



Do not Cheat Yourself: Cheat Control is not a Cost

Kim Anderson

Professor, Extension Grain Marketing Specialist

Case Medlin

Assistant Professor, Plant and Soil Sciences

Oklahoma Cooperative Extension Fact Sheets are also available on our website at: <http://osufacts.okstate.edu>

Cheat (*Bromus secalinus*) cheats you by keeping money out of your bank account by reducing yield and increasing dockage in wheat delivered to the elevator. One way to put more money in your bank account is to control cheat and other weeds that reduce yield and quality.

Research indicates that cheat is normally produced in a 1 to 1 ratio with wheat. For every bushel of cheat produced wheat yield is normally reduced by one bushel. Research reported in this fact sheet shows that wheat fields with 5 percent cheat infestation might lower income by about \$10 per acre per year. In most cases, treating fields with 5 percent infestation every other year will more than pay for the herbicide treatment by increasing yield and quality of the harvested grain.

Depending on how the combine's cylinder and fans are set, cheat is either left in the field or delivered to the elevator. Cheat left in the field results in a higher infestation in the next crop. Cheat hauled to the elevator results in the cheat weight being removed from total weight and usually results in discounts.

Discounts

To determine the US grade and other quality characteristics, a 1,000 to 1,200 gram sample is removed from each load of wheat when it is delivered to an elevator or mill. Dockage is determined by running the sample through an approved dockage machine¹ that removes cheat and other non-wheat material from the sample. Cheat or non-wheat material remaining in the sample after passing through the dockage machine is removed by hand and classified as foreign material (FM).

Dockage is not a grade factor, however the percent dockage is used to adjust the load weight, and possibly determine price discounts (Table 1). Foreign material is a grade factor and may result in lower US grades and price discounts (Table 2).

For the following, assume that the posted wheat price is \$3 per bushel.

All dockage is removed from weight (Table 1). Thus if a 1,000 bushel load of wheat is delivered with 1 percent dockage, the seller would be paid the posted price for 990

Table 1. Wheat dockage discounts^a.

Dockage %	Additional Discount ¢/bushel
1.1 to 2.0	2
2.1 to 3.0	2+4
3.1 to 10.0	2+4+(2¢ for each additional half percent above 3%)
>10.0	Negotiable and subject to rejection

^aAll dockage is deducted from the weight of the grain plus-specified additional discounts. These discounts were obtained from a sub-terminal elevator and represent discounts that are applied to wheat shipped from local elevators.

Table 2. Wheat foreign material discounts.

Foreign Material %	Discounts ¢/bushel
1.1 to 5.0	1¢ for each half percent or fraction thereof
5.1 to 10.0	8¢ + (5¢ for each 1% or fraction above 5%)
>10	Negotiable and subject to rejection

bushels (1000 bushel x 0.99 = 990 bushels) (990 bushels x \$3 = \$2,970).

For dockage levels greater than 1 percent, the dockage is removed from weight and price discounts are applied. A 1 to 2 percent dockage results in a 2-cent per bushel discount (Table 1). For example if dockage is 2 percent, the seller would be paid for 980 bushels (1,000 x 0.98) and the price would be reduced to \$2.98 (980 x \$2.98 = \$2,920). If the dockage is 5 percent, the seller would be paid for 950 bushels (1,000 x 0.95) and the price would be reduced to \$2.86 (2 cents for the first 2 percent, 4 cents for the percent between 2.1 and 3.0, and 8 cents for the next 2 percent). Therefore, the total payment for the load would be \$2,717 (950 bushels x \$2.86).

Herbicide cost and net return

Several methods may be used to control cheat². The following analysis assumes that herbicide is applied at a cost of \$15 per acre (this includes cost of chemical, surfactant,

¹ For additional information see OSU Cooperative Extension Fact Sheets F-226, "Grading Cheaty Wheat," F-227, "Adjusting and Setting-up Mechanical Dockage Testers," and F-236, "MCI Dockage Tester."

