Resúmenes | Abstracts

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Sesson Plenaria | Plenary Session

Lunes, 11 de septiembre | Monday, September 11, 2017

Trends in the Cost of Supplying Plant Proteins from G3 Producers to Major End-users. Owen Wagner, Senior Economist, LMC International, USA

Brazil, Argentina and the US constitute over 85% of global exports of soybean products, by volume. To meet growing global demand for oil and proteins, these three countries have all increased production in their own way over the past twenty years. In Brazil, production has increased by pushing the agricultural frontier north and west. In the United States, soybean production has increased by capturing acreage from small grains in the north and specialty crop products in the south. Finally, In Argentina, soybean production has not pushed into new boundaries-instead increasing on the back of intensification efforts in traditional growing areas. Each of these approaches has had important implications for both the quality and landed cost of soybean product exports globally.

Trends in protein content of soybean meal from the so-called "G3" countries as well as costs of delivering this product to key markets globally will be addressed. This presentation will discuss how meal protein is valued in a global context and examine payback on investing in high protein varieties versus investments in infrastructure to deliver products more efficiently.

Chemical Substance Management in Central and South America: Insights into Sustainability, Regulatory and Management Opportunities. Michael S. Wenk, Senior Regulatory Consultant, The Acta Group and Bergeson & Campbell, P.C., USA

Mr. Wenk will present an overview of the chemical substance, pesticide, product stewardship, and worker and workplace safety regulations developing and being implemented at an unprecedented rate in the region. He will focus on several countries that have key legislation either in process or recently enacted, such as Argentina, Brazil, Chile, Colombia, and Costa Rica among others, and will offer observations on how companies can manage their compliance obligations.

Aceites especiales: aceite de oliva, aceite de palta, aceite de algas y más | Specialty Oils: Olive, Avocado, Algal Oil, and more

Miércoles 13 de septiembre | Wednesday, September 13, 2017

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Production of Olive-Pomace Oil Towards Green Chemistry. M. Victoria Ruiz-Méndez[1], Gloria Márquez-Ruiz[2], M. Pino Pérez-Alvarez[3], and Joaquín Velasco[1], [1]Instituto de la Grasa, CSIC, Spain; [2]ICTAN-CSIC; Spain; [3]Universidad Católica Santa Teresa de Ávila, Spain

Recently, "Design Principles for Sustainable Green Chemistry and Engineering" (DGCE) have been presented so that people can make their Chemistry and Engineering "greener" and more sustainable. Both principles are grouped into three categories: (i) maximize resource efficiency, (ii) eliminate and minimize hazards and pollution, and (iii) design systems holistically and using life cycle thinking. From this point of view, olive-pomace oil production will be revised in this presentation.

Olive-pomace is the solid by-product generated from olive oil extraction. This is obtained by treating olive pomace with solvents (Chemical Process) or by centrifugation (Physical process). The interest in this oil is growing due to its economic value and because it contains all functional compounds present in virgin olive oil, some of them even in a higher concentration than in virgin olive oils, such as erythrodiol and triterpenic acids.

Crude oils have to be refined to remove unwanted minor components that make oils unappealing to consumers. Two main processes to remove free fatty acids are alkaline and physical (neutralizing distillation) refining. The alkaline neutralization process has major drawbacks, such as relatively low yields because of oil losses due to emulsification and saponification of neutral oil. Also, a considerable amount of effluent is generated.

In the present work, olive-pomace oils obtained by centrifugation were refined by physical means at high temperature and vacuum. Neither steam nor reagents were used. The results were compared to other samples that were refined by the traditional process, i.e. with alkali.

Obtención de aceite de aguacate RBDW, 24 h Cold Test. Eduardo Olivares Tapia, Dipasa Internacional de México, S.A. de C.V., Mexico

El aceite de aguacate ha tenido un incremento en la demanda en los últimos años de manera acelerada, tanto en el ámbito alimenticio y principalmente en el farmacéutico. Dipasa, en el refinamiento de aceites vegetales, ha tenido que evolucionar para dar nuevos productos y nuevas propiedades fisicoquímicas que son demandadas por la innovación de nuevos productos en el mercado, el cual aplica para el aceite de aguacate. La obtención de Aceite de Aguacate RBDW (Refinado, Blanqueado, Desodorizado y Winterizado) Cold Test 24h, se obtiene con la aplicación de técnicas de filtrado (temperaturas, flujos, mallas de filtración) y uso filtro-ayuda en la etapa de Winterizado, además de la selección de aceite crudo como materia prima. El doble Winterizado es primordial para la obtención de la calidad especificada por la industria farmacéutica, lo cual implica la remoción de ceras propias del aceite de aguacate. La selección de lotes de aceite crudo es importante debido a que aparte de la etapa de maduración del fruto, se debe considerar el ciclo de la temporada. Se nota que al principio y final de temporada se encuentran los lotes con mayor contenido de ceras. El contenido de ceras puede variar de 5 a 10 % de manera natural en un lote de aceite crudo lo que lleva a rendimientos desde 78 % hasta 88 % considerando con el contenido de ácidos grasos libres.

