GEAPS & Grain Journal Magazine’s
Grain Operations Webinar Series

September 11, 2014
Grain Accounting and Inventory Management for Grain Operations Supervisors

Presenter:
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President
J FV Solutions, Inc.
Mt Zion, IL
Outline

• Operational Grain Accounting
  o Introduction to accounting
  o Data collection
  o Report generation
  o Analysis and decision making

• Grain Inventory Management
  o Factors affecting grain inventories
  o Inventory procedures and data collection

• Relationship between accounting and inventory management
Have you ever experienced?

- You have a train to load and for some reason you can’t make grade.
- Your records show you should have space to take in forty more trucks but your bins are almost full.
- You have just cleaned out all your bins for harvest and your records indicate you have lost 65,000 bushels somewhere.
- Your operating expenses have increased by 7% over the previous year.
- The amount of FM coming out of your dry corn bin seems higher than normal.
What do I do next?

• Go over my numbers again - possible mistakes
• Do nothing and hope it corrects itself next time
• Retake my inventory measurements
• Resample my bins
• Review my operating procedures
• Pull retention samples and recheck
• Past history - did I have this problem before
• Discuss with my colleagues in the elevator
• Consult with my accounting department
• Consult with plant management
Accounting
Accounting – "The Language of Business"

Accounting is the process of:

- Identifying
- Measuring
- Sorting
- And Communicating economic information to permit informed judgments and decisions by users of the information.
Accounting Principles

Types of transactions:
- Income
- Expense
- Capital
- Assets
- Liabilities
- Equity

Assets = Liabilities + Equity
Accounting Principles

- Data is the building block of accounting and management.
- Data must be:
  1. Meaningful
  2. Reliable/accurate
  3. Verifiable
  4. Repeatable
  5. Timely
  6. Presented in a systematic and usable format
Accounting Systems

- Traditional Manual entries and close
- Excel spreadsheets
- Fully automated accounting and inventory management software
  - Initial expense
  - Lower operating cost
  - Reduce chance of errors
  - Real time accounting
  - Allows for greater analysis
  - Provides for better decision making
  - Results in better management
Sourcing and Accounting of Raw Data

Concentrate on Manageable Expenses and Inventories
What are Manageable Expenses and Inventories?

- Manageable expenses or inventories are those items you have direct control over and would include items such as:
  - Operating cost
  - Energy Usage
  - Bin Space
  - Grain quality
  - Asset utilization
Source Data Documents

- **Receipts**
  - Weights, grades, logistical, and contractual
- **In-process**
  - Handling, cleaning, aeration, drying shrinks
- **Inventories**
  - Quantity and quality
  - Book vs. actual
- **Shipping**
  - Weights, grades, logistical, and contractual
- **Expenses**
  - Variable and fixed
- **Capital cost**
- **Income**
Inbound Scale Ticket

ABC Grain Company
1234 W. Main St.
Anywhere, USA

Shipper: HAULED BY CUSTOMER
SMIB4: Smith – Back 40

50%: Smith, John
25%: Smith, Jane
25%: Jones, Sam

COMMODITY: #2 Y CORN

MOISTURE SHR: 16.1
FOREIGN MATE: 1.0
TEST WEIGHT: 56.2
DAMAGE: 5.7

05/05/14 14:23 53400 Lbs.
05/05/14 14:29 31520 Lbs.
NET WGT: 31880 Lbs.
GROSS BU: 569.29
NET BU: 560.53

Quality: Passed
Scale Operator: XYZ
Bill of Lading

ORIGINAL BILL OF LADING

BL Date: 4-30-14
Commodity: Corn

Shipper: [Redacted]
Origin: [Redacted]
Account of: [Redacted]

Destination: MEMPHIS, TN
Routing: DT-DCATR-CN DIRECT
Route Code: DT
Freight: PPD [Redacted]

Protect 25 Car Rate
Authority:
Rules: Signed Section 7, Straight Bill of Lading
Grades: Origin Official
Weights: Destination
Waive Inspection & Set Direct

