Lecture 10

Forecasting Use for Crops

by
Professor Scott H. Irwin

Required Reading:

Forecasting Calendar for 2011/12 Crop Use Categories

**Fall 2010:** First forecasts of use for 2011/12 marketing year

- Typically based on _______ forecasts, recent history and basic ___________ relationships

**Spring and Summer 2011:** Update use forecasts based on US and world production prospects

**2011/12 Marketing Year:** Update forecasts based on weekly, monthly, and quarterly usage reports

**Theory of Demand**

Consumer demand is defined as the various _______ of a particular commodity that an individual consumer is _____ and _____ to buy as the price of that commodity varies, with all other factors that affect demand held __________
Each of the following are demand __________

- __________ size and its distribution by age, geographic area, etc.

- __________ income and its distribution

- _______ and availability of other commodities

- ________ tastes and preferences

**Demand and Use Terminology**

Changes in _______________ and changes in ________ are NOT the same thing

- Change in quantity demanded is a movement ______ a demand curve

- Change in demand is a _______ in the demand curve
Change in Quantity Demanded

Change in Demand
Demand and use are also not the same thing

- Use (usage, utilization, consumption) is the equilibrium quantity observed in a market

- Use equals both the quantity _________ and quantity ___________

Assume corn exports increase from the 2008/2009 to the 2009/2010 marketing year

Which is true?

- Corn export demand increased

- Corn quantity demanded increased

- Corn export use increased
Corn: Food, Seed, and Industrial Use

Rapid growth in last 20 years

- About 10% of use in early 1980s
- About 40% of use currently

Largest components are:

- Corn ___________ for food and soft drinks
- Corn starch for construction uses
- ___________ for fuel
- Cereals, snack foods

Ethanol use has grown rapidly in recent years

Other FSI uses flat at about _________ billion bushels over the last decade
**US Corn, Food, Seed and Industrial Use, 1975/76-2009/10***

![Graph showing US Corn, Food, Seed and Industrial Use from 1975/76 to 2009/10 with the equation \( y = 105.11x - 88.232 \) and \( R^2 = 0.7778 \).]

Source: USDA  
*2009/10 Projected

**US Corn, Food, Seed and Industrial Share of Total Use, 1975/76-2009/10***

![Graph showing US Corn Share of Total Use from 1975/76 to 2009/10 with the equation \( y = 0.7434x + 5.9443 \) and \( R^2 = 0.8284 \).]

Source: USDA  
*2009/10 Projected
Corn: Forecasting Food, Seed, and Industrial Use

Food component tends to grow at the rate of ____________ growth

Relatively price ______________

Corn sweetener use is critically affected by ________________

Ethanol use is also driven by government policies:

• ________________ blender tax credit

• ________________ import tariff

• ___________ for blending with unleaded gasoline and MTBE replacement
US Corn, Ethanol for Fuel Use, 1975/76-2009/10*

Source: USDA

*2009/10 Projected

US Corn, Ethanol for Fuel Share of Total Use, 1975/76-2009/10*

Source: USDA

*2009/10 Projected
Corn: Export Use

Little volume ________ in the last 25 years

Substantial decline in relative importance as a use category

- About 30% of use in early 1970s
- About 15% of use currently

Largest export customers in 2008/09:

- ______ 33%
- ________ 17%
- ________ 11%
- ________ 8%
Corn: Forecasting Exports

Large _______ year-to-year and difficult to forecast

Factors to consider:

- Crop production in _______ and _______ countries

- _______ in ___________ export countries

- Exchange _______

- Government export subsidy programs both in the US and other countries

- Economic _______

- _______ numbers outside the US
Corn: Domestic Feed and Residual Use

Historically largest component of corn use

- Averaged about 60% of total corn consumption until recent years
- _______ driver of corn prices
- Largely dependent on the number of _______
  __________________

Residual use:

Wherever possible, use is ______________ with ________ information sources

- Not all use can be cross-checked
- Leads to a category for ____________ or ____________ use
- Reflects _________ error in one or more use categories or in production estimates
- Lumped together with feed usage in corn balance sheet
US Corn, Feed and Residual Use, 1975/76-2009/10*

\[ y = 67.348x + 3694.3 \]
\[ R^2 = 0.8057 \]