New Advances In the Traceability and Authentication of Olive Oil Using DNA Molecular Markers. Jose M. Martinez-Rivas[1], Tullia G. Toschi[2], and Wenceslao Moreda[1], [1]Instituto de la Grasa (CSIC), Spain; [2]University of Bologna, Italy

Olive oil production has a worldwide economic impact. Nowadays, there is a great concern in Institutions and private industries because of the increasing number of fraud and adulteration attempts to the market products. That is why olive oil traceability and authenticity have become a

major issue to guarantee the consumer's protection. However, traceability and authenticity of olive oils remains a challenge due to the complexity not only of assessing their origin but also of fraudulent practices. On one hand, olive oil origin and cultivar verification is of primary importance, especially because the increased regional spread of olive cultivars and their various contributions to high quality monovarietal extra virgin olive oils and olive oil mixtures for certification of denomination of origin. On the other hand, high-priced virgin and refined olive oils are subjected to adulterations by addition of low-cost oils obtained from plants other than olive. Therefore, a reliable method of species authentication of vegetable oils is desirable.

Although analytical chemistry techniques are widely used to satisfy all these needs DNA-based methods can serve as complementary approaches. DNA-based technologies are gaining greater attention in recent years since, unlike the chemical composition of olive oil, they are not influenced by environmental conditions, and also because DNA analysis is a fast and economic tool with high specificity, sensitivity and reliability. Recent advances and current trends on DNA-based methods in olive oil authenticity and traceability, including those that will be developed in the European project OLEUM, together with practical implementation will be discussed.

Caracterización del aceite virgen de calabaza ("butternut squash"). Bruno A. Irigaray and María A Grompone, Facultad de Química-UdelaR, Uruguay

Los consumidores exigentes están interesados en aceites no-refinados, debido a la creciente evidencia de sus beneficios nutricionales. Entre ellos están los conocidos como "aceites especiales o gourmets" que son únicos en sabor, aroma y características particulares. Son aceites vírgenes extraídos sin intervención de ningún proceso que no sea físico, obteniéndose generalmente por prensado en frío a temperaturas inferiores a 50ºC.

El "butternut squash" es una variedad de zapallo (Cucurbita moschata). En Uruguay se plantan anualmente unas 3000 hectáreas de zapallos, donde aproximadamente 2500 hectáreas son de kabutiá y unas 500 de zapallo criollo y "butternut". Las agroindustrias procesan anualmente de 600 a 900 toneladas de zapallo principalmente para dulce de corte y mermeladas, quedando semillas como sub-producto. En consecuencia, es interesante poder usarlas para extraer aceite virgen.

Se extrajo el aceite de semillas peladas de butternut en una prensa de tornillo. Se determinó la estabilidad inherente en base a su composición en ácidos grasos, las constantes aparentes de velocidad de deterioro a 110ºC por medio de la calorimetría diferencia de barrido, el contenido de tocoferoles y de polifenoles, el contenido de pigmentos (clorofilas y carotenos) y la absorbancia al ultravioleta (K232 y K270).

El aceite de butternut es rico en ácido palmítico (16.1%) y en ácido oleico (23.6%) y muy rico en ácido linoleico (50.1%); prácticamente carece de ácido linolénico. Debido a esto, su estabilidad inherente es relativamente buena (5.5). El contenido de tocoferoles fue de 1307 ppm, repartidos principalmente entre alfa y beta/gama mayoritariamente. Prácticamente no presenta polifenoles.

***Ricinodendron heudelotii* Oil Stability Study: Temperature, Water and Light Radiation Effect on Oil Chemical Composition.** Diakaridja Nikiema, Muriel Cerny, Eric Lacroux, and Zephirin Mouloungui, Laboratoire de Chimie Agro-Industrielle, France

Ricinodendron heudelotii oil is composed of about 90% unsaturated fatty acids. Presence of single or multiple double bonds gives to these chromophoric molecules a high reactivity with respect to factors such as temperature, ultraviolet rays, oxygen and water. The influence of these factors on fatty acids profile of Ricinodendron heudelotii oil is studied. Experiments are carried out on three types of samples: extracted oil, almonds and whole seeds. Analysis are performed by gas chromatography.