Lead Car: AEX 13307 & 26 OTHERS
Cars Applied: (27 of 27)

AEX 13307
LCCX 680
AEX 14214
CGCX 20108
INTX 47241
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Temperature Cable Report

Number One (1) Thermocouple 1.5 foot from Bottom of Cable

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### Dryer Operating Report

**Dryer Report and Shrinkage Calculation**

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<thead>
<tr>
<th>Date:</th>
<th>Start time:</th>
<th>Stop time:</th>
<th>Operator:</th>
<th>Grain:</th>
<th>Wet Bin#:</th>
<th>Dry Bin#:</th>
<th>Weather:</th>
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<tbody>
<tr>
<td>Grain Dryer Hour Reading:</td>
<td>Start:</td>
<td>Stop:</td>
<td>Gas Meter:</td>
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<table>
<thead>
<tr>
<th>Time</th>
<th>Dry Moisture</th>
<th>Grain Temp</th>
<th>Wet Moisture</th>
<th>Grain Temp</th>
<th>Burner Temp</th>
<th>Dryer Volts</th>
<th>Comments</th>
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<table>
<thead>
<tr>
<th>Average</th>
<th>Bu, per hour:</th>
<th>Total Drying Shrink</th>
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<tbody>
<tr>
<td>Average Wet:</td>
<td>Bu, per hour:</td>
<td>Total Drying Shrink</td>
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</table>

Difference: \[ \text{Total Dried} \times 0.014 = \] 

1/23/2013
Importance of Source Documents

- Provide input for contractual activities
- Component of customer service and satisfaction
- Provide input for regulatory activities
- Provide input for managerial reports
- Basis of management analysis and decisions
  - Critical for continuous improvement
  - Critical for profitability
  - Critical for sustainability
Typical Management Reports

- Cost reports
- Inventory reports
  - Quantity
  - Quality
- Daily Position Report (DPR)
- Delivery Sheets
- Settlement Sheets
- Production Reports
- Profit and loss
- Balance sheet
## Operating Expenses

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<th>Acct #</th>
<th>Labor</th>
<th>This Month</th>
<th>Month $ Cost /bu.</th>
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<td></td>
<td>Overtime</td>
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<tr>
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<td>Payroll Taxes</td>
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<td>Benefits</td>
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<td>Utilities</td>
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<td>Telephone and data services</td>
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<td></td>
<td>Vehicle expense</td>
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<td>Data Processing</td>
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<td>Travel and Meetings</td>
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<td>Dues and Subscriptions</td>
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<td>Trucking Expense</td>
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<td>Rail Expenses (demurrage, switching, etc)</td>
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<td>Barge Expense</td>
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<td>License and Fees</td>
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# Daily Position Report

**ABC Grain Company**

**DATE:** 05/21/14  
**TIME:** 10:12 am  
**Last Ticket In:** 0913491  
**Out:** 0000001  
**Control:** Ce22631

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<th>OUT TRANS</th>
<th>TERMINAL TOT STOCK</th>
<th>TOT STOCK</th>
<th>HOLD GRAIN BMK</th>
<th>OPEN STOR</th>
<th>WHS RCPT</th>
<th>OWN UNPD</th>
<th>OWN PAID</th>
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**US C&I**

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<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
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<tr>
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**US STU**

<table>
<thead>
<tr>
<th>UNIT OF MEASURE</th>
<th>IN TRANS</th>
<th>OUT TRANS</th>
<th>TERMINAL TOT STOCK</th>
<th>TOT STOCK</th>
<th>HOLD GRAIN BMK</th>
<th>OPEN STOR</th>
<th>WHS RCPT</th>
<th>OWN UNPD</th>
<th>OWN PAID</th>
<th>DELAYED</th>
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</thead>
<tbody>
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<td>05/21/14</td>
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**US YUK**