Source: USDA

*2009/10 Projected

US Corn, Feed and Residual Use Share of Total Use, 1975/76-2009/10*

\[ y = -0.3248x + 63.769 \]
\[ R^2 = 0.4028 \]

Source: USDA

*2009/10 Projected
Corn: Forecasting Domestic Feed and Residual Use

Related directly to the number of beef, pork and poultry _________ on _______

Number of animals on feed is, in turn, related to _________________ to livestock production

Profitability depends on:

- _________ prices
- Price of _______ including corn
- Also have to account for relative price of feed inputs, such as sorghum and wheat

So, there is a ____________ determination element to feed and residual use

- ______ in feed price effects due to biological lags in livestock production
- This lessens forecasting problems ______ a particular marketing year as livestock numbers are relatively fixed
A major new uncertainty is substitution of ethanol production by-products, _____________ for corn in feed rations.
Soybeans: Domestic Soybean Crush

Largest component of soybean use

- Averages about _____ of total soybean consumption
- _________ driver of soybean prices

Soybeans are “crushed” into two components

- ______________
- ______________

A bushel (60 pounds) of crushed soybeans normally yields

- 48 pounds of meal
- 11 pounds of oil
- 1 pound of waste
US Soybeans, Crush Use, 1975/76-2009/10*

\[ y = 28.509x + 812.52 \]
\[ R^2 = 0.9313 \]

US Soybeans, Crush Share of Total Use, 1975/76-2009/10*

\[ y = 0.0901x + 56.291 \]
\[ R^2 = 0.0736 \]
Soybeans: Forecasting Domestic Crush

Soybean crush tends to ______ at a fairly steady pace from year-to-year

Driven primarily by domestic demand for soybean oil and soybean meal

A good deal of complexity in the relationship between soybean, soybean oil and soybean meal demand

Also a number of products that are substitutes in demand

- _________ meal
- Peanut meal
- _________ oil
- Canola oil
- Fish oils
Soybeans: Exports

Some volume growth in the last 25 years

Modest _______ in relative importance as a use category

- About 40% of use in early 1970s
- Back to about 40% of use currently

Largest export customers in 2005/06:

- ______ 38%
- ______ 14%
- ________ 12%
- _________ 8%
US Soybeans, Exports, 1975/76-2009/10*

\[ y = 15.558x + 565.98 \]
\[ R^2 = 0.5597 \]

Marketing Year

Source: USDA

*2009/10 Projected

US Soybeans, Exports Share of Total Use, 1975/76-2009/10*

\[ y = -0.1048x + 38.829 \]
\[ R^2 = 0.0797 \]

Marketing Year

Source: USDA

*2009/10 Projected
Soybeans: Forecasting Exports

Large variation year-to-year

Factors to consider:

- Prices and available supplies in competing export countries

- ____________

- Demand for soybean oil and soybean meal in ____________ countries

- Government export ______ programs both in the US and other countries

___________ production prospects have become an especially important factor in determining US soybean exports

Important to note that export demand is driven by foreign demand for soybean oil and soybean meal; which, in turn, is often driven by ____________ in the same foreign countries
Soybeans: Feed, Seed, and Residual Use

_________ component of soybean use

- Actually possible to feed soybeans directly to animals using on-farm processing procedure
- Seed use for domestic planting

Residual use:

As noted earlier, where possible, consumption use is ____________ with objective information source

- Export loadings at US ports
- Census Bureau oilseed crushings

Since not all soybean use can be cross-checked a category for “residual” or “unaccounted” use is required

Lumped together with ________________ in soybean balance tables, as objective information is not available to cross-check
US Soybeans, Feed, Seed and Residual Use, 1975/76-2009/10*

\[ y = 2.6723x + 70.213 \]
\[ R^2 = 0.5012 \]

Marketing Year

Source: USDA  
*2009/10 Projected

US Soybeans, Feed, Seed and Residual Share of Total Use, 1975/76-2009/10*

\[ y = 0.0147x + 4.8729 \]
\[ R^2 = 0.0249 \]

Marketing Year

Source: USDA  
*2009/10 Projected
Soybeans: Forecasting Feed, Seed, and Residual Use

Quite constant at about ____ million bushels until the mid-1990s

More variable since then, with an average level of about ____ million bushels since 2003/04

Most analysts use a recent average to forecast FSR

\[ y = 46.744x + 1448.8 \]

\[ R^2 = 0.8556 \]

Source: USDA

*2009/10 Projected
Updating Use Estimates within the Marketing Year

As mentioned at the beginning of this lecture, use estimates are updated within the marketing year based on various reports, such as export sales and inspections, quarterly USDA reports and USDA inventory reports.