Different observations have been realised. Contact of samples with water at room temperature (20-25°C) had no influence on oil chemical composition, regardless of its environment (pure oil, almond, seed). On the other hand, heating of the samples (103°C) leads to the degradation of a-eleostearic acid into linoleic acid by converting one

of the three double bonds into a single carbon-carbon bond. This oil degradation is much more pronounced when experiment is conducted on whole seeds and not observable when carried out directly on oil. Effect of natural or artificial light radiation results in a strong oil composition modification when oil is directly exposed. Effect is also noticeable when almonds are exposed but light radiation have no effect on oil composition of whole seeds. This modification results in a decrease of a-eleostearic acid (C18: 3n5) amount and an increase of linoleic acid (C18: 2n6c), ß-eleostearic acid (C18: 3n5) and punicic acid (C18: 3n5) amounts. Isomerization of a-eleostearic acid double bond on 9th position (cis-to-trans) gives ß-eleostearic acid and on 13th position (trans-to-cis) gives punicic acid.

Integrando la sustentabilidad social y ambiental en las cadenas de proveedores. Jose Manuel Melero, Sedex, Chile

Esta presentación cubre la importancia de integrar los temas de la sustentabilidad social y ambiental en las cadenas de proveedores. El análisis se hace desde las oportunidades que representa un trabajo cooperativo con los proveedores. Al mismo tiempo se analizan los riesgos asociados de no integrar y evaluar los temas laborales, sociales y ambientales con los proveedores. Finalmente se presentan las herramientas disponibles para reducir los riesgos y maximizar las oportunidades.

BIODIESEL

Miércoles 13 de septiembre |
Wednesday, September 13, 2017

Conversión de aceites usados en fritura en biogasoil mediante hidrodeoxigenación catalítica.
Elisa Volonterio[1], Juan Bussi[2], Jorge Castiglioni[2], Ignacio Vieitez[1], and Iván Jachmanián[1], [1]CYTAL, Facultad de Química, Universidad de la República, Uruguay; [2]DETEMA. Facultad de Química, Universidad de la República, Uruguay

La hidrodeoxigenación catalítica (HDO) de aceites vegetales a alta temperatura y presión de H2 ha demostrado ser una metodología conveniente para la obtención de combustibles líquidos renovables (denominados “biogasoil”) constituidos por hidrocarburos (HC) de composición y propiedades muy similares a las del diesel derivado del petróleo.

En este trabajo, los aceites de descarte provenientes de la fritura de alimentos (WFO) fueron procesados en un reactor Parr 4570HP/HT de 250 mL, a 350 °C y 100 bar de H2 durante 4 h, en presencia de catalizadores de PtO2, NiMo/Al2O3 comercial y éste sulfurado (S-NiMo/Al2O3). La sulfuración se realizó mediante el tratamiento del catalizador NiMo/Al2O3 en un reactor tubular bajo flujo de H2 enriquecido en DMDS y temperatura convenientemente programada.

Cuando un aceite refinado fue sometido a la HDO en presencia de 0,48 % de PtO2 se obtuvo un producto conteniendo 93 % de HC y 4,5 % de FFA. Mientras que cuando se procesó en idénticas condiciones un WFO conteniendo 51 % de compuestos polares y 2,9% de polímeros, el producto presentó sólo 48% de HC y los FFA se incrementaron a 24%.

El procesamiento del WFO con NiMo/Al2O3 no produjo hidrocarburos, pero cuando se lo trató en presencia de 1,4% de S-NiMo/Al2O3 se obtuvo un producto con 95 % de HC y sólo 0,6 % de FFA.

Estos resultados indican que aceites de descarte provenientes de la fritura de alimentos pueden ser eficientemente convertidos a biogasoil mediante HDO utilizando un catalizador comercial de NiMo, de relativo bajo costo, previamente sulfurado.

