>	<i>Yield</i>
June Crops/Stocks and Area Surveys – updated as needed to reflect current growing conditions based on survey, satellite, and FSA acreage data	F O R E C A S T	Agricultural Yield Surveys Objective Yield Surveys
December Crops/Stocks Satellite Imagery FSA Acreage Data	F I N A L	December Crops/ Stocks Survey Obj. Yield Survey

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## In Conclusion.....

- Information makes for efficient markets
- NASS mission is to provide information
- NASS estimates/forecasts based on survey data  
- only possible with the cooperation of farmers
- Confidentiality and Security – taken seriously
- NASS statistics are available to all
- Everyone gets the same results at the same time

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## NASS Contact Information

- [www.nass.usda.gov](http://www.nass.usda.gov)
- Greg Thessen  
[greg\\_thessen@nass.usda.gov](mailto:greg_thessen@nass.usda.gov)
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(800) 772-0825  
[nass-ia@nass.usda.gov](mailto:nass-ia@nass.usda.gov)
- Customer Service:  
(800) 727-9540




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