Updating Exports for Corn and Soybeans

The USDA has an extensive reporting system for crops:

- The system has its roots in the unexpected purchase of large amounts of grain by the ____________ in 1972.

- The huge, unanticipated Soviet purchases of U.S. wheat and corn that year produced a sizable run-up in US food prices and depleted US reserve stocks (popularly known as the “Great Soviet Grain Robbery of 1972”)

10-29
• Concern that large grain companies gained an advantage in this situation because they had ____________ than the public had on future prices and grain trade trends

• Congress mandated export sales reporting in 1973 so that all parties involved in the production and export of U.S. grain have access to ____________ export information

• Prior to the establishment of the export sales reporting system, it was impossible for the public to obtain information on exports until the products were actually shipped.

Under the export sales reporting system, U.S. ________ are required to report all _________ of certain commodities by 3:00 p.m. (Eastern time) on the business day after the sale is made

• US. exporters provide information on the ________ of their sales transactions, the ____ and class of commodity, the ____________ of shipment, and the ____________
• They also report any changes in previously reported information, such as cancellations and changes in destinations.

All daily sales reported to USDA by the 3:00 p.m. deadline are summarized and released to the general public through a Departmental press announcement at 9:00 a.m. on the next business day.

• A ________________ of export activity, "U.S. Export Sales," is generally published every Thursday at 8:30 a.m.

• The Foreign Agricultural Service (FAS) within the USDA has responsibility for the export sales reporting system
FOR WEEK ENDING 3/24/2005

<table>
<thead>
<tr>
<th>COMMODITY</th>
<th>NET SALES</th>
<th>CURRENT MARKETING YEAR</th>
<th>NEXT MARKETING YEAR</th>
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<td></td>
<td>OUTSTANDING SALES</td>
<td>WEEKLY EXPORTS</td>
<td>ACCUMULATED EXPORTS</td>
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<td>CURRENT YEAR</td>
<td>YEAR AGO</td>
<td>CURRENT YEAR</td>
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<td>CORN</td>
<td>1,158.90</td>
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<td>SOYBEANS</td>
<td>56.4</td>
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<td>TOTAL</td>
<td>45.8</td>
<td>663.6</td>
<td>561.6</td>
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<td>0.2</td>
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<td>17.8</td>
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<td>M S MLD</td>
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<td>TOTAL</td>
<td>45.8</td>
<td>663.6</td>
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<td>COTTON</td>
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<td></td>
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<tr>
<td>UPLAND</td>
<td>155.7</td>
<td>4,282.90</td>
<td>4,451.10</td>
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<td>PIMA</td>
<td>3.6</td>
<td>59.9</td>
<td>51.4</td>
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THOUSAND METRIC TONS

THOUSAND RUNNING BALES

CURRENT YEAR THOUSAND METRIC TONS

CURRENT MARKETING YEAR WEEKLY EXPORTS ACCUMULATED EXPORTS NET SALES OUTSTANDING SALES

NEXT MARKETING YEAR NET SALES OUTSTANDING SALES

COTTON

THOUSAND RUNNING BALES

UPLAND 155.7 4,282.90 4,451.10 377.4 6,468.30 7,149.40 9.2 604.9

PIMA 3.6 59.9 51.4 17.9 685.6 394.6 0 0.2
This data can be used to track the ______ of exports within the marketing year

**US Corn, Export Progress for the 2007/08 Marketing Year Through 3/27/2008**

- **Pace needed to meet USDA estimate = 2,450 mil. bu.**
- **2007/08 to date**
- **Average pace of previous 3 mktg. yrs.**

**Source:** USDA

**US Soybeans, Export Progress for the 2007/08 Marketing Year Through 3/27/2008**

- **Average pace of previous 3 mktg. yrs.**
- **2007/08 to date**
- **Pace needed to meet USDA estimate = 1,025 mil. bu.**