Maintaining the Normal Engine oil Changing Interval in the Midst of Biofuel Usage. Jerome Kpan[1], Anja Singer[1], and Juergen Krahl[2], [1]Technology Transfer Automotive Centre of Coburg University of Applied Sciences and Arts, Germany; [2]Coburg University of Applied Sciences and Arts; Ostwestfalen-Lippe University of Applied Sciences, Germany

This study presents the feasibility of using the process of adsorption in mitigating the negative impact of the use of biodiesel on the crankcase oil by suppressing oligomers formation in the oil as a result of the degradation of the biodiesel. Biodiesel blended with neat base oil (20 % biogenic fuel and 80 % neat base oil) were thermo oxidatively aged. This was done to determine the ageing impact of the biogenic fuels on crankcase oil. The adsorption experiments were carried out as a function of differential concentrations, adsorbent dosage and temperature. The separation of the oligomers was carried out through fixed bed columns made of Magnesium aluminum hydroxycarbonate and 1,3,5-trimethyl-2,4,6-tris(3,5-di-tert-butyl-4-hydroxybenzyl)benzene. In this work, the two above named compounds were used in the ratio of 1: 2 respectively. An amount of 10g of the combined adsorbent was used per 1L of oil. The Magnesium aluminum hydroxycarbonate compound was placed on top of 1,3,5-trimethyl-2,4,6-tris(3,5-di-tert-butyl-4-hydroxybenzyl)benzene in a fixed bed column. 100 ml of the oil sample run through the adsorbent bed at a temperature of 130°C at a time. Also the combined adsorbents were also added to the sample and tested for induction time, acid number, and peroxide value. Size exclusion chromatography was also carried out to determine the buildup of the oligomers. The analysis using FTIR showed that adsorption prevented about 80% formation of acidic products. This is collaborated with the size exclusion chromatography results and that of the total acid number. The induction time increased by a factor of 3. This study has shown that adsorption is a potential useful tool for the suppression of oligomers formation. Therefore, if biodiesel will be a significant fuel of the future then preventing its role in short oil change interval by the process of adsorption is a great achievement.

Simultaneous Hydrotreatment and Isomerization of Waste Fats and Oils Using Heterogeneous Catalysis. Martin Mittelbach, Sigurd Schober, Alexander Studentschnig, and Maximilian Meissner, University of Graz, Austria

Especially for fats and oils with high content of saturated fatty acids hydrotreatment is an alternative to transesterification to obtain high quality alternative Diesel fuels. A comparison of fuel properties of fatty acid methyl esters and hydrotreated fatty acid material is given. Heterogeneous catalysts, based on Ni and Co impregnated alumosilicates are prepared and used as catalysts for the hydrotreatment of animal fat as well as tall oil. The influence of reaction conditions like time, temperature and type of catalyst has been investigated. The aim of the study was a combined hydrotreatment as well as isomerization with high yield in one step. It could be shown that depending on the reaction conditions high quality products could be obtained from each feedstock, leading to products with low sulphur content and good cold temperature behaviour in one-step reaction. The catalysts could be reused successfully without significant loss of activity. Even the rosin acids in tall oil which cannot be converted by classical transesterification reaction, are totally converted in valuable hydrocarbons by hydrotreatment. Advantages and disadvantages of both options for the conversion of fatty acid material, either transesterification and hydrotreatment, are compared and discussed.

The Solubility of Free Glycerin, Saturated Monoglycerides and Steryl Glucosides in Biodiesel Fuels. Richard W. Heiden[1] and Martin Mittelbach[2], [1]R.W. Heiden Associates LLC, USA: [2]University of Graz, Austria

Impurities in hydrocarbon diesel and fatty acid ester biodiesel fuels sometimes have solubility limits which, when exceeded, can become problematic. While sometimes thought of as a particularly difficult challenge in cold weather, such limitations in solubility can play an important role in fuel filterability, storage maintenance, and diesel engine operability in warm climates, also. Among impurities in biodiesel, free glycerin (FG), saturated monoglycerides (SMG) and steryl glucosides (SG)

have limited solubility. When in excess, these three are well documented nuisances, largely due to the unexpected formation of precipitates. But soluble forms may have little or no impact on fuel properties. While FG is directly regulated by quality standards adopted in many countries, SMG and SG are specified indirectly. In this presentation, we review the pertinent published work on these impurities, and we present our results of solubility measurements which are intended to help define conditions which induce unwanted precipitation. The solubility saturation point (SP), which is a function of the molecular structure and fuel composition, was measured at different temperatures, and in different fuel compositions.

The shapes of the resulting solubility-temperature plots differ appreciably, and are helpful in describing and predicting field observations associated with these polar solutes. The results are discussed in the context of standard analytical methods used for assessing biodiesel quality, filterability, and possible storage vessel accumulations in climates which are considered temperate or tropical.

