Executive summary: Using data provided by one of the largest growers and shippers of watermelons in Arizona, the Full DisclosureSM modeling tool analyzed total annual costs involved in shipping bulk watermelons using corrugated bulk bins versus returnable plastic container (RPC) bulk bins. The findings clearly demonstrate that the corrugated solution offers more cost-effective packing, storing, handling and shipping than RPC bulk bins.

- Using corrugated bulk bins decreases overall supply chain costs by 19.8 percent. The corrugated solution realizes an overall supply chain cost advantage of $1.74 million over RPC bulk bins, or $2.64 million annually if RPC bulk bin purchase costs were amortized over their useful life.

- The retailer’s system costs decrease by 10.2 percent with corrugated by avoiding higher RPC bulk bin transportation costs.

- The grower/shipper enjoys system cost savings of 44.7 percent with corrugated due primarily to the per-container cost difference between purchased corrugated bulk bins ($6.30 each and $2 of amortized pallet costs) and rented RPC bulk bins ($14 per trip).
Conducting the Arizona bulk watermelons scenario.

In 2002, 4 billion pounds of watermelons were grown in the United States, making the U.S. the fourth largest producer worldwide. Watermelons are grown in 44 states with Florida, Texas, California, Georgia and Arizona consistently leading the country in production. The subject of this real-world scenario is one of the nation’s largest grower/shippers of watermelons, shipping the equivalent of 110,250 bulk bins of watermelons annually. Its packaging and distribution system is typical of that of a large melon grower/shipper and translates well to any produce grower/shipper using bulk bins.

Figure 1

<table>
<thead>
<tr>
<th>Container</th>
<th>Stacking Pattern (containers/layer x number of layers)</th>
<th>Container Gross Weight (lbs)</th>
<th>Containers per Pallet</th>
<th>Full Pallet Weight (lbs)</th>
<th>Stacked Pallet Height (inches)</th>
<th>Pallets per Trailer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Watermelon Corrugated</td>
<td>1 per layer, 3 high</td>
<td>851.5*</td>
<td>1</td>
<td>851.5*</td>
<td>84**</td>
<td>81***</td>
</tr>
<tr>
<td>Watermelon RPC</td>
<td>1 per layer, 2 high</td>
<td>912</td>
<td>1</td>
<td>912</td>
<td>66</td>
<td>48**</td>
</tr>
</tbody>
</table>

* Corrugated bin weighs 11.5 lbs., pallet weighs 40 lbs., 800-lb. capacity = 851.5 lbs. total pallet weight.
** Includes 4” wooden pallet.
*** Trailers carrying both bulk bin corrugated containers and bulk bin RPCs are weight-constrained at 51 and 48 pallets/trailer (or 43,427 lbs. and 43,776 lbs., respectively).

The 1,800-mile trip from the packing facility to the distribution center – the approximate distance from Red Bluff, Arizona, to Cincinnati, Ohio – takes about four days (approximately 38 hours). Industry standard pallet specifications were assumed.\(^1\) (Figure 1)

Corrugated bulk bins have a multi-purpose future.

Retailers frequently reuse empty corrugated bulk bins for another commodity (sometimes for many months or seasons), or “re-purpose” them for another use within the warehouse. If a corrugated bulk bin has served its useful purpose, it is broken down and recycled for its old corrugated container (OCC) value ($0.37 per container). At this point, the corrugated bulk bin’s distribution function is complete.

RPC bulk bins, on the other hand, must now enter the return trip process, which requires sorting, washing, sanitizing, warehousing and redistribution to the grower. On average, it takes 60 days for an RPC bulk bin to make this round-trip. Therefore, each RPC bulk bin makes six complete cycles (or “turns”) per year with an expensive and often time-consuming return leg. And each lost or stolen RPC bulk bin can cost the supply chain up to $145 per container. (Figure 2)

Total cost picture is straightforward.

The Full Disclosure analysis demonstrates that distributing watermelons in corrugated bulk bins is economically preferable to purchased RPC bulk bins.

Corrugated bulk bins show an annual cost advantage of more than $1.74 million, which increases to $2.64 million by factoring in the amortization cost of the RPC bulk bins over their useful life. In fact, if purchased, RPC bulk bins would increase the overall required cash outlay in the supply chain by 24.7 percent per year, or by 37.6 percent when the cost of RPC amortization is included.

1. Pallets with RPCs are height-constrained (in this case limited to 2 layers) due to trailer door height limitations.

\(^{1}\) Pallets carrying both bulk bin corrugated containers and bulk bin RPCs are weight-constrained at 51 and 48 pallets/trailer (or 43,427 lbs. and 43,776 lbs., respectively).
The Full Disclosure analysis shows that these higher costs are incurred in the trucking (additional $1,463,625) and handling (additional $276,317) legs. A fully-loaded truck of watermelons packed in corrugated bulk bins carries 2,400 pounds more product than a fully-loaded truck of watermelons packed in RPC bulk bins. RPC bulk bin backhaul trip requirements, such as washing and warehousing, contribute additional costs to the total picture. (Figure 3)

**Who pays for what?**
The Full Disclosure analysis further demonstrates that rented RPCs result in significant hidden costs. (Figure 4)

- The retailer spends an additional $699,000 each year to ship in rented RPC bulk bins, or an additional $6.34 per container.
- The grower/shipper pays a $14 per-container fee to rent RPC bulk bins (in comparison to the per-container price of $6.30 for corrugated bulk bins and $2 of amortized pallet costs), and sees its net costs increase by $742,692 (or an additional $6.74 per container).

(CONTINUED ON BACK)
The RPC pool provider appears to sustain a loss of more than $1.2 million annually to operate this float of containers. Even if the pool operator rented the container for $8.30 per trip (the same total cost as a corrugated bulk bin), the grower/shipper would still see a corrugated bulk bin cost advantage of $114,267 per year.

**Conclusion.**
By studying the impact of multiple cost drivers on different shipping container options throughout the value chain, retailers and grower/shippers can see the clear advantage of shipping watermelons in corrugated bulk bins versus either purchased or rented RPC bulk bins.

Furthermore, corrugated bulk bins offer graphic benefits and display-quality printing in the retail environment. If this billboard effect could be measured in dollars, the case for corrugated bulk bins becomes even stronger.

Lastly, close scrutiny reveals that pool operators bear the burden of significant extra dollars in “hidden” costs of rented RPC bulk bins. These high, yet seemingly “subsidized” rental rates may increase over time and as pool operators feel more comfortable with their market influence.

The bottom line remains the same: corrugated bulk bin containers make the most sense.