**Source:** USDA
Another agency within the USDA also produces weekly information on grain export activity

- The Federal Grain Inspection Service (FGIS) of the Grain Inspection Packers and Stockyards Division (GIPSA) of the USDA establishes the _________________ for grain, which are used by sellers and buyers to communicate the _____ and ______ of grain bought and sold

- FGIS collects grain export volume data during _________________ of grain loaded on ships for export

- The FGIS weekly Grains Export Inspections Report can be found at: http://www.ams.usda.gov/mnreports/WA_GR 101.txt
### WEEKLY GRAIN INSPECTIONS

GRAINS INSPECTED AND/OR WEIGHED FOR EXPORT
- 1,000 BUSHELS -

<table>
<thead>
<tr>
<th>GRAIN</th>
<th>03/31/05</th>
<th>03/24/05</th>
<th>04/01/04</th>
<th>CURRENT TO DATE</th>
<th>PREVIOUS TO DATE</th>
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<td>WHEAT</td>
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<td>OATS</td>
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<td>0</td>
<td>0</td>
<td>5</td>
<td>239</td>
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<td>1,173</td>
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<td>12,386</td>
<td>17,103</td>
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<td>934</td>
<td>1,806</td>
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<td>30,661</td>
<td>29,266</td>
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<td>SORGHUM</td>
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<td>3,132</td>
<td>3,848</td>
<td>89,505</td>
<td>112,663</td>
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<td>SOYBEANS</td>
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<td>17,513</td>
<td>7,188</td>
<td>888,425</td>
<td>768,251</td>
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<td>0</td>
<td>0</td>
<td>0</td>
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<td><strong>TOTAL</strong></td>
<td>62,562</td>
<td>73,011</td>
<td>62,984</td>
<td>2,867,219</td>
<td>2,953,491</td>
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</table>

Crop marketing years begin June 1 for wheat, rye, oats, barley and flaxseed; September 1 for corn, sorghum, soybeans and sunflower seeds.

Includes waterway shipments to Canada.
Note that FAS and FGIS grain volume data, while often quite similar, do not have to be the same.

To further complicate matters, the ________ data on grain exports is not based on either of the previous USDA reports!

The __________________ of the Department of Commerce produces the official statistics on grain exports:

- Collected as part of ongoing industry reporting system
- Reported on a ________ basis
- However, reported with a ___________
- The quantity data on grain exports is not reported on the web, but is usually reported by wire services as soon as it is released
**Updating Food, Seed and Industrial Use for Corn**

Official statistics on FSI use for corn are reported quarterly by the Economic Research Service (ERS) of the USDA.

This data can be found in the monthly *Feed Outlook* publication at: [http://usda.mannlib.cornell.edu/MannUsda/viewDocumentInfo.do?documentID=1273](http://usda.mannlib.cornell.edu/MannUsda/viewDocumentInfo.do?documentID=1273)

![Graph showing US Corn, Food, Seed and Industrial Use Progress for the 2007/08 Marketing Year Through First Quarter](#)

**US Corn, Food, Seed and Industrial Use Progress for the 2007/08 Marketing Year Through First Quarter**

- **Pace needed to meet USDA estimate = 4,555 mil. bu.**
- **2007/08 to date**
- **Average pace of previous 3 mktg. yrs.**

*Source: USDA*
US Corn, Ethanol for Fuel Use Progress for the 2007/08 Marketing Year Through First Quarter

Pace needed to meet USDA estimate = 3,200 mil. bu.

2007/08 to date

Source: USDA
** Updating Crush Use for Soybeans **

Official statistics on soybean crushings are reported monthly by the US Census Bureau in the Department of Commerce.

The report is entitled *Fats and Oils, Oilseed Crushings* and is available on the web at: [http://www.census.gov/cir/www/311/m311j.html](http://www.census.gov/cir/www/311/m311j.html) (Table 2 under the heading “Crushed or Used”)

![US Soybeans, Crushings Progress for the 2007/08 Marketing Year Through February 2008](chart.png)

*Source: Dept. of Commerce*
**Updating Use via Quarterly Stocks**

Quarterly stocks estimates are another important means of assessing the ____________ within a marketing year.

The USDA estimates the level of stocks on four dates during the year:

- __________ 1
- __________ 1
- ________ 1
- _______ 1

The stocks reports are released at the end of each of the above calendar months.