Advanced Biodiesel Cluster of the Mexican Innovation Center of Bioenergy. Georgina Sandoval[1], Griselda Corro[2], Manuel Aguilar[3], Francisco Rodriguez[4], and Julio Sacramento[5], [1]CIATEJ, Mexico, [2]BUAP, Mexico, [3]CICY, Mexico, [4]CIDETEQ, Mexico. [5]UADY, Mexico

Biodiesel is a liquid biofuel based on greases. Indeed, Diesel engine was originally conceived to work with oils, for this reason diesel engines do not need major modifications to be able to use biodiesel. In addition, due to its nature it does not contain Sulphur and in mixtures helps to accomplish with the regulation of low diesel in Sulphur. Also, the biodiesel increases the lubricity and therefore the duration of the engine. Unlike fossil diesel, the combustion of the biodiesel does not produce harmful emission nor carcinogenic compounds as the aromatic polycyclic hydrocarbons (PAH).

Despite its many advantages, biodiesel has not yet been extensively used in Mexico due to the lack of oleaginous seeds and vegetable oils, in fact, most of this raw material is imported.

Therefore, Mexican Biodiesel Industry faces many challenges to develop efficient and cost-effective processes using alternative raw materials. To meet such challenges, the Advanced Biodiesel Cluster of the Mexican Innovation Center of Bioenergy is working closely with the productive sector and developing new technologies and biotechnologies which are going to be reviewed in this talk.

Alternative Technologies for the Production of Second Generation Biodiesel. Roland Verhé[1] and Wim De Greyt[2] [1]Ghent University, Faculty of Bioscience Engineering, Bio Base Europe Pilot Plant, Belgium; [2]De Smet Ballestra , Belgium

Due to the Food to Fuel discussion and EU legislation new fat and oil resources are used for the production of biodiesel. Especially waste oils and fats such as used cooking oils and animal fats cat 1 and side streams from refining (deodorizer distillates) are used for the production of second generation biodiesel.

However these oils and fats cannot be transformed into biodiesel by the conventional ones step alkaline transesterification of refined oils due to the high concentration of contaminants. The majority of these oils and fats have an higher acidity and additional refining and/or processing technologies have to be applied.

Acidic oils and fats are converted into biodiesel via a combination of acidic esterification and alkaline transesterification, re-esterification of the FFA with glycerol (glycerolysis) and transesterification and by simultaneous enzymatic catalyzed esterification and transesterification. A comparison of these alternative processes will be presented showing the advantages and disadvantages in the conversion of acidic oils and fats . In order to reach the biodiesel standards additional pre-refining steps are necessary in order to eliminate contaminants in the raw materials.

By combination of additional refining steps and alternative biodiesel processes low quality oils and fats are converted into high quality biodiesel.

Process Optimization for Precipitate Removal and Improvement of Biodiesel Filterability by Response Surface Methodology. Vladimir Plata[1], Darrin Haagenson[2], Ayhan Dağdelen[3], Dennis Wiesenborn[2], Viatcheslav Kafarov[1], [1]Research Center for Sustainable Development in Industry and Energy, Industrial University of Santander, Bucaramanga, Colombia; [2]Dept. of Agricultural and Biosystems Engineering, North Dakota State University, Fargo, USA; [3]Dept. of Food Engineering, University of Balikesir, Turkey

Biodiesel has emerged as a promising alternative to traditional diesel. However, the sedimentation of insoluble material capable of plugging filters has become a concern for biodiesel producers. A cold soak filtration test was included in the ASTM D6751 Standard Specification with the goal of assessing the propensity of biodiesel to plug filters. Palm oil biodiesel (POB) is characterized by a very high cold soak filtration time (CSFT). Improving the filterability of POB through selection of an adsorbent capable of removing the insoluble material was the primary objective of this study. The effect of four adsorbents on the precipitate content and CSFT was investigated. The impact on total glycerin content and oxidative stability was also examined. All treatments were effective to significantly reduce the precipitate content and total glycerin content, but only treatments with silicate, neutral and acid activated bleaching earth at 5 wt% and 25 ºC improved the filterability. The OSI value was also reduced; however, it remained above the ASTM D6751 limit. Acid activated bleaching earth was selected for the optimization of the operational conditions of the adsorbent treatment. A two-factor, five-level center composite design was conducted to evaluate the combined effect of adsorbent concentration and treatment time on CSFT. Combination of 0.65 wt% with 10 min resulted enough to reduce CSFT to below the ASTM D6751 limit. Lower adsorbent concentrations could be effectively used (up to 0.44 wt%), but it would be necessary to increase the contact time (up to 30 min).

