

Farm: \_\_\_\_\_

## **Farm Specific Grain Storage Management**

### **Records**

- Grain Storage Monitoring Record
- Storage Management Activity Record
- Storage Fixed Cost Record
- Equipment Fixed Cost Record
- Grain Grade Record
- US Grain Grades & Grade Requirements

Use these records to monitor grain quality, grain management activities and management costs. Make additional copies as needed. Use this information in the “Grain Storage Cost Calculator” to calculate grain storage management costs.

The Grain Storage Cost Calculator is available at <https://blogs.cornell.edu/capitalareaagandhortprogram/2021/09/17/grain-storage-cost-calculator-record-sheets/> along with blank copies of the Record sheets.

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This material is based upon work supported by the National Institute of Food and Agriculture, U.S. Department of Agriculture, through the Northeast Sustainable Agriculture Research and Education program under sub-award number SARE LNE20-396.

## Grain Bin Monitoring – Grain Storage Management Education for the Hudson Valley

Weekly monitoring is best, monthly is a minimum. Compare grain temperature to the monthly average temperature (<http://newa.cornell.edu/index.php?page=daily-weather>). When grain is >15°F different from the monthly **average** temp, consider cooling/warming grain to prevent condensation. Record grain moisture, temperature, insects, eaten kernels, grain dust from feeding, insect webbing, molds, condensation, grain bridging, odor/mustiness/feel of the air as the fan is turned on.

**Farm:**

Monitoring Date / Ave Monthly Temp	Storage ID		Storage ID		Storage ID	
	% moist./temp	Pests & Observ.	% moist./temp	Pests & Observ.	% moist./temp	Pests & Observ.
Date						
Ave Temp						
Date						
Ave Temp						
Date						
Ave Temp						
Date						
Ave Temp						

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<b>Monitoring Date / Ave Monthly Temp</b>	<b>Storage ID</b>		<b>Storage ID</b>		<b>Storage ID</b>	
	<b>% moist./temp</b>	<b>Pests &amp; Observ.</b>	<b>% moist./temp</b>	<b>Pests &amp; Observ.</b>	<b>% moist./temp</b>	<b>Pests &amp; Observ.</b>
<b>Date</b>						
<b>Ave Temp</b>						
<b>Date</b>						
<b>Ave Temp</b>						
<b>Date</b>						
<b>Ave Temp</b>						
<b>Date</b>						
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**Farm:**

Monitoring Date / Ave Monthly Temp	Storage ID		Storage ID		Storage ID	
	% moist./temp	Pests & Observ.	% moist./temp	Pests & Observ.	% moist./temp	Pests & Observ.
Date						
Ave Temp						
Date						
Ave Temp						
Date						
Ave Temp						
Date						
Ave Temp						

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<b>Monitoring Date / Ave Monthly Temp</b>	<b>Storage ID</b>		<b>Storage ID</b>		<b>Storage ID</b>	
	<b>% moist./temp</b>	<b>Pests &amp; Observ.</b>	<b>% moist./temp</b>	<b>Pests &amp; Observ.</b>	<b>% moist./temp</b>	<b>Pests &amp; Observ.</b>
<b>Date</b>						
<b>Ave Temp</b>						
<b>Date</b>						
<b>Ave Temp</b>						
<b>Date</b>						
<b>Ave Temp</b>						
<b>Date</b>						
<b>Ave Temp</b>						
<b>Date</b>						
<b>Ave Temp</b>						











The Grain Storage Cost Calculator for these record sheets is found at <https://blogs.cornell.edu/capitalareaagandhortprogram/2021/09/17/grain-storage-cost-calculator-record-sheets/>.

**Grain Drying Record & Fuel Cost Calculator** (adapted from Jason Arnold) *Grain Storage Management Education for the Hudson Valley*

*This record sheet will provide grain-drying fuel-cost information as well as help you manage the grain drying process.*

Date	Fields	Crop ID	Batch	Bushels	Field Sample		Fuel Meter Reading			Batch Cook Time			Mid-Dry Sample		Batch Cool Period			Dry Grain Sample	
					Field Moist. %	Field Temp °F	Start	End	Total Used	Start	End	Total Time	% Moist. @100°F	Shut Off Temp °F	Start	End	Total Time	Cool Grain °F	Final Moist.(%)
15-Oct		corn 1	1	5000	18	50	100	90	10	5:15 AM	6:00 AM	0:45	15	90	4:15 AM	#####	1:45	50	14

