

# 黃豆油—健康而零反式脂肪的解決措施

## *Soybean Oil: a Healthy Zero Trans Solution*

The Soyfoods Council, U.S.A., January 2007

### 反式(或反型)脂肪挑戰(Trans Fat Challenge):

反式脂肪，意指反式脂肪酸(Trans fatty acids)，於此，其不飽和油脂結構的雙鍵(Double bond)，係屬於反式組態(Trans configuration)。天然的反芻動物肉類及其乳製食品，均含有某些反式脂肪(係共軛型反式脂肪 conjugated trans fat 具有預防疾病效應)，然而大都份的反式脂肪，係由於經部份氫化加工(Partial hydrogenation)而副產者，它屬於非共軛型反式脂肪(Non-conjugated trans fat)，卻具有健康風險效應。

對許多消費者而言，“反式脂肪”(即所謂非共軛型反式脂肪)，意指健康風險的警告指標，例如，心血管疾病(Coronary Heart Disease)的罹患風險。

對食品服務，烘焙以及配製食品領域的業者而言，“Trans fat”擁有甚大的挑戰。部份氫化油脂，長久以來，業經提供擁有味道、口感、組織性、穩定性等的優異特性，如此，那麼多的一般食品均含有它。然而由於健康訴求與志向，最近的法規，以及大眾壓力高漲而使得必須改用零反式脂肪(Zero trans fat)來替代它，以確保消費者健康。這就是挑戰—這個簡訊提供有關報導及您務必宣導的“黃豆解決措施”(Soybean solutions)。

參考資料：低亞麻油酸油(Low-Linolenic Oil)報導—油炸油

交酯化油(Interesterified Oil)報導—烘焙用的半固態油脂

壓搾油(Expeller Pressed Oil)報導—油炸油

黃豆食品協會(Soyfoods Council)願意提供反式脂肪挑戰的有關解決措施，以利進行中間工場測試，而益於有關食品加工油脂業務。

請洽: [ahemauer@thesoyfoodscouncil.com](mailto:ahemauer@thesoyfoodscouncil.com) [www.thesoyfoodscouncil.com](http://www.thesoyfoodscouncil.com)

### 黃豆油解決措施(Soybean Oil Solutions): 低亞麻油酸的黃豆油(Low-Linolenic Acid Soybean Oil)

亞麻油酸(Linolenic acid)係最容易受氧化的脂肪酸(即不穩定而易酸敗，

但對健康有益)。它係使黃豆油不穩定的最大原因成份物質，以致黃豆油較易劣敗，因此，通常食品廠商，係將黃豆油予以部份氫化加工，以利增進其儲存壽命(Shelf life)。然而卻在加工過程副產反式脂肪(非共軛型反式脂肪)，它會提升 LDL 膽固醇效應而導致心臟疾病的罹患風險。擁有較低量亞麻油酸的黃豆，可產生不需部份氫化加工的黃豆油，以配製少含或不含反式脂肪的加工食品。

低亞麻油酸黃豆油，係在室溫呈清澈透明液態狀而供為油炸及其他許多加工食品應用。Iowa 州立大學、Monsanto 公司、Pioneer 公司，業經育種成功，比傳統黃豆更為低亞麻油酸含量的黃豆新品種，它含有 3% 以下的亞麻油酸(傳統黃豆油含有 7% 亞麻油酸)。低亞麻油酸的黃豆油，其飽和脂肪酸含量亦比部份氫化黃豆油為低，以致不必考量罹患心血管疾病的風險。

### **1. 亞麻油酸含量 1% 的黃豆油:**

最近美國 Iowa 州立大學研發新品種黃豆，可製取 1% 亞麻油酸的黃豆油，經由 Asoyia 公司，以 Asoyia™ 品牌上市供應。該州的食物經銷商，業經測試 1% 亞麻油酸黃豆油並提供給餐廳使用而獲甚佳結果，包括較長的油炸壽命，長期脆性良好的油炸食品以及其風味良好或比傳統者更佳者，並繼續應用在油炸業務。它係非基因改造(Non-GMO)的新品種黃豆，經通常的提油方式製成亞麻油酸含量 1% 的黃豆油產品供用。

請洽: [www.zerotranssoy.com](http://www.zerotranssoy.com) · [www.notrans.iastate.edu](http://www.notrans.iastate.edu) · [www.asoyia.com](http://www.asoyia.com)

### **2. 亞麻油 3% 以下的黃豆油:**

Ag 公司、Bunge 公司及 Cargill 公司，均已生產由新品種低亞麻油酸黃豆所提製的低亞麻油酸黃豆油，其亞麻油酸含量為 3% 以下。這種黃豆油可減少或免除部份氫化加工作業，而提供比部份氫化油更佳穩定性及儲存壽命的黃豆油供用，猶如 1% 亞麻油酸黃豆油。Monsanto 公司 VISTIVE 黃豆，Bunge 公司 TREUS 黃豆均是。

