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An Economic Budget for Determining Co-Product Storage Costs

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Summary

Co-Product STORE — Storage To Optimize Ration Expenses — is a spreadsheet designed to quantify the costs of co-product storage. It allows producers to analyze and evaluate specific storage scenarios in response to changing market conditions using different storage methods. Two storage examples (bunker and silo bag) are evaluated to illustrate how the spreadsheet estimates storage costs. Co-Product STORE can be found online at http://beef.unl.edu *under the byproduct feeds tab.*

Introduction

Ethanol co-product contracting and storage opportunities may be available for cattle feeders and cow/calf operations based on co-product seasonal price trends (*2009 Nebraska Beef Report,* pp. 50-52). The typical decrease in co-product price during the late summer months provides incentive for producers to purchase co-product during this period and then place it in storage. Storage of ethanol co-products involves several costs that vary depending on the storage method used. Our objective was to use Co-Product STORE (Storage To Optimize Ration Expenses), an electronic budget designed to analyze the costs associated with different co-product storage methods for the purpose of co-product inclusion in cattle rations, to evaluate storage decisions. Co-Product STORE and accompanying user manual are available at *http://beef.unl.edu*.

Procedure

Co-Product STORE is organized into four steps (parameters, feed costs, equipment and structure costs, and other costs), and users need to provide several inputs for their operations in each of the four steps (Table 1). Using these inputs, the budget generates a results summary (Table 1). It is important to note that the co-product cost per ton is estimated using the co-product cost per ton, transportation cost per ton and a proportion of the remaining total costs based on the percentage of co-product in the total mixture. This value is used to compare co-product cost per ton across storage methods, because each storage method requires a different inclusion level of mixing material. Additionally, it allows the co-product cost per ton to be directly compared to contracted or spot prices if storage is foregone and the co-product is purchased at a later date. Users also can evaluate storage costs per pound of crude protein (CP) and/or per pound of total digestible nutrients (TDN) by providing appropriate CP and TDN values (DM basis) in the spreadsheet.

Although individuals using Co-Product STORE should define costs and include parameters that are representative of their own operation, general assumptions were utilized in this evaluation of two storage methods (bunker and silo bag) based on 2008 prices and conditions. Both examples assumed that 250 tons (as-is) of wet distillers grain plus solubles (WDGS) were mixed and stored with grass hay at the appropriate inclusion levels (34.2% and 15.3% inclusion DM basis for bunker and bag storage, respectively; Erickson et al., 2008, *Storage of Wet Corn Co-Products*). For the bunker method of storage, the mixture is assumed to be stored on the ground using large round bales for bunker walls. Because the large round bales will be usable after storage in this example, they are not included as a cost. The ownership cost of the owned tractor for both methods is calculated using an 8% interest rate and a useful life of 10 years. The salvage value, repairs, taxes, and insurance costs for the tractor are the average annual costs for each respective item expressed as a percentage of the original investment cost and are assumed to be 30%, 3%, 1.5% and 5%, respectively, for both storage methods. Additionally, the original purchase price of the tractor is assumed to be $75,000, and the proportion of time that the tractor is used for each storage project (expressed as a percentage of its annual total use) is 5% and 1.25% for bunker and bag storage, respectively. These values combine to generate the tractor ownership costs associated with each storage method

Table 1. Inputs required and outputs derived from Co-Product STORE.

Inputs Required	Outputs Generated
Step 1: Parameters • Interest rate on feed and supplies • Shrink • Tons of co-product per loaded truck • Date co-product placed in storage • Date start feeding stored co-product • Date finish feeding stored co-product **Step 2: Feed Costs** • Ethanol co-product % DM, % CP (DM basis), % TDN (DM basis), as-is quantity, as-is price (FOB plant) • Forage % DM, % CP (DM basis), % TDN (DM basis), as-is quantity, as-is price **Step 3: Equipment and Structure Costs** • Rented equipment/structure quantity, price • Ownership costs on equipment/structures (proportion of time/space used, interest rate, useful life, salvage value, repairs, taxes, insurance) • Other supplies quantity, price **Step 4: Other Costs** • Transportation quantity, price • Labor quantity, price	**Results Summary** • Total mixture cost • Mixture cost per ton without shrink • Mixture cost per ton with shrink • Shrink cost per ton • Co-product cost per ton without shrink • Co-product cost per ton with shrink • Mixture cost per pound of CP without shrink • Mixture cost per pound of CP with shrink • Mixture cost per pound of TDN without shrink • Mixture cost per pound of TDN with shrink • Tons of mixture before shrink • Tons of mixture remaining after shrink • Tons of co-product before shrink • Tons of co-product remaining after shrink

Table 2. Assumptions for bunker and silo bag storage examples.