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					Field Moist. %	Field Temp °F	Start	End	Total Used	Start	End	Total Time	% Moist. @100°F	Shut Off Temp °F	Start	End	Total Time	Cool Grain °F	Final Moist.(%)
15-Oct		corn 1	1	5000	18	50	100	90	10	5:15 AM	6:00 AM	0:45	15	90	4:15 AM	#####	1:45	50	14

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Date	Fields	Crop ID	Batch	Bushels	Field Sample		Fuel Meter Reading			Batch Cook Time			Mid-Dry Sample		Batch Cool Period			Dry Grain Sample	
					Field Moist. %	Field Temp °F	Start	End	Total Used	Start	End	Total Time	% Moist. @100°F	Shut Off Temp °F	Start	End	Total Time	Cool Grain °F	Final Moist.(%)
15-Oct		corn 1	1	5000	18	50	100	90	10	5:15 AM	6:00 AM	0:45	15	90	4:15 AM	#####	1:45	50	14

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					Field Moist. %	Field Temp °F	Start	End	Total Used	Start	End	Total Time	% Moist. @100°F	Shut Off Temp °F	Start	End	Total Time	Cool Grain °F	Final Moist.(%)
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## Storage Structure and Container Profiles and Fixed Costs

*Grain Storage Management Education for the Hudson Valley*

Farm:	<input type="text"/>	Grain Facility Property taxes/rent:	<input type="text"/>
Harvest Year:	<input type="text"/>	Grain Facility Insurance:	<input type="text"/>

Storage Structures & Containers	Capacity or Dimensions	Storage Capacity (bushels)	Units for Capacity	Annual Ownership Cost(\$)	Annual Repairs, Mntnce \$

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## Grain Grading Record – Grain Storage Management Education for the Hudson Valley

Use the US Grain Inspection Service guidelines, <https://www.gipsa.usda.gov/fgis/usstandards.aspx>.

**Farm:**

	Storage ID	Storage ID	Storage ID	Storage ID	Storage ID
	Grain	Grain	Grain	Grain	Grain
	From Fields	From Fields	From Fields	From Fields	From Fields
	Fill date(s)	Fill date(s)	Fill date(s)	Fill date(s)	Fill date(s)
from fields					
Initial Storage Moisture %					
Fill date(s)					
Test Wt					
Initial Storage Temperature					
Observations/Notes					
Other Material Counts*					
Foreign Material %					
Heat / Total Damage %					
Broken/Shrunk/Splits %					
Thin %					
Other grains %					
Soybeans of other color					
US Grain Grade					

Depending on the grain being evaluated, not all rows of the table will be used.

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**Farm:**

	Storage ID	Storage ID	Storage ID	Storage ID	Storage ID
	Grain	Grain	Grain	Grain	Grain
	From Fields	From Fields	From Fields	From Fields	From Fields
	Fill date(s)	Fill date(s)	Fill date(s)	Fill date(s)	Fill date(s)
from fields					
Initial Storage Moisture %					
Fill date(s)					
Test Wt					
Initial Storage Temperature					
Observations/Notes					
Other Material Counts*					
Foreign Material %					
Heat / Total Damage %					
Broken/Shrunk/Splits %					
Thin %					
Other grains %					
Soybeans of other color					
US Grain Grade					

Depending on the grain being evaluated, not all rows of the table will be used.

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Tables – Grain Grades

§ 810.404 Grades and grade requirements for corn.

Grade	Minimum test weight per bushel (pounds)	Maximum limits of:		
		Damaged kernels		Broken corn and foreign material (percent)
		Heat damaged kernels (percent)	Total (percent)	
U.S. No. 1	56.0	0.1	3.0	2.0
U.S. No. 2	54.0	0.2	5.0	3.0
U.S. No. 3	52.0	0.5	7.0	4.0
U.S. No. 4	49.0	1.0	10.0	5.0
U.S. No. 5	46.0	3.0	15.0	7.0
<p>U.S. Sample Grade</p> <p>U.S. Sample grade is corn that:</p> <p>(a) Does not meet the requirements for the grades U.S. Nos. 1, 2, 3, 4, or 5; or</p> <p>(b) Contains stones with an aggregate weight in excess of 0.1 percent of the sample weight, 2 or more pieces of glass, 3 or more crotalaria seeds (<i>Crotalaria spp.</i>), 2 or more castor beans (<i>Ricinus communis</i> L.), 4 or more particles of an unknown foreign substance(s) or a commonly recognized harmful or toxic substance(s), 8 or more cockleburs (<i>Xanthium spp.</i>), or similar seeds singly or in combination, or animal filth in excess of 0.20 percent in 1,000 grams; or</p> <p>(c) Has a musty, sour, or commercially objectionable foreign odor; or</p> <p>(d) Is heating or otherwise of distinctly low quality</p>				