這兩種黃豆油，均供為食品廠商及製造廠商使用而擴大其應用，猶如 1% 亞麻油酸黃豆油，尤其適於油炸之用。

請洽: [www.zeroTRANS.soy.com](http://www.zeroTRANS.soy.com) · [www.noTRANS.iastate.edu](http://www.noTRANS.iastate.edu) ·  
[www.bunge.com](http://www.bunge.com) · [www.cargill.com](http://www.cargill.com) · [www.monsanto.com](http://www.monsanto.com)

### **3. 機械壓榨及物理精煉的黃豆油：**

機械壓榨及物理精煉 (Expeller pressed & physically refined) 的黃豆油擁有類似部份氫化黃豆油的穩定性，但卻不含反式脂肪。這種加工方式不會去除任何天然黃豆油所存有的抗氧化物質。含有高含量天然抗氧化物質的黃豆油，可提升其油脂穩定性。加之，這些油脂不需要化學溶劑，或氫氧化鈉化學品的處理，卻僅經過擠壓處理過程的加熱及蒸氣以去除遊離脂肪酸。它在室溫呈液態狀而甚適合於食品加工業務用的混合油、油炸油、以及沙拉調味油等，同時亦可供為烘焙應用。

經 USDA/ARS 的國家農業利用研究中心(National Center for Agricultural Utilization Research, Peoria, Illinois)的測試，得悉機械壓榨及物理精煉所製取的黃豆油，至少擁有猶如部份氫化黃豆油的穩定性而可供為製造油炸食品，其味道、口感可與部份氫化油媲美或更佳。據使用這種黃豆油的餐廳報導，它比部份氫化油擁有更佳的油炸壽命。Spectrum 食品公司最近生產機械壓榨及物理精煉的黃豆油，而以 Nexsoy 品牌上市供應食品市場採用。它包括天然的、有機的、基因改造的以及非基因改造的品種在內。

請洽: [www.nexsoy.com](http://www.nexsoy.com)

### **4. 交酯化加工的黃豆油：**

交酯化(Interesterification)加工的黃豆油，係可替代部份氫化油的一種選擇，它可協助減低或去除反式脂肪，然而仍擁有良好的味道、組織(Texture)及風味以供加工食品之用。它係供為造成特定熔點形態(Specific melting profiles)並且擁有機能性(Functionality)貢獻。通常係將完全氫化油(飽和硬化油)與未經部份氫化油(仍有不飽和成份油)予以混合交酯化加工製造者，並不產生反式脂肪，蓋因它不經過部份氫化加工處理所致。

採用化學法或酵素法予以催化的交酯化加工，可重排黃豆油的脂肪酸基(醯基 Acyl group)的位置而使得這種黃豆油擁有類似部份氫化油的機能特性，但並不會產生反式脂肪，乃為其特點。

交酯化黃豆油，係在室溫呈半固態狀而甚適合於固態或半固態脂肪的應用加工場合，諸如在糖果餅點及烘焙食品上配製人造奶油(Margarine)，塗抹油(Spreads)以及酥油(Shortening)，以利製造良好的組織、口感、結構及含氣量的加工食品。

#### **a) 化學法交酯化加工(Chemical Interesterification):**

最為普遍的化學催化劑(Chemical Catalyst)為甲醇鈉(Sodium methoxide)或乙醇鈉(Sodium ethoxide)。這些催化劑可使油脂上的醯基、雜亂地(Randomly)予以重排位置，如是獲得更為穩定的奶油性黃豆油，並且擁有良好的機能性，猶如部份氫化酥油(Partially hydrogenated shortening)，但不含有反式脂肪，例如 Bunge 公司及 Cargill 公司的交酯化黃豆油，塗抹性甚佳。

請洽: [www.zerotranssoy.com](http://www.zerotranssoy.com) · [www.cargill.com](http://www.cargill.com) · [www.bunge.com](http://www.bunge.com)

#### **b) 酵素法交酯化加工(Enzymatic Interesterification):**

酵素催化劑(Enzymatic catalyst)，通常比化學法催化劑可使交酯化反應加工作業更為準確予以掌控。它並不像化學法交酯化加工的雜亂重排而係為在油脂結構上特定位置(例如 1,3-specific)予以重排。其反應較為慢，然而可依照所需求的交酯化度(或時段)予以完成加工反應，為其特點。

Bunge公司及ADM公司提供酵素法交酯化黃豆油產品，前者擁有各種品牌而後者的品牌為Novalipid™，供為參考。

請洽: [www.zerotranssoy.com](http://www.zerotranssoy.com) · [www.bunge.com](http://www.bunge.com) · [www.admworld.com](http://www.admworld.com)