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<th>TOT STOCK</th>
<th>HOLD GRAIN BMK</th>
<th>OPEN STOR</th>
<th>WHS RCPT</th>
<th>OWN UNPD</th>
<th>OWN PAID</th>
<th>DELAYED</th>
</tr>
</thead>
<tbody>
<tr>
<td>BUSHELS</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
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</tr>
<tr>
<td>05/21/14</td>
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<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
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</tr>
</tbody>
</table>
# Delivery/Settlement Sheets

## Delivery Sheet

**Company:** ABC Grain Company  
**Address:** 1234 W. Main St.  
**City:** Anytown, USA

**Customer:** Smith, John  
**Address:** 678 N. Farm Rd.  
**City:** Anytown, USA

**Delivery Sheet:** 142366  
**Reprinted:** Purchase  
**Date:** 5/21/2014

**Grain:** #2 Y CORN

<table>
<thead>
<tr>
<th>Ticket</th>
<th>Date</th>
<th>Vehicle ID</th>
<th>OTHER REF. #</th>
<th>Weight</th>
<th>% Grade</th>
<th>Base Value</th>
<th>Unit</th>
<th>Factor</th>
<th>Rate</th>
<th>Amount</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>204475.20</td>
<td>67142010</td>
<td></td>
<td>16.34</td>
<td>99</td>
<td>1.29</td>
<td>69</td>
<td></td>
<td>3.75</td>
<td>60.90</td>
<td>4.6200</td>
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<tr>
<td>2</td>
<td>204475.21</td>
<td>67142010</td>
<td></td>
<td>16.35</td>
<td>99</td>
<td>1.29</td>
<td>69</td>
<td></td>
<td>3.75</td>
<td>60.90</td>
<td>4.6200</td>
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<tr>
<td>3</td>
<td>204475.22</td>
<td>67142010</td>
<td></td>
<td>16.36</td>
<td>99</td>
<td>1.29</td>
<td>69</td>
<td></td>
<td>3.75</td>
<td>60.90</td>
<td>4.6200</td>
</tr>
<tr>
<td>4</td>
<td>204475.23</td>
<td>67142010</td>
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<td>16.37</td>
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<td>1.29</td>
<td>69</td>
<td></td>
<td>3.75</td>
<td>60.90</td>
<td>4.6200</td>
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</tbody>
</table>

**Totals:** 6 Loads

<table>
<thead>
<tr>
<th>Base Value</th>
<th>69.00</th>
</tr>
</thead>
</table>

## Settlement Sheet

**Company:** ABC Grain Company  
**Address:** 1234 W. Main St.  
**City:** Anytown, USA

**Customer:** Smith, John  
**Address:** 678 N. Farm Rd.  
**City:** Anytown, USA

**Settlement Number:** 652975-P  
**Reprinted:** Purchase  
**Settlement Date:** 4/3/2014

**Grain:** #2 Y CORN

## Purchase Settlement Report

<table>
<thead>
<tr>
<th>Contract</th>
<th>Delivery Sheet Information</th>
<th>BUSHELS</th>
<th>Price</th>
<th>Extension</th>
</tr>
</thead>
<tbody>
<tr>
<td>S001917-01</td>
<td>141774-01</td>
<td>3,629.94</td>
<td>$4.8000</td>
<td>$17,532.13</td>
</tr>
<tr>
<td>S001917-01</td>
<td>142368-01</td>
<td>1,606.00</td>
<td>$4.8000</td>
<td>$7,537.76</td>
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<tr>
<td>S001917-01</td>
<td>142369-03</td>
<td>1,167.03</td>
<td>$4.8000</td>
<td>$5,486.76</td>
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<tr>
<td>S001917-01</td>
<td>142368-02</td>
<td>2,489.76</td>
<td>$4.8000</td>
<td>$12,106.22</td>
</tr>
</tbody>
</table>