§ 810.1604 Grades and grade requirements for soybeans

Grading factors	Grades U. S. Nos.			
	1	2	3	4
<b>Maximum percent limits of</b>				
Damaged kernels:				
Heat (part of total)	0.2	0.5	1.0	3.0
Total	2.0	3.0	5.0	8.0
Foreign material	1.0	2.0	3.0	5.0
Splits	10.0	20.0	30.0	40.0
Soybeans of other colors <sup>1</sup>	1.0	2.0	5.0	10.0
<b>Maximum count limits of</b>				
Other materials:				
Animal filth	9	9	9	9
Castor beans	1	1	1	1
Crotalaria seeds	2	2	2	2
Glass	0	0	0	0
Stones <sup>2</sup>	3	3	3	3
Unknown foreign substance	3	3	3	3
Total <sup>3</sup>	10	10	10	10
<p>U.S. Sample grade are soybeans that:</p> <p>(a) Do not meet the requirements for U.S. Nos. 1, 2, 3, or 4; or</p> <p>(b) Have a musty, sour, or commercially objectionable foreign odor (except garlic odor); or</p> <p>(c) Are heating or otherwise of distinctly low quality.</p> <p><sup>1</sup> Disregard for Mixed soybeans.</p> <p><sup>2</sup> In addition to the maximum count limit, stones must exceed 0.1 percent of the sample weight.</p> <p><sup>3</sup> Includes any combination of animal filth, castor beans, crotalaria seeds, glass, stones, and unknown foreign substances. The weight of stones is not applicable for total other material.</p>				

§ 810.2204 Grades and grade requirements for wheat.

(a) Grades and grade requirements for all classes of wheat, except Mixed wheat.

Grading factors	Grades U.S. Nos.				
	1	2	3	4	5
<b>Minimum pound limits of:</b>					
Test weight per bushel					
Hard Red Spring wheat or White Club wheat	58.0	57.0	55.0	53.0	50.0
All other classes and subclasses	60.0	58.0	56.0	54.0	51.0
<b>Maximum percent limits of:</b>					
<b>Defects:</b>					
Damaged kernels					
Heat (part of total)	0.2	0.2	0.5	1.0	3.0
Total	2.0	4.0	7.0	10.0	15.0
Foreign material	0.4	0.7	1.3	3.0	5.0
Shrunken and broken kernels	3.0	5.0	8.0	12.0	20.0
Total <sup>1</sup>	3.0	5.0	8.0	12.0	20.0
Wheat of other classes: <sup>2</sup>					
Contrasting classes	1.0	2.0	3.0	10.0	10.0
Total <sup>3</sup>	3.0	5.0	10.0	10.0	10.0
Stones	0.1	0.1	0.1	0.1	0.1
<b>Maximum count limits of:</b>					
<b>Other material in one kilogram:</b>					
Animal filth	1	1	1	1	1
Castor beans	1	1	1	1	1
Crotalaria seeds	2	2	2	2	2
Glass	0	0	0	0	0
Stones	3	3	3	3	3
Unknown foreign substances	3	3	3	3	3
Total <sup>4</sup>	4	4	4	4	4
Insect-damaged kernels in 100 grams	31	31	31	31	31
U.S. Sample grade is Wheat that:					
(a) Does not meet the requirements for U.S. Nos. 1, 2, 3, 4, or 5; or					
(b) Has a musty, sour, or commercially objectionable foreign odor (except smut or garlic odor) or					
(c) Is heating or of distinctly low quality.					
<sup>1</sup> Includes damaged kernels (total), foreign material, shrunken and broken kernels.					
<sup>2</sup> Unclassed wheat of any grade may contain not more than 10.0 percent of wheat of other classes.					
<sup>3</sup> Includes contrasting classes.					
<sup>4</sup> Includes any combination of animal filth, castor beans, crotalaria seeds, glass, stones, or unknown foreign substance.					

## Grades and Grade Requirements

### § 810.1204 Grades and grade requirements for rye.

Grade	Minimum test weight per bushel (pounds)	Maximum limits of:				
		Foreign material		Damaged kernels		Thin rye (percent)
		Foreign matter other than wheat (percent)	Total (percent)	Heat damaged (percent)	Total (percent)	
U.S. No. 1	56.0	1.0	3.0	0.2	2.0	10.0
U.S. No. 2	54.0	2.0	6.0	0.2	4.0	15.0
U.S. No. 3	52.0	4.0	10.0	0.5	7.0	25.0
U.S. No. 4	49.0	6.0	10.0	3.0	15.0	—

U.S. Sample grade –

U.S. Sample grade is rye that:

- (a) Does not meet the requirements for the grades U.S. Nos. 1, 2, 3, or 4; or
- (b) Contains 8 or more stones or any numbers of stones which have an aggregate weight in excess of 0.2 percent of the sample weight, 2 or more pieces of glass, 3 or more crotalaria seeds (*Crotalaria* spp.), 2 or more castor beans (*Ricinus communis* L.), 4 or more particles of an unknown foreign substance(s) or a commonly recognized harmful or toxic substance(s), 2 or more rodent pellets, bird droppings, or equivalent quantity of other animal filth per 1-1/8 to 1-1/4 quarts of rye; or
- (c) Has a musty, sour, or commercially objectionable foreign odor (except smut or garlic odor); or
- (d) Is heating or otherwise of distinctly low quality.

## Grades and Grade Requirements

### § 810.1004 Grades and grade requirements for oats.

Grade	Minimum limits-		Maximum limits-		
	Test weight per bushel (pounds)	Sound oats (percent)	Heatdamaged kernels (percent)	Foreign material (percent)	Wild oats (percent)
U.S. No. 1	36.0	97.0	0.1	2.0	2.0
U.S. No. 2	33.0	94.0	0.3	3.0	3.0
U.S. No. 3 <sup>1</sup>	30.0	90.0	1.0	4.0	5.0
U.S. No. 4 <sup>2</sup>	27.0	80.0	3.0	5.0	10.0

U.S. Sample grade--

U.S. Sample grade are oats which:

- (a) Do not meet the requirements for the grades U.S. Nos. 1, 2, 3, or 4; or
- (b) Contain 8 or more stones which have an aggregate weight in excess of 0.2 percent of the sample weight, 2 or more pieces of glass, 3 or more crotalaria seeds (*Crotalaria spp.*), 2 or more castor beans (*Ricinus communis* L.), 4 or more particles of an unknown foreign substance(s) or a commonly recognized harmful or toxic substance(s), 8 or more cocklebur (*Xanthium spp.*) or similar seeds singly or in combination, 10 or more rodent pellets, bird droppings, or equivalent quantity of other animal filth per 1-1/8 to 1-1/4 quarts of oats; or
- (c) Have a musty, sour, or commercially objectionable foreign odor (except smut or garlic odor); or
- (d) Are heating or otherwise of distinctly low quality.

<sup>1</sup> Oats that are slightly weathered shall be graded not higher than U.S. No. 3.

<sup>2</sup> Oats that are badly stained or materially weathered shall be graded not higher than U.S. No. 4.



## Grades and Grade Requirements

### § 810.204 Grades and grade requirements for Six-rowed Malting barley and Six-rowed Blue Malting barley.

Grade	Minimum limits of--			Maximum limits of--				
	Test weight per bushel (pounds)	Suitable malting types (percent)	Sound barley 1/ (percent)	Damaged kernels 1/ (percent)	Foreign material (percent)	Other Grains (percent)	Skinned and broken kernels (percent)	Thin barley (percent)
U.S. No. 1	47.0	95.0	97.0	2.0	0.5	2.0	4.0	7.0
U.S. No. 2	45.0	95.0	94.0	3.0	1.0	3.0	6.0	10.0
U.S. No. 3	43.0	95.0	90.0	4.0	2.0	5.0	8.0	15.0
U.S. No. 4	43.0	95.0	87.0	5.0	3.0	5.0	10.0	15.0

1/ Injured-by-frost kernels and injured-by-mold kernels are not considered damaged kernels or considered against sound barley.

NOTES: Malting barley shall not be infested in accordance with § 810.107(b) and shall not contain any special grades as defined in § 810.206. Six-rowed Malting barley and Six-rowed Blue Malting barley varieties not meeting the requirements of this section shall be graded in accordance with standards established for the class Barley.

**§ 810.205 Grades and grade requirements for Two-rowed Malting barley.**

Grade	Minimum limits of--			Maximum limits of--			
	Test weight per bushel (pounds)	Suitable malting types (percent)	Sound barley 1/ (percent)	Wild oats (percent)	Foreign material (percent)	Skinned and broken kernels (percent)	Thin barley (percent)
U.S. No. 1	50.0	97.0	98.0	1.0	0.5	5.0	5.0
U.S. No. 2	48.0	97.0	98.0	1.0	1.0	7.0	7.0
U.S. No. 3	48.0	95.0	96.0	2.0	2.0	10.0	10.0
U.S. No. 4	48.0	95.0	93.0	3.0	3.0	10.0	10.0

1/ Injured-by-frost kernels and injured-by-mold kernels are not considered damaged kernels or considered against sound barley.