² See OSU Cooperative Extension Publication E-978, "Weed Control Guidelines for Oklahoma."

and application) and controls 99 percent of the cheat. It is assumed that the potential wheat yield is 40 bushels per acre, the selling price of wheat is \$3 and harvesting and hauling costs are \$15 per acre plus 15 cents per bushel above 20 bushels and 15 cents per bushel for hauling. Harvesting and hauling are based on tare weight divided by 60 pounds per bushel.

Cheat reduces yield, increases price discounts, and increases harvesting and hauling costs³. Losses were calculated for different cheat infestation levels (Tables 3 and 4). The calculations were based on assumptions that may or may not be applicable to your farm. This analysis estimates the costs and loss due to delivering 100, 50, 20 and 0 percent of the cheat to the elevator. Anecdotal evidence indicates that with custom harvesters, about 50 percent of the cheat ends up in the harvested grain and about 50 percent in the field.

Regardless of whether the cheat is delivered to the elevator or left in the field, net income is reduced because of cheat. Cheat delivered to the elevator results in reduction in weight and possibly price discounts. Leaving the cheat in the field results in reduced yield and increased costs for the next wheat crop.

Analysis

Gains and losses due to cheat infestation were determined for cheat infestation levels of 0, 1, 2.5, 5, 7.5, 10, 12.5, and 20 percent (Tables 3, 4, 5, and 6). Table 3 shows the wheat yield reduction per acre due to cheat and how much the price per bushel would be reduced if 100 percent of the cheat were delivered to the elevator. For example with 10 percent cheat infestation, yield is reduced by four bushels and the price discount would be 34 cents per bushel (Table 3).

Table 4 shows the total income loss per acre. A cheat infestation level of 2.5 percent results in a \$3 loss per acre due to yield, a \$2.34 per acre loss due to price discounts and a 30 cent per acre loss for harvesting and hauling. Total loss per acre for 2.5 percent cheat is \$5.64 per acre.

At 10 percent infestation, there is a \$12 loss due to reduced yield, \$12.24 loss due to price discounts, and a \$1.20 loss due to harvesting and hauling. Total loss per acre would be \$25.44.

If cheat herbicide and application costs are \$15 per acre, the breakeven cheat infestation is about 6 percent. At 7.5 percent, reduced income per acre is \$9 due to yield loss, \$8.88 due to price discounts, and 90 cents due to harvesting and hauling. Total loss per acre with 7.5 percent infestation is \$18.78.

Using an herbicide to control cheat will reduce the cheat infestation. Assuming that 99 percent of the cheat is controlled, losses will be reduced. If the original infestation level was 7.5 percent, the loss due to cheat was \$18.78 per acre without herbicide. After herbicide application, losses were reduced to 10 cents per acre (Table 5). Thus, after applying herbicide for \$15 per acre, the net income gain was \$3.68 per acre (Table 6).

Table 6 shows the net gain or loss after herbicide application. For example, if the original infestation level were

10 percent, loss without herbicide would have been \$25.44 per acre (Table 4). After an herbicide application, the loss was reduced to 13 cents per acre (Table 5). Thus after applying an herbicide for \$15 per acre, the total gain was \$10.31 per acre (Table 6, 100 percent Delivered).

Major Losses of Income

Cheat reduces income by reducing yield, causing price discounts and increasing harvesting and hauling costs. The two biggest impacts on income are yield loss and price discounts. Yield loss will occur whether the cheat is delivered to the elevator or blown back on the field. However, the price discounts vary greatly depending on whether cheat is delivered to the elevator or left in the field (Tables 6 and 7).

Wheat delivered to an elevator with cheat levels less than 1 percent may not receive a price discount. Thus, for wheat delivered to the elevator containing less than 1 percent cheat; there is no price impact and only negligible harvesting and hauling costs. There are normally discounts for cheat levels greater than 1 percent.

The net gains or losses shown in Table 7 show the difference in lost income from delivering cheat to the elevator or leaving it in the field. Results shown in the four "Total Loss Deliver" columns compare delivering 100, 50, 20, or 0 percent of the harvested cheat to the elevator.