**Total BUSHELS:** 8,178.69  
**Total Price:** $35,503.07

**Delayed Price Change:** $2,215.43  
**Check Off:** $31.12  
**Settlement Amount:** $17,325.52  
**Check No:** 567895  
**Settler:** Smith, John  
**Amount:** $17,325.52
<table>
<thead>
<tr>
<th>Income Statement</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABC GRAIN COMPANY</td>
</tr>
<tr>
<td>INCOME STATEMENT</td>
</tr>
<tr>
<td>April 30, 2014</td>
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</table>

<table>
<thead>
<tr>
<th>TRADING INCOME</th>
<th>THIS YEAR</th>
<th>BUDGET</th>
<th>VARIANCE UNDER BUDGET</th>
<th>LAST YEAR</th>
<th>LAST MONTH</th>
</tr>
</thead>
<tbody>
<tr>
<td>GRAIN SALES</td>
<td>$104,109,125</td>
<td>$207,327,531</td>
<td>($173,218,406)</td>
<td>$175,371,535</td>
<td>$175,371,535</td>
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<tr>
<td>COST OF GRAIN SOLD</td>
<td>109,093,605</td>
<td>209,283,345</td>
<td>100,189,740</td>
<td>170,444,165</td>
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<tr>
<td>GROSS GRANULAR INCOME</td>
<td>$5,015,520</td>
<td>$6,040,186</td>
<td>($1,024,666)</td>
<td>$4,907,375</td>
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</tr>
<tr>
<td>WET MILL SALES &amp; CARBOY</td>
<td>$316,240</td>
<td>$366,110</td>
<td>($59,870)</td>
<td>$271,532</td>
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<tr>
<td>COST OF MERCHANDISE SOLD</td>
<td>235,726</td>
<td>240,705</td>
<td>($4,979)</td>
<td>206,109</td>
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<tr>
<td>GROSS MERCHANDISE INCOME</td>
<td>$84,514</td>
<td>$220,000</td>
<td>($1,485,486)</td>
<td>$13,345</td>
<td></td>
</tr>
<tr>
<td>INCOME TAXES &amp; INTEREST</td>
<td>$4,474,406</td>
<td>$4,474,406</td>
<td>($0)</td>
<td>$4,474,406</td>
<td></td>
</tr>
</tbody>
</table>

| SERVICE INCOME | |
|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| DRYING          | $4,072,667      | $4,030,000      | $4,072,067      | $2,415,674      | $4,050,195      |
| STORAGE         | 3,265,358       | 3,500,000       | (244,642)       | 1,815,280       | 3,162,313       |
| CLEANING & OTHER | 0               | 0               | 0               | 0               | 0               |
| GRAIN HANDLING  | 0               | 0               | 0               | 0               | 0               |
| MARKETING INCOME | 77,353          | 76,000          | 1,353           | 56,210          | 77,087          |
| FARM PICKUP     | 18,070          | 15,000          | 3,070           | 1,935           | 17,611          |
| VAC RENTAL      | 700             | 600             | 100             | 900             | 600             |

| GROSS SERVICE INCOME | $7,424,667 | $7,621,500 | ($196,833) | $4,293,632 | $7,317,735 |
| TOTAL GROSS INCOME | $12,832,863 | $11,661,586 | ($1,171,277) | $11,763,754 | $12,144,773 |

| OPERATING EXPENSES | $9,671,375 | $10,887,566 | ($2,216,191) | $8,537,335 | $10,965,468 |
| NET OPERATING INCOME | $3,161,488 | $3,774,020 | ($672,532) | $2,226,419 | $2,179,305 |

| OTHER INCOME | |
|---------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| INTEREST & FINANCE CHARGES | 8,595 | $10,560 | ($8,565) | 9,514 | 9,514 |
| PATRONAGE REFUNDS | 406,082 | 790,000 | 1,184,918 | 587,940 | 671,491 |
| RENT | 37,150 | 30,000 | 7,150 | 59,156 | 59,156 |
| MISC | 12,376 | 9,000 | 3,376 | 8,346 | 8,346 |

| TOTAL OTHER INCOME | $944,494 | $915,030 | $29,464 | $955,912 | $223,877 |

| OTHER EXPENSE | |
|---------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| INTEREST EXPENSE & OTHER | 593,097 | $800,800 | ($207,903) | $520,201 | $330,200 |

| TOTAL OTHER EXPENSE | $293,097 | $509,000 | ($209,903) | $430,201 | $330,200 |

| NET INCOME FOR PERIOD | $3,111,391 | $3,265,020 | ($143,629) | $1,796,218 | $1,849,138 |
Analysis