附表: 減低或不含反式脂肪的黃豆油(Soybean Oils with Reduced or No Trans Fats): Qualisoy™ The Soyfoods Council,  
[www.thesoyfoodscouncil.com](http://www.thesoyfoodscouncil.com)

## Soybean Oils with Reduced or No Trans Fats<sup>1</sup>

| Product   | Brands & Sources  | Contacts   | Common Uses  | Benefits  |
|---|---|--|--|---|
| <p><b>Expeller Pressed 1 Percent Low Linolenic Soybean Oil<sup>2</sup></b></p> <p>Soybean oil from 1% linolenic soybeans processed by expeller pressing and physical refinement rather than chemical extraction.</p> <p>The Combination of 1% linolenic soybeans and expeller pressing leads to an extremely stable oil without any hydrogenation</p> |   |  | <ul style="list-style-type: none"> <li>• Deep-fried foods</li> <li>• Sauteed foos</li> <li>• Pan-fried foods</li> <li>• Browning</li> <li>• Spray coatings</li> <li>• Various commercial formulations</li> </ul>                                 | <ul style="list-style-type: none"> <li>• Stable without hydrogenation</li> <li>• Trans-fat free<sup>1</sup></li> <li>• Virtually free of saturated fats know to increase “bad” cholesterol (LDLs)</li> <li>• Non GMO soybeans</li> <li>• Natural because no chemicals used in expeller pressing or physical refinement.</li> </ul>  |
| <p><b>Expeller Pressed and Physically Refined Soybean Oil</b></p> <p>Soybean oil from standard soybeans processed by expeller pressing and physical refinement rather than chemical extraction.</p> <p>Expeller pressing retains naturally occurring antioxidants that provide the oil’s stability without any hydrogenation</p>                      | <p><b>Endura Products LLC-Endura®</b> (foodservice) and <b>Nexsoy®</b> (ingredient)</p> | <ul style="list-style-type: none"> <li>• Rob Kirby<br/>217-391-0091, ext. 12<br/><a href="mailto:rkirby@spectrum-foods.com">rkirby@spectrum-foods.com</a></li> </ul>   | <ul style="list-style-type: none"> <li>• Sauteed foods</li> <li>• Margarines, spreads</li> <li>• Commercial blending</li> <li>• Processed cheese and other sauces</li> <li>• Infant formulas</li> <li>• Some baked goods, snack foods</li> </ul> | <ul style="list-style-type: none"> <li>• Eliminates need for hydrogenation</li> <li>• Trans-fat free<sup>1</sup></li> <li>• Virtually free of saturated fats known to increase “bad” cholesterol (LDLs)</li> <li>• No chemical solvents or caustics used</li> <li>• Can be used with any type of soybean—standard or low-linolenic</li> <li>• Natural, organic, GMO, and non-GMO available</li> </ul>   |
| <p><b>Chemically Interesterified Soybean Oil</b></p> <p>Blend of fully-and non-hydrogenated soybean oils that performs like partially hydrogenated soybean oil but with lower levels of trans fatty acids. Processed with a chemical catalyst.</p>  | <p><b>Bunge</b></p> <p><b>Cargill</b></p> <p><b>Ventura Foods, LLC</b></p>              | <ul style="list-style-type: none"> <li>• John Jansen, Bunge<br/>314-292-2250<br/><a href="mailto:John.jansen@bunge.com">John.jansen@bunge.com</a></li> <li>• Jason Ward, Cargill<br/>804-287-1347<br/><a href="mailto:jason_ward@cargill.com">jason_ward@cargill.com</a></li> <li>• Terry Splane, Ventura<br/>714-257-3963<br/><a href="mailto:tsplane@ventruafoods.com">tsplane@ventruafoods.com</a></li> </ul> | <ul style="list-style-type: none"> <li>• Margarines</li> <li>• Baked goods</li> <li>• Confectionery</li> </ul>   | <ul style="list-style-type: none"> <li>• Processed without partial hydrogenation, thus no trans-fatty acids<sup>1</sup></li> <li>• May be labeled, “interesterified soybean oil”</li> <li>• Slightly higher in saturated fats but not those known to increase “bad” cholesterol (LDLs)</li> <li>• Functions like semi-solid shortening</li> </ul>   |
| <p><b>Enzymatically Interesterified Soybean Oil</b></p> <p>Blend of fully –and non-hydrogenated soybean oils that performs like partially hydrogenated soybean oil but with lower levels of trans fatty acids<sup>1</sup>. Processed with an enzymatic catalyst.</p>  | <p><b>ADM-NovaLipid™</b></p> <p><b>Bunge</b></p>  | <ul style="list-style-type: none"> <li>• Mike Rath, ADM<br/>217-451-4006<br/><a href="mailto:m_rath@admworld.com">m_rath@admworld.com</a></li> <li>• John Jansen, Bunge<br/>314-292-2250<br/><a href="mailto:john.jansen@bunge.com">john.jansen@bunge.com</a></li> </ul>   | <ul style="list-style-type: none"> <li>• Margarines</li> <li>• Baked goods</li> </ul>  | <ul style="list-style-type: none"> <li>• Processed without partial hydrogenation, thus no trans-fatty acids<sup>1</sup></li> <li>• May be labeled, “interesterified soybean oil”</li> <li>• Slightly higher in saturated fats but not those known to increase “bad” cholesterol (LDLs)</li> <li>• Functions like semi-solid shortening</li> <li>• More precise and cost-effective than chemical interesterification</li> <li>• Less harsh on the environment than chemical interesterification</li> </ul> |