There are no differences in net return at cheat levels of 1 percent or less. At 2.5 percent cheat infestation; there was a \$1.55 per acre difference between delivering 100 percent and 50 percent, and \$2.31 between delivering 100 percent and delivering 20 percent or 0 percent.

At 10 percent infestation, lost income is reduced from \$25.31 to \$18.17 per acre by leaving 50 percent of the cheat in the field. Lost income is reduced further by only delivering 20 percent of the cheat (\$13.89) or leaving all the cheat in the field (\$13.20). As the cheat infestation increases, the economic benefit from not delivering cheat increases.

Results shown in Table 7 are another way to evaluate if it is better to deliver cheat to the elevator or leave it in the field. This analysis only considers income loss due to cheat infestation. The income gain or losses shown in Table 6 are the losses shown in Table 7 minus the \$15 per acre herbicide application costs.

Conclusions and Comments

Parts of this analysis are made with "fuzzy numbers." Best educated guesses are required on some of the values used. One example is the percentage cheat that is left in the field and the percentage delivered to the elevator. The percentage delivered depends on combine settings, combine speed, and the maturity of the cheat plant. If the cheat is ripe, it may shatter and fall to the ground. If it is "green," a higher percentage will be found in the harvested grain.

What this analysis does show is that cheat cheats producers out of income. Lost income due to yield loss is a "no-brainer." For every 1 percent of cheat produced, yield is reduced about 1 percent.

Measuring the lost income due to price discounts depends on how much cheat remains in the field and how much is taken to market. There is a cost either way. If the cheat goes to market, there are price discounts. If the cheat stays in the field, the field cheat problem is increased.

³ A Microsoft Excel spreadsheet was developed and may be downloaded at agecon.okstate.edu/anderson

This analysis only considered the benefit of applying a cheat control herbicide for one year. Application frequency will partially depend on the percentage of cheat that stays in the combine or goes on the field. Anecdotal evidence indicates that cheat herbicides will need to be applied every two or

three years depending on infestation levels and application efficiency.

Spreading herbicide costs over a two to three year period would lower the breakeven analysis. Herbicide costs could be reduced from \$15 per year to \$7.50 per year or lower.

Table 3. Yield loss and price discount due to cheat infestation assuming 100% of the cheat is hauled to the elevator.

Loss Due to Cheat Infestation			
Cheat Infestation Level %	Percentage Cheat in Sample %	Yield Reduction bu /ac	Price Discount \$/bu
0.0	0.0	-	\$ -
1.0	1.0	0.4	\$ -
2.5	2.5	1.0	\$ 0.06
5.0	5.0	2.0	\$ 0.14
7.5	7.5	3.0	\$ 0.24
10.0	10.0	4.0	\$ 0.34
12.5	12.5	5.0	\$ 0.44
20.0	20.0	8.0	\$ 0.74

Table 4. Income loss per acre due to cheat infestation if a cheat herbicide is not applied assuming 100% of the cheat is hauled to the elevator.

Income Loss Due to Cheat Infestation				
Cheat Infestation Level %	Yield Loss w/o Control	Price Discount	Harvesting & Hauling Loss	Total Loss
0.0	-	-	-	-
1.0	1.20	-	0.12	1.32
2.5	3.00	2.34	0.30	5.64
5.0	6.00	5.32	0.60	11.92
7.5	9.00	8.88	0.90	18.78
10.0	12.00	12.24	1.20	25.44
12.5	15.00	15.40	1.50	31.90
20	24.00	23.68	2.40	50.08

Table 5. Dollar loss per acre due to cheat infestation after herbicide application, which controlled 99% of the cheat.

Income Loss After Herbicide Application				
Cheat Infestation Level %	Yield Loss	Price Discount	Harvesting & Hauling Loss	Total Loss
0.0	-	-	-	-
1.0	0.01	-	0.00	0.01
2.5	0.03	-	0.00	0.03
5.0	0.06	-	0.01	0.07
7.5	0.09	-	0.01	0.10
10.0	0.12	-	0.01	0.13
12.5	0.15	-	0.02	0.17
20	0.24	-	0.02	0.26

Table 6. Net income gain or loss after herbicide application and delivering 100 percent, 50 percent or 20 percent cheat^a to the elevator.