• Comparative
  o Versus budget
  o Versus prior periods
  o Versus benchmarks - industry

• Trends
  o Short and long term

• Correlations
  o Cause and effect
## Operating Expenses

<table>
<thead>
<tr>
<th></th>
<th>Date:</th>
<th>Plant Operating Expenses</th>
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<tbody>
<tr>
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<td></td>
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<tr>
<td>xxxx</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Salaried</td>
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<td></td>
</tr>
<tr>
<td>Hourly</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overtime</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maintenance</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maintenance Overtime</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Labor
- **This Month**
- **Month $ Cost /bu.**
- **Month Last Year**
- **Year to Date**
- **YTD $ Cost /bu.**
- **Last Year to Date**
- **Month Variance to Budget**
- **YTD Variance to Budget**
Management Action

- Compare performance against business plan
  Accept and acknowledge performance or
- Take action on manageable items not meeting expectations or
- Establish new goals or acceptable performance
- Share expectations and delegate task to achieve desired results
Actions

• Actions should be taken after analysis and based on data.
• Actions should be specific to correct or enhance plan variances.
• Actions should be immediate.
• Actions and expectations should be communicated.
• Actions should be reviewed for effectiveness.
Inventory Management
Asset Management

- Inventories are an asset.
- Inventories are an extremely valuable asset.
- Inventories require large amounts of working capital to maintain.
- Inventories must be managed to retain value.
  - Quantity
  - Quality
Types of Inventories

- Raw Materials (grain)
- In-process
- Finished goods
- Supplies
- Parts
Valuable Asset

• You have a 2,000,000 bushel house
• At year end you come up short
  o 45,000 bu. of corn
  o 5,000 bu. Of beans
• 45,000 bu x $3.75/bu = $168,750
• 5,000 bu x $10.75/bu = $53,750
• Total value of shrink = $222,500
• Represents a 2.5% shrink

Is this acceptable?
Risk Associated with Grain Inventories

- Valuation/Markets
- Quality losses
  - Mixing, moisture, insects, breakage, molds, toxins
- Quantity losses
  - Shrink - handling, drying, aeration
  - Theft
- Accounting
  - Procedures and systems
  - Management
Managing Grain Inventories

1. Identification
2. Measurement
3. Procedures
4. Security
5. Accounting
6. Management Action
Identification

- Commodity identity must be established and preserved.
- Storage units must be clearly labeled.
- Routing systems must be clearly labeled.
- Documentation linked to physical commodity must have an audit trail:
  - What
  - When
  - Where
  - Who
Measurement

- Accurate measurements are critical
- Timeliness of measurements
- Specific measurement procedures, “Best Practice”
- Specific Forms
- Avoid assumptions
- Clear cut offs, suspend activity if possible
- Charts
- Tools
- Safety
- Training
Measurement

How to Measure Your Grain

How do I find the bushels my round bin will hold?

\[(\text{Diameter}) \times (\text{Diameter}) \times (\text{Depth}) \times (0.7854) \times (0.80385) = \text{Standard Bushels}\]

How about the peak in my round bin?

\[(\text{Diameter}) \times (\text{Diameter}) \times (0.7854) \times (0.80385) = \text{bushels per foot}\]

The height of the peak above the base divided by 3 and multiplied times the bushels per foot = Standard Bushels

If you can not determine the height of the peak. Divide the Diameter by 2 and multiply that times 0.4 for corn or 0.5 for soybeans. Divide that number by 3 and multiply that times the bushels per foot = Standard Bushels

How about my round bin which is pulled down into a cone in the center?