NOTES: Malting barley shall not be infested in accordance with § 810.107(b) and shall not contain any special grades as defined in § 810.206. Two-rowed Malting barley varieties not meeting the requirements of this section shall be graded in accordance with standards established for the class Barley.

§ 810.206 Grades and grade requirements for barley.

Grade	Minimum limits of		Maximum limits of				
	Test weight per bushel (pounds)	Sound barley (percent)	Damaged kernels 1/ (percent)	Heat damaged kernels (percent)	Foreign material (percent)	Broken kernels (percent)	Thin barley (percent)
U.S. No. 1	47.0	97.0	2.0	0.2	1.0	4.0	10.0
U.S. No. 2	45.0	94.0	4.0	0.3	2.0	8.0	15.0
U.S. No. 3	43.0	90.0	6.0	0.5	3.0	12.0	25.0
U.S. No. 4	40.0	85.0	8.0	1.0	4.0	18.0	35.0
U.S. No. 5	36.0	75.0	10.0	3.0	5.0	28.0	75.0

U.S. Sample Grade:

U.S. Sample grade shall be barley that:

- (a) Does not meet the requirements for the grades U.S. Nos. 1, 2, 3, 4, or 5; or
- (b) Contains 8 or more stones or any number of stones which have an aggregate weight in excess of 0.2 percent of the sample weight, 2 or more pieces of glass, 3 or more crotalaria seeds (*Crotalaria spp.*), 2 or more castor beans (*Ricinus communis* L.), 4 or more particles of an unknown foreign substance(s) or a commonly recognized harmful or toxic substance(s), 8 or more cocklebur (*Xanthium spp.*) or similar seeds singly or in combination, 10 or more rodent pellets, bird droppings, or equivalent quantity of other animal filth per 1-1/8 to 1-1/4 quarts of barley; or
- (c) Has a musty, sour, or commercially objectionable foreign odor (except smut or garlic odor); or
- (d) Is heating or otherwise of distinctly low quality.

1/ Includes heat-damaged kernels. Injured-by-frost kernels and injured-by-mold kernels are not considered damaged kernels.

(t) *Thin barley*. Thin barley shall be defined for the appropriate class as follows:

(1) *Malting barley*. Six-rowed Malting barley that passes through a  $5/64 \times 3/4$  slotted hole

sieve and Two-rowed Malting barley which passes through a  $5.5/64 \times 3/4$  slotted hole sieve in accordance with procedures prescribed in GIPSA's instructions.

(2) *Barley*. Six-rowed barley, Two-rowed barley, or Barley that passes through a  $5/64 \times$

$3/4$  slotted-hole sieve in accordance with procedures prescribed in GIPSA's instructions.

§ 810.2004 Grades and grade requirements for triticale.

Grade	Minimum test weight per bushel (pounds)	Minimum limits of					
		Damaged kernels		Foreign material		Shrunken and broken kernels (percent)	Defects <sup>3</sup> (percent)
		Heat damaged (percent)	Total <sup>1</sup> (percent)	Material other than wheat or rye (percent)	Total <sup>2</sup> (percent)		
U.S. No. 1	48.0	0.2	2.0	1.0	2.0	5.0	5.0
U.S. No. 2	45.0	0.2	4.0	2.0	4.0	8.0	8.0
U.S. No. 3	43.0	0.5	8.0	3.0	7.0	12.0	12.0
U.S. No. 4	41.0	3.0	15.0	4.0	10.0	20.0	20.0

U.S. Sample grade –

U.S. Sample grade is triticale that:

- (a) Does not meet the requirements for the grades U.S. Nos. 1, 2, 3, or 4; or
- (b) Contains 8 or more stones or any number of stones which have an aggregate weight in excess of 0.2 percent of the sample weight, 2 or more pieces of glass, 3 or more crotalaria seeds (*Crotalaria spp.*), 2 or more castor beans (*Ricinus communis* L.), 4 or more particles of an unknown foreign substance(s) or a commonly recognized harmful or toxic substance(s), 2 or more rodent pellets, bird droppings, or equivalent quantity of other animal filth per 1-1/8 to 1-1/4 quarts of triticale; or
- (c) Has a musty, sour, or commercially objectionable foreign odor (except smut or garlic odor); or
- (d) Is heating or otherwise of distinctly low quality.

<sup>1</sup> Includes heat-damaged kernels.

<sup>2</sup> Includes material other than wheat or rye.

<sup>3</sup> Defects include damaged kernels (total), foreign material (total), and shrunken and broken kernels. The sum of these three factors may not exceed the limit for defects for each numerical grade.