Optimización del proceso de remoción de precipitados y mejoramiento de la filtrabilidad del biodiesel mediante metodología de superficie de respuesta

Vladimir Plata[1], Darrin Haagenson[2], Ayhan Dağdelen[3], Dennis Wiesenborn[2], Viatcheslav Kafarov[1], [1]Research Center for Sustainable Development in Industry and Energy, Industrial University of Santander, Bucaramanga, Colombia; [2]Dept. of Agricultural and Biosystems Engineering, North Dakota State University, Fargo, USA; [3]Dept. of Food Engineering, University of Balikesir, Turkey

El biodiesel ha emergido como una alternativa promisoria al diesel tradicional. Sin embargo, la sedimentación de material insoluble capaz de obstruir filtros se ha convertido en una gran preocupación para los productores de biodiesel. Recientemente, se incluyó en la norma técnica ASTM D6751 una prueba de filtración con el propósito de evaluar el potencial del biodiesel de obstruir filtros. El biodiesel de palma (POB) se caracteriza por un tiempo de filtrado muy alto. Por tanto, el objetivo de este estudio consistió en seleccionar el adsorbente más adecuado para el mejoramiento de la filtrabilidad del biodiesel de palma. Se investigó el efecto de cuatro adsorbentes sobre el contenido de precipitados y el tiempo de filtrado. También se investigó el efecto sobre el contenido de glicerina total y la estabilidad oxidativa. Todos los tratamientos fueron efectivos para reducir significativamente el contenido de precipitados y el contenido de glicerina total, pero sólo el tratamiento con silicato, tierras de blanqueo neutras y tierras de blanqueo ácidas a 5 wt% y 25 °C mejoró la filtrabilidad. El índice de estabilidad oxidativa también se redujo, pero se mantuvo por encima de 3 h. Debido a su mayor desempeño y menor costo, se seleccionaron las tierras de blanqueo ácidas para la optimización de las condiciones de adsorción mediante metodología de superficie de respuesta. La combinación de 0.65 wt% con 10 min produjo un biodiesel con un tiempo de filtrado menor que 360 s. Una menor concentración de adsorbente (0.44 wt%) podría utilizarse, pero sería necesario aumentar el tiempo de contacto entre el biodiesel y el adsorbente hasta 30 minutos.

Biotecnología: Interesterificación, productos biológicos y proceso enzimático | Biotechnology: Interesterification, Bio-Products, and Enzymatic Process

Martes 12 de septiembre |
Tuesday, September 12, 2017

Interesterificacion enzimatica. Nueva tecnologia para modificacion de grasas y aceites vegetales. Salvador Ríos Valladolid, Chevreul Dumas de México, Mexico

De las tecnologías actuales, existentes para la modificación de grasas y aceites vegetales, la interesterificacion enzimática viene a proponer un nuevo panorama en varios aspectos, tales como de proceso, tecnológicos, ambientales, de aplicación de grasas interesterificadas, entre otros.

Como toda nueva tecnología, está sujeta a competir con las ya establecidas, implicando de manera natural también nuevos retos, que le permitan primeramente posicionarse dentro del campo de manufactura de grasas y aceites vegetales y después consolidarse como una tecnología rentable y accesible a las diferentes compañías del ramo.

También de forma paralela a los retos implicados en esta tecnología, están los nuevos aportes que ofrece y que son de suma importancia para ser considerada como nueva opción en este tipo de industrias. Podemos mencionar de forma breve algunos de los nuevos beneficios en las grasas procesadas con Interesterificacion enzimatica: Ecológico, tecnológico, salud, entre otros.

En esta presentación se conocerá que es la interesterificacion enzimática, su mecanismo, el proceso a nivel industrial, se darán ejemplos de productos que se pueden obtener con este proceso, su aplicación, así como temas de interés referentes a esta nueva tecnología.

Enzymatic Interesterification. New Technology for Fats and Vegetable Oils Modification. Salvador Ríos Valladolid, Chevreul Dumas de México, Mexico

Existing technologies for modification of vegetable fats and oils, enzymatic interesterification comes to propose a new perspective in several aspects, such as process, technological, environmental, application of interesterified fats, among others.

Like any new technology, it is bound to compete with those already established, naturally implying new challenges that allow it, first get position within vegetable fats and oils manufacture, and then consolidate itself as a profitable and accessible technology to different companies of the branch.