Find the bushels per foot the same as the peak above. Find the depth of the cone or use the rule of thumb given above and multiply two thirds of that number times the bushels per foot.

You can also take the depth at the side wall and add one third of the height of the cone up or subtract one third of the depth of the cone down. Then calculate the bushels as if the bin were level across.

The rule of thumb of 0.4 times the radius of a bin for corn or 0.5 times the radius of a bin for soybeans works for dry clean grain. If the grain is wet or has a lot of fines the peaks and valleys will be higher and deeper.

The test weight of the grain will affect the number of bushels. The directions given above result in Standard (Winchester) Bushels. Corn weighing more than 54 pounds and soybeans weighing more than 56 pounds per bushels will have more bushels than the standard and if they weigh less there will be less bushels. The Pack charts are too big to be placed here. If you need that degree of accuracy talk to your County Extension office.

My grain does not lay in nice regular figures. Try to break your bin down into several rectangles, triangles, or cones and calculate each and add up the totals. Good luck!
# Measurement

## Ground Pile Calculator

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
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</thead>
<tbody>
<tr>
<td>Diameter</td>
<td>150 Feet</td>
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<tr>
<td>Radius</td>
<td>75 Feet</td>
</tr>
<tr>
<td>Angle of Repose</td>
<td>22 Degrees</td>
</tr>
<tr>
<td>Radians</td>
<td>0.383972435</td>
</tr>
<tr>
<td>Tangent of angle</td>
<td>0.404026226</td>
</tr>
<tr>
<td>Cosine of angle</td>
<td>0.927183855</td>
</tr>
<tr>
<td>Height of Pile</td>
<td>30.3 Feet</td>
</tr>
<tr>
<td>Side Wall Height</td>
<td>4 Feet</td>
</tr>
<tr>
<td>Total Height of Pile</td>
<td>34.3 Feet</td>
</tr>
<tr>
<td>Distance from Edge to Edge</td>
<td>162 Feet</td>
</tr>
<tr>
<td>Going over the Peak</td>
<td></td>
</tr>
<tr>
<td>Volume of Pile (No Pack)</td>
<td>199,343 Bushels</td>
</tr>
</tbody>
</table>

![Diagram of a round pile with measurements](image)

**Ground Pile Calculator**

**Round Pile**

- **Diameter**: 150 Feet
- **Radius**: 75 Feet
- **Angle of Repose**: 22 Degrees
- **Radians**: 0.383972435
- **Tangent of Angle**: 0.404026226
- **Cosine of Angle**: 0.927183855
- **Height of Pile**: 30.3 Feet
- **Side Wall Height**: 4 Feet
- **Total Height of Pile**: 34.3 Feet
- **Distance from Edge to Edge**: 162 Feet
- **Volume of Pile (No Pack)**: 199,343 Bushels
Measurement
Procedures

- Receiving – weights and grades
- Storage – design, preparation, care
- Drying
- Cleaning
- Moisture management (aeration)
- Pest management
- Handling – turning, coring, inspections
- Shipping – blending
- Maintenance
- Training
Procedures - Receiving
Procedures - Receiving

- **Sampling**
  - Representative sample
  - Labeled

- **Grading**
  - Follow procedures
  - Repeatable
  - Documentation

- **Binning**
  - Maintain identity
  - Take time, check sets
  - Labeling – commodity, grades, weights
Procedures - Routing

- Receiving pits
- Bucket elevator legs
- Conveyance
- Spouting
- Distributors
- Gates and valves
- Dust Systems

- Keep equipment maintained and intact – eliminate leaks and spills
Procedures - Handling

• Maintain grain identity
  o System design
  o System maintenance
  o Training

• Maintain grain quality
  o Moisture
  o Breakage
  o Micotoxins
  o Mixes
  o Insects
  o Rodents
  o Birds
Procedures - Cleaning