	Bunker	Bag
Parameters		
Interest rate on feed and supplies	8.5%	8.5%
Shrink[1]	15%	6%
Tons of co-product per loaded truck	25	25
Date co-product placed in storage	8/1/2008	8/1/2008
Date start feeding stored co-product	12/1/2008	12/1/2008
Date finish feeding stored co-product	4/23/2009	4/23/2009
Feed		
WDGS	250 tons, 35% DM, 30% CP[2], 112% TDN[2,3], $65/ton	250 tons, 35% DM, 30% CP[2], 112% TDN[2,3], $65/ton
Grass hay	52 tons, 87.6% DM, 14.4% CP, 56% TDN, $85/ton	18 tons, 87.6% DM, 14.4% CP, 56% TDN, $85/ton
Rented Equipment		
Mixer	10 hrs, $15/hr	5 hrs, $15/hr
Hay grinder	6 hrs, $20/hr	3 hrs, $20/hr
Bagger		268 tons, $8/ton
Owned Equipment		
Tractor	$813.75 ownership cost	$203.44 ownership cost
Other Supplies and Costs		
Bunker plastic	600 sq ft, $0.13/sq ft	
Fuel	120 gal, $3.50/gal	30 gal, $3.50/gal
Transportation	30 miles, $3.50/loaded mile	30 miles, $3.50/loaded mile
Labor	21 hrs, $10/hr	6 hrs, $10/hr

[1]Percentage difference of quantity of material bunkered or bagged compared to quantity of material weighed out and fed. Shrink may range from 8% to 15% for bunker storage and 3% to 6% for bagging.
[2]Percentages are averages based on UNL feeding performance data and are expressed on a DM basis.
[3]TDN value changes depending on co-product inclusion level; percentages are calculated assuming corn is 90% TDN (DM basis).

Table 3. Bunker and silo bag storage costs estimated using Co-Product STORE.

	Bunker (As-is Basis)	Bunker (DM Basis)	Bag (As-is Basis)	Bag (DM Basis)
Total mixture cost	$24,465.61	$24,465.61	$22,283.37	$22,283.37
Mixture cost per ton without shrink	$81.01	$183.88	$83.15	$215.78
Mixture cost per ton with shrink	$95.31	$216.33	$88.45	$229.56
Shrink cost per ton	$14.30	$32.45	$5.31	$13.77
Co-product cost per ton without shrink	$88.84	$225.33	$86.55	$230.80
Co-product cost per ton with shrink	$104.52	$265.10	$92.07	$245.53
Mixture cost per pound of CP without shrink	$0.373	$0.373	$0.391	$0.391
Mixture cost per pound of CP with shrink	$0.439	$0.439	$0.416	$0.416
Mixture cost per pound of TDN without shrink	$0.099	$0.099	$0.104	$0.104
Mixture cost per pound of TDN with shrink	$0.117	$0.117	$0.111	$0.111

and are important to include for every piece of machinery used, regardless of whether it was purchased for the storage project or not. All other assumptions are outlined in Table 2.

Results

Table 3 presents the mixture and co-product costs for the bunker and silo bag storage examples previously described. As the table suggests, it is important to analyze the costs on a DM basis. Although the as-is mixture cost per ton with shrink is less for bag storage than bunker storage in this example, the DM mixture cost per ton with shrink is actually greater for the silo bag storage method compared to the bunker method. This is due to the lower total tonnage associated with bagging (lower forage inclusion level) and the resulting relative DM differences associated with the mixtures (bunker mixture was 44.1% DM and bag mixture was 38.5% DM).

Assuming that both storage methods are equal regarding physical feasibility, either method of storage could be cheapest depending upon an operation's individual costs. Whether the total mixture cost per ton or co-product cost per ton is most appropriate for comparison to other prices depends on the operation's needs. For example, if a cow/calf producer is analyzing co-product and forage storage during the summer versus purchasing co-product later in the year to feed as a supplement, it would be more appropriate to compare the mixture cost per ton with shrink to the cost of the co-product purchased at a later date. On the other hand, it may be appropriate for feedlots (or any operation storing only co-product with no other feedstuff) to evaluate the co-product cost per ton with shrink, as most of the co-product purchased by feedlots will be included in a ration regardless of whether it is stored alone, mixed with another feedstuff and stored, or purchased later in the year. It is important to remember that all costs and tonnage values will change from operation to operation, and the numbers in Table 3 simply represent the costs and parameters assumed for these two particular scenarios.

Many operations may use Co-Product STORE to compare storage costs to co-product purchased at a later date without storage (using a forecasted co-product price). In order to make this comparison, a spot market or contracted price for deferred co-product delivery (for a date similar to the date the stored co-product would start being fed) should be obtained from an ethanol plant. If the ethanol plant does not offer forward contracts, standardized relationships between co-products and corn or other feeds could be used to formulate a forecasted co-product price. If the forecasted or contracted co-product price without storage exceeds the total per-ton cost of the stored co-product, then it would likely be more beneficial for the producer to store the co-product.

In summary, ethanol co-product contracting and storage opportunities are available for cattle feeders and cow/calf operations as suggested by the co-product seasonal price trend. Although several methods are available for the storage of co-products, producers must recognize and define the type of storage method that is optimal for their own operation, while ensuring that the benefits of actually storing the co-product exceed the costs to do so. Co-Product STORE quantifies the costs of co-product storage and allows producers to analyze and address these issues.

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