Also in parallel to the challenges involved in this technology, they are new contributions that it offers, they are of mainly importance to be considered as a new option in this type of industries. We can briefly mention some of the new benefits in fats processed with enzymatic Interesterification: Ecological, technological, health, among others.

In this presentation, it will be known what it is the enzymatic interesterification, its mechanism, the process at industrial level, will give examples of products that can be obtained with this process, its application, as well as topics of interest concerning this new technology.

Interesterification Fats Formulations, for Different Applications in the Food Industry. Paula Restrepo, Aceites Finos S.A.S, Colombia

(Abstract not available.)

Enzymatic Transesterification of Hybrid Palm Stearin in Mixture with Palm Kernel Oil. Reyna Janin Flores-Rueda, Elena Dibildox-Alvarado*, and Jaime D. Pérez-Martínez, Dept. of Food Biopolymers, Chemical Faculty, Autonomous University of San Luis Potosí, Mexico

The enzymatic transesterification (ET) of hybrid palm stearin as a new source of vegetable fat in mixture with palm kernel oil (HPS/PKO, 70/30) was studied and a comparison was made with an analogous mixture of traditional palm stearin (PS/PKO). Changes in the triacylglycerides (TAGs) profile after ET indicated that the predominantly hydrolyzed and esterified fatty acids during the

reaction were lauric, palmitic and oleic acids, thus in the HPS/PKO the enzymes hydrolyzed ˜ 38% of the total ester bonds present in the TAGs and esterified ˜ 35% of the fatty acids. These percentages were not significantly different from those obtained in the PS/PKO ($P>0.05$), indicating that the enzyme worked equally in both mixtures. The TAGs after ET showed a more homogeneous distribution of fatty acids in the glycerol molecule and were of the mixed type like LaPL and LaLaO, as a result of the decrease of simple TAGs like PPP and LaLaLa. This fact favors the miscibility of the fats that make up each mixture when they crystallized, as shown by the results of the thermal study. ET mixtures developed lower melt temperatures, 34.13 °C and 36.51 °C for HPS/PKO and PS/PKO respectively, due to the decrease in the high melting TAGs in the mixture, so they would have functionality either in spreadable products or for baking.

Purifine 3G, an Alternative Form of Enzymatic Degumming. Jose Lenta, DSM, Argentina

Enzymatic degumming takes vegetable oil processing to another level, harnessing the catalytic power
of phospholipases to break the phospholipids into water-soluble and oil-soluble fragments converting part of the gums into diglycerides, reducing the total amount of gums, reducing the neutral oil losses
in the emulsion and making degumming easier. Purifine 3G is designed for complete reaction of all phospholipids; maximizing oil yield and minimizing by-product formation.

Selección asistida por marcadores moleculares de híbridos oxg de palma aceitera. Kevin Ponce[1], Olga León[2], Enrique Ritter[3], Francisco Orellana[2], Shone Morales[1], and Nathalie Quezada[1], [1]La Fabril, Ecuador; [2]Energy Palma, Ecuador; [3]Neiker, Spain

La producción de aceite de palma es de suma importancia a nivel mundial, ya que satisface las necesidades de diversos sectores industriales como el de alimentos, higiene y limpieza y energía. Las principales amenazas para estos cultivos son la aparición de enfermedades, la sostenibilidad medioambiental y cambios climáticos extremos. En este sentido, la tecnología de selección asistida por marcadores moleculares (MAS) ofrece herramientas para mejorar la productividad, tolerancia a enfermedades y mitigar efectos del cambio climático.

Un programa MAS está siendo desarrollado en Ecuador para la producción de material híbrido OxG (Elaeis oleifera x Elaeis guineensis) que incorpore las mejores características de ambas variedades. Se seleccionaron 200 genotipos de material híbrido (OxG) y 200 genotipos de material parental de E. Guineensis y E. Oleifera de plantaciones de la zona de San Lorenzo, Esmeraldas (Ecuador). La extracción del material genético se realizó con kits de extracción comerciales. La secuenciación se realizó con el sistema 454 de Roche y el análisis bioinformático y asociación por mapeo con un software propietario.

Los resultados de este trabajo conciernen a los dos primeros años de los 4 estimados para este proyecto. Se identificaron 54 genes candidatos usando bases de datos públicas, y se genotiparon y fenotiparon 400 individuos. Se encontraron 29 asociaciones mediante análisis de alelos y 43 asociaciones mediante análisis de combinación de alelos. Además se han elaborando modelos predictivos en base a los estudios MAS y Genomic Selection.