- System design
  - Match commodity and desired output
  - Avoid over cleaning
  - Control over fractions - track weights
  - Air and dust system losses
- Maintenance
- Training
- Oversight
  - Require attention from operator and supervision
Procedures – Moisture Management

- Control inbound
- Control drying
- Control aeration
- Monitor storage
- Control outbound

Moisture loss is one of the largest causes of inventory variance!
Procedures - Drying

• System design
  o Type of dryer
  o Fuel source
  o Retention time
  o Heat to cool ratios
  o Air flows

• Procedures
  o Drying temperatures
    • Plenum
    • Exit
  o Moisture monitoring – manual or automated
  o Cleaning

• Maintenance
• Training
Procedures - Storage

- Bin design
  - Shape – diameter, height, length
  - Access for inspection, sampling, and unloading
- Bins labeled
- Bins maintained
  - Sound
  - Water tight
- Bins cleaned
- Sufficient aeration
- Quality monitoring
  - Temp cables
  - Infrared
  - CO2
Procedures – Pest Management

- Control inbound
- Monitor storage
  - Insects
  - Rodents
  - Birds
- Treat as needed
  - Periodic
  - Situational
- Trained technicians
  - In house
  - Contracted
  - SAFETY
Procedures - Shipping

- **Sampling**
  - Representative sample
  - Labeled
- **Grading**
  - Follow procedures
  - Repeatable
  - Documentation
- **Routing and Blending**
  - Maintain identity
  - Take time, check sets
  - Documents - commodity, grades, weights, times, signatures
  - Seals
Procedures - Maintenance

• Maintenance and inventory management
  o Goal is to maintain identity, quantity, and quality

• Preventative maintenance
  o Use historical data
  o Follow plan
  o Training

• Corrective Maintenance
  o Act upon issues as they occur

• Capital programs - useful life of equipment
Procedures - Training

- Train
- Train
- Train
- Train
- Train
- TRAIN!!!!!!!!!!!
Security

- **Fraud**
  - Controls
  - Systems
  - Checks and balances
  - Audits – internal and external

- **Theft**
  - Secure your facility
    - Locks – mechanical and electrical
    - Alarms
    - Cameras

- **Areas of major concern**
  - Scales
  - Side draw loadout spouts
  - Ground piles or other temporary storage
Accounting

- Data and documents
- Frequency
- Book inventories
- Physical inventories
- Taking physical inventories
- Shrink calculation and management
- Report analysis
- Warehousing and grain dealers licenses
- Reconciliation
Source Data Documents

- Receipts
  - Weights, grades, logistical, and contractual

- In-process
  - Handling, cleaning, aeration, drying, shrinks

- Inventories
  - Quantity and quality
  - Book vs. actual
  - DPR's - Daily Position Report

- Shipping
  - Weights, grades, logistical, and contractual
Accounting – Book vs Physical Inventories

• **Book Inventory** – the theoretical quantity and quality resulting from source data and documents.
• **Physical Inventory** – the actual quantity and quality determined through measurement.
• If Book is greater than physical you have a loss or shrink.
• If Book is less than physical you have a gain.
• It is normal to see period to period variations.
• Trends overtime must be tracked to determine effectiveness of inventory management programs.
Accounting – Taking a Physical Inventory

- **Inventory Procedures**
  - **Have a written plan!**
  - **When**
    - Establish frequencies
    - Establish cutoffs
    - Suspend operation if possible
  - **Who**
    - Trained employees
    - Document dates, times, and signatures
  - **How**
    - Specific methodology to be used on each type of structure or storage unit
Common Types of Shrinks

- Handling
- Cleaning
- Moisture
  - Drying
  - Aeration
Accounting – Shrink Calculation and Management

- **Handling shrinks**
  - .2 to .5% is normally assigned

- **Cleaning shrinks**
  - Wheat – dockage is taken as a weight reduction on receipt
  - Beans – FM is taken as a weight reduction on receipt
  - Other commodities take actual measured losses