Each stock estimate can be used to assess whether the rate of usage has been ____________ than expected.
December 1:

Available supply for Sep-Nov quarter =
   Sep 1 stocks + production + imports =

Available supply for Sep-Nov quarter – Dec 1 stocks
   = Total use for Sep-Nov quarter

March 1:

Available supply for Dec-Feb quarter =
   Sep 1 stocks + production + imports
   -Total use for Sep-Nov quarter

Available supply for Dec-Feb quarter – Mar 1 stock
   = Total use for Dec-Feb quarter

June 1:

Available supply for Mar-May quarter =
   Sep 1 stocks + production + imports
   -Total use for Sep-Nov quarter
   -Total use for Dec-Feb quarter

Available supply for Mar-May quarter – Jun 1 stock
   = Total use for Mar-May quarter
September 1:

Available supply for Jun-Aug quarter =
   Sep 1 stocks + production + imports
   -Total use for Sep-Nov quarter
   -Total use for Dec-Feb quarter
   -Total use for Mar-May quarter

Available supply for Jun-Aug quarter – Sep 1 stock
   = Total use for Jun-Aug quarter

The _______ usage for each quarter can be compared
to the _________ in the latest WASDE balance sheet
to see if usage is evolving at the pace expected

__________________________ of each quarter’s usage to total
usage are helpful in assessing whether the pace is fast
or slow

Quarterly stocks estimates are also an important
means of assessing _________________ for corn
during the marketing year
The only balance sheet categories that ________ be monitored on an ongoing basis during the marketing year are:

- Corn feed and residual use
- Soybean feed, seed and residual use

Since corn feed and residual use is about ___ of total use, it is ________ to monitor its pace during the marketing year.

This is not as important for soybean feed, seed and residual use, which is only about 5% of total use.

Once __________ for a given quarter is determined, the level of feed and residual use can be ________ by the following simple formula:

\[
\text{Total use for a quarter (computed)} - \text{Exports (known)} - \text{FSI (known)} = \text{Feed and residual use}
\]

Once, again ________________ of feed and residual use for a given quarter to total usage can be used to assess whether the pace feed and residual use is ____
**Updating Use Based on Livestock Inventories**

Livestock inventories are important determinants of corn feed and residual use and soybean crush use.

The _______ of animals on feed is tracked by several USDA reports within the marketing year:

- Monthly *Hogs and Pigs Reports*
- Monthly Cattle on Feed Reports
- Monthly *Broiler Hatchings Reports*

As these reports are released, feed and crush use estimates can be _________.

One problem is that inventory estimates are reported _______ for different livestock _________.

However, ________ species consume quite ______ amounts of corn and soybean meal in feeding rations.

- There is a need to ________ different species according to the amount of feed that one animal consumes.
• This led to the development of the concept of a ________________

The base for computing grain consuming animal units is the total level of grain concentrate fed to a __________ for the base period of 1969-1971, which equals __________

The number of pounds of grain concentrate consumed by another species is divided by 4,293 pounds to determine the __________

<table>
<thead>
<tr>
<th>Animal Category</th>
<th>Grain Concentrate Fed Per Animal</th>
<th>Weighting Factor</th>
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</thead>
<tbody>
<tr>
<td>Milk Cows</td>
<td>4,293</td>
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<tr>
<td>Other Dairy Cattle</td>
<td>910</td>
<td>0.212</td>
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<tr>
<td>Cattle Placed on Feed</td>
<td>3,311</td>
<td>0.771</td>
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<tr>
<td>Other Beef Cattle</td>
<td>289</td>
<td>0.067</td>
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<tr>
<td>Sheep</td>
<td>112</td>
<td>0.026</td>
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<tr>
<td>Hogs Fed During Year</td>
<td>1,127</td>
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<tr>
<td>Hens and Pullets</td>
<td>94</td>
<td>0.022</td>
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<tr>
<td>Chickens Raised</td>
<td>30</td>
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<td>Broilers</td>
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<td>Turkeys</td>
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<tr>
<td>Horses and Mules</td>
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</table>

Next, the ________ of animals in each category for a given year is ________ by the weighting factor.

Finally, the weighted numbers are ________ to derive the ___________ of livestock in the US in grain-consuming animal _____

GCA data can be found in the monthly *Feed Outlook* publication at:
http://www.ers.usda.gov/data/feedgrains/Table.asp?t=30