<sup>1</sup> Per serving

<sup>2</sup>Standard soybean oil contains about 7 percent linolenic acid

## Soybean Oils with Reduced or No Trans Fats<sup>1</sup>

| Product   | Brands & Sources   | Contacts   | Common Uses   | Benefits   |
|---|--|--|---|--|
| <b>Standard Soybean Oil</b> <sup>2</sup><br>Soybean oil pressed from standard soybeans and processed traditionally. Commonly marketed as “vegetable oil”  | Virtually all cooking oil suppliers have a brand of soybean (vegetable) oil  | Any distributor  | <ul style="list-style-type: none"> <li>• Sautéed foods</li> <li>• Commercial blending</li> <li>• Dressings, marinades</li> <li>• Processed sauces</li> <li>• Some baked goods, snack foods</li> </ul> | <ul style="list-style-type: none"> <li>• Processed without partial or full hydrogenation, thus no trans-fatty acids<sup>1</sup></li> <li>• Virtually free of saturated fats known to increase “bad” cholesterol (LDLs)</li> <li>• Cost-effective</li> <li>• Readily available and consistent supply</li> </ul> |
| <b>1 Percent Low Linolenic Soybean Oil</b> <sup>2</sup><br>Oil processed from soybeans bred to have less than 1% linolenic acid. Less linolenic acid results in oil that is stable without partial hydrogenation.     | <b>Asoyia™</b><br>Processed by Iowa Quality Agricultural Guild (IQAG)  | <ul style="list-style-type: none"> <li>• Rich Lineback<br/>319-257-3400 ext. 105<br/><a href="mailto:rineback@asoyia.com">rineback@asoyia.com</a></li> </ul>   | <ul style="list-style-type: none"> <li>• Deep-fried, pan-fried and sautéed foods</li> <li>• Browning</li> <li>• Spray coatings</li> <li>• Various commercial formulations</li> </ul>                  | <ul style="list-style-type: none"> <li>• Stable without hydrogenation</li> <li>• Trans-fat free<sup>1</sup></li> <li>• Virtually free of saturated fats known to increase “bad” cholesterol (LDLs)</li> <li>• Non GOM soybeans</li> </ul>  |
| <b>&lt;3 Percent Low Linolenic Soybean Oil</b> <sup>2</sup><br>Oil processed from soybeans bred to have less than 3% linolenic acid. Less linolenic acid results in oil that is stable without partial hydrogenation. | <b>Bunge</b> with DuPont Biotech Alliance Pioneer seeds-TREUS™<br><br><b>Cargill</b> , utilizing Vistive seeds from Monsanto.<br><br><b>Ventura Foods, LLC</b> -Mei-Fry Free Soy | <ul style="list-style-type: none"> <li>• John Jansen, Bunge<br/>314-292-2250<br/><a href="mailto:John.jansen@bunge.com">John.jansen@bunge.com</a></li> <li>• Jason Ward, Cargill<br/>804-287-1347<br/><a href="mailto:jason_ward@cargill.com">jason_ward@cargill.com</a></li> <li>• Terry Splane, Ventura<br/>714-257-3963<br/><a href="mailto:tsplane@venturafoods.com">tsplane@venturafoods.com</a></li> </ul> | <ul style="list-style-type: none"> <li>• Fried foods</li> <li>• Baked goods</li> <li>• Margarine blends</li> <li>• Various commercial formulations</li> </ul>   | <ul style="list-style-type: none"> <li>• Stable without hydrogenation</li> <li>• Trans-fat free<sup>1</sup></li> <li>• Virtually free of saturated fats known to increase “bad” cholesterol (LDLs)</li> </ul>  |

<sup>1</sup> Per serving

<sup>2</sup> Standard soybean oil contains about 7 percent linolenic acid