- **Moisture**
  - Depending on accounting system in use, shrinks may be taken on inbound corn - 1.4% shrink for each point of moisture over 15% is common. Some accounting systems will arbitrarily add back a percent to reduce variability.
  - Maybe taken during drying and aeration based on measured realized moisture loss.
Accounting – Shrink Calculation and Management

- Normal shrinks
  - Corn - 0.25%
  - Beans - neutral
  - Wheat - 0.2 to 0.3%

- Ground piles or other temp storage
  - Take an additional 1.0% shrink
  - May be taken as 0.1% per month of storage being “out”
Calculating Grain Weight Shrinkage in Corn Due to Mechanical Drying - NCH 61

- Table 1. Water shrink factors for drying shelled corn to various moisture levels.
- Final moisture content (%) Water shrink factor (% shrink per point)
- 15.5 1.183
- 15 1.176
- 14 1.163
- 13 1.149
- 12 1.136
Calculation and Management

- Pack Factors
- Dependent on:
  - Bin or structure design - height, shape, diameter
  - Grain
    - Type - commodity and variety
    - Moisture
    - Cleanliness
    - Test weight
    - Depth of material in bin
## Calculation and Management

<table>
<thead>
<tr>
<th>Test Weight</th>
<th>PACK FACTOR</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Corn</td>
<td>Beans</td>
<td>Wheat</td>
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<tr>
<td>51</td>
<td>1.017</td>
<td>0.0951</td>
<td>0.994</td>
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<td>52</td>
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<td>59</td>
<td>1.151</td>
<td>1.074</td>
<td>1.126</td>
</tr>
</tbody>
</table>

2290 or over sq ft bins

FCIC/USDA - 25010 (LAM)
Calculation and Management

- **Pack Factor Example**

  Standard 90’ Diameter corrugated steel bin

  Dry clean 56# com has a pack factor of 1.102%

  Measured quantity in the bin is 235,000 bushels

  \[235,000 \times 1.102 = 258,970 \text{ bushels}\]

  The 258,970 bushels is what would actually be recorded as the inventory in the bin.
Accounting – Analysis and Reconciliation

- Analyze book vs. physical
- Identify variances
- Identify source of variance
  - Review source documents and data
  - Review last periods data
  - Re-measure
- Make adjustments to book

Even though you will have some period to period variance it is a good idea to keep book adjusted to physical inventory. Track trends to correct procedures.
Management Action

- Review data immediately
- Identify opportunity areas
- Identify cause and effect variable(s)
- Identify probable cause(s)
- Identify corrective actions
- Initiate corrective actions
- Review outcomes
- Establish new controls or procedures
- Follow-up
Summary

• Accounting – is the process of identifying, measuring, sorting, and communicating economic information to permit informed judgments and decisions by the users of the information.
• Concentrate on Manageable Expenses and Inventories
• Know the source data documents and insure their accuracy
• Know all the reports available to analyze your area of operation and where the data inputted into them is derived from
• Take action!!!!
Summary

Six Inventory Management Tools
1. Identification
2. Measurement
3. Procedures
4. Security
5. Accounting
6. Management Action

Use these tools to maintain value of inventory.
Summary

- Trained employees
- **Accurate source documents**
- Understand operating activities impact on inventories, both quantity and quality
- Have a written physical inventory procedure and plan
- Safe unrestricted access to measurement points
- Proper tools
- **Take immediate action on variances**
Questions?

E-mail us at:

jfvsolutions@hotmail.com
Disclaimer

- This lesson is intended for a global audience that works in a variety of different styles of facilities as well as economic and governmental conditions. The content of this lesson is for informational purposes and to be used as it applies to your specific situation.
- The content of this lesson is not to take precedence over your current plant and/or company policies and programs, nor any governmental regulations.
- The photos used in this lesson were for illustration of the topic and are not to be taken as a recommendation for any design or equipment depicted in them.