Initial Cheat Infestation Level %	Net Gain or Loss After Application (Deliver 100%) ^b	Net Gain or Loss After Application (Deliver 50%) ^b	Net Gain or Loss After Application (Deliver 20%) ^b
0.0	(15.00)	(15.00)	(15.00)
1.0	(13.69)	(13.69)	(13.69)
2.5	(9.39)	(10.94)	(11.71)
5.0	(3.15)	(6.15)	(8.41)
7.5	3.68	(1.45)	(4.38)
10.0	10.31	3.17	(1.11)
12.5	16.74	8.42	3.57
20	34.82	22.15	14.55

^a Assumes \$15 per acre herbicide costs.

^b Percentage of cheat in field delivered to elevator.

Table 7. Dollar loss per acre due to cheat infestation at various dockage levels^a.

Income Loss Due to Cheat Infestation w/o Herbicide Application				
Cheat Infestation Level %	Total Loss (Deliver 100%)	Total Loss (Deliver 50%)	Total Loss (Deliver 20%)	Total Loss (Deliver 0%)
0.0	-	-	-	-
1.0	1.32	1.32	1.32	1.32
2.5	5.61	4.06	3.30	3.30
5.0	11.85	8.85	6.59	6.60
7.5	18.68	13.55	10.62	9.90
10.0	25.31	18.17	13.89	13.20
12.5	31.74	23.42	18.57	16.50
20	49.82	37.15	29.55	26.40

^a Assumes that dockage discounts presented in Table 1 are applied.

^b Increased cost due to harvesting and hauling cheat were not removed (see Table 4).

The Oklahoma Cooperative Extension Service

Bringing the University to You!

The Cooperative Extension Service is the largest, most successful informal educational organization in the world. It is a nationwide system funded and guided by a partnership of federal, state, and local governments that delivers information to help people help themselves through the land-grant university system.

Extension carries out programs in the broad categories of agriculture, natural resources and environment; family and consumer sciences; 4-H and other youth; and community resource development. Extension staff members live and work among the people they serve to help stimulate and educate Americans to plan ahead and cope with their problems.

Some characteristics of the Cooperative Extension system are:

- The federal, state, and local governments cooperatively share in its financial support and program direction.
- It is administered by the land-grant university as designated by the state legislature through an Extension director.
- Extension programs are nonpolitical, objective, and research-based information.
- It provides practical, problem-oriented education for people of all ages. It is designated to take the knowledge of the university to those persons who do not or cannot participate in the formal classroom instruction of the university.
- It utilizes research from university, government, and other sources to help people make their own decisions.
- More than a million volunteers help multiply the impact of the Extension professional staff.
- It dispenses no funds to the public.
- It is not a regulatory agency, but it does inform people of regulations and of their options in meeting them.
- Local programs are developed and carried out in full recognition of national problems and goals.
- The Extension staff educates people through personal contacts, meetings, demonstrations, and the mass media.
- Extension has the built-in flexibility to adjust its programs and subject matter to meet new needs. Activities shift from year to year as citizen groups and Extension workers close to the problems advise changes.

Oklahoma State University, in compliance with Title VI and VII of the Civil Rights Act of 1964, Executive Order 11246 as amended, Title IX of the Education Amendments of 1972, Americans with Disabilities Act of 1990, and other federal laws and regulations, does not discriminate on the basis of race, color, national origin, gender, age, religion, disability, or status as a veteran in any of its policies, practices, or procedures. This includes but is not limited to admissions, employment, financial aid, and educational services.

Issued in furtherance of Cooperative Extension work, acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture, Robert E. Whitson, Director of Cooperative Extension Service, Oklahoma State University, Stillwater, Oklahoma. This publication is printed and issued by Oklahoma State University as authorized by the Vice President, Dean, and Director of the Division of Agricultural Sciences and Natural Resources and has been prepared and distributed at a cost of 20 cents per copy. 0305 JA