Crushing

Martes 12 de septiembre |
Tuesday, September 12, 2017

Análisis evolutivo del crushing de oleaginosas en Latinoámerica. Héctor Autino, Bunge Argentina SA, Argentina

En esta presentación evaluaremos en la primera parte de la misma, como se compone la producción mundial de granos y semillas oleaginosas a nivel mundial, así como también conocer en detalle quienes son los principales productores, exportadores e importadores; para luego en la segunda parte analizar de manera pormenorizada como ha evolucionado la producción y molienda de semillas oleaginosas en los distintos países latinoamericanos, a través de la misma sera posible observar que Brasil y Argentina lideran ampliamente ambos aspectos, pero que sin embrago otros países como Paraguay , Bolivia y Uruguay han evolucionado de manera sostenida alcanzando al igual que los mencionados en primer término una evolución más que importante. Finalmente un Análisis de las Fortalezas. Oportunidades, Debilidades y Amenazas que cada uno de los actores presenta definirá la presentación.

How to Achieve the Best Energy Recovery in Oilseed Preparation Plants. Farah Skold, Solex Thermal Science Inc, Canada

The use of compact and energy efficient plate heat exchangers in last decade has opened up many new opportunities in the processing of seeds like rapeseed and Soy bean, to enhance the overall energy efficiency of a plant. The use of this technology in recent years has lead to innovative ways of capturing and utilizing waste heat in a variety of manner. Such innovations and improvements are addressed in this paper. These innovations are attractive to plant operators and also need a careful examination of the optimization that is required to reap the full benefits.

Oilseed Preparation and Meal Processing 2017 and Beyond. Mark A. Heimann, CPM/Roskamp Champion, USA.

This presentation will explore the current state of oilseed preparation plants with a particular focus on soybean, rape seed/Canola, and palm kernel preparation and meal processing.

In all processes, seed cleaning ahead of the process has been a growing concern and focus. Included in this trend is an increased interest in the recovery of seeds from pods, particularly in the soybean industry.

Within the soybean processing industry the focus has been on improving the dehulling process and renewed attention and emphasis on conditioning the seeds and cracked seeds prior to cracking and/or flaking.

For rapeseed/Canola processing, there continues to be a latent interest in dehulling, as well as improving conditioning ahead of the flaking process. Current technologies for cooking the flaked seed prior to pressing will also be examined.

Around the world there is a growing interest in palm kernel processing with the focus shifting to alternatives to strict pressing operations to try to reduce maintenance and energy costs.

Meal and hull processing are important steps at the end of the process to convert the residual solids left after the extraction process to attractive products for the animal feed industry. Market requirements and expectations are very different based on geographical location.

Solvent Extractors, Advances—Energy Savings in Preparation. Adolfo Subieta, Desmet Ballestra N.A., USA

There are several solvent extractor designs in the market. An overview is presented. Emphasis is given to the most recent designs. The Immersion extractor is described in more detail pointing out the advances achieved with this design. The features and processing advantages of the Immersion extractor are offered. Its advantage in flake thickness permits energy savings in preparation.

Extractores por solventes, sus avances—ahorros energéticos en preparación. Adolfo Subieta, Desmet Ballestra N.A., USA

Hay varios diseños de extractores por solventes en el mercado. Se presenta un analisis general. Se hace hincapié en los diseños más recientes. El extractor de inmersión se describe con más detalle señalando los avances logrados con este diseño. Se ofrecen las características y ventajas de procesamiento del extractor de inmersion. Su ventaja en el espesor de lámina (hojuela) permite ahorros energéticos en preparación.

Innovations in the Solvent Extraction Plants. Marcos Felipe Gerber Wietzikoski and Allen Ost, Crown Iron Works, Brazil

This paper will discuss improvements on methods of manufacturing de oiled soy meal and crude soy oil when starting with flake or collet aiming to increase the efficiencies and reduce the energy consumption. The paper will make an analysis of the reasons for making significant changes to Crown's line of extractors. The paper will also discuss new application to heat thermal integration between the oil-hexane distillation systems.

Jueves, 14 de septiembre |
Thursday, September 14, 2017

Desarrollos en desolventización de harinas. Anibal A. Demarco, Desmet Ballestra, Argentina

La harina con solvente retenido proveniente del proceso de extracción contiene un 26-30% en peso de solvente. El objetivo del proceso de desolventización es remover el solvente de la harina extraída, tostar la misma para controlar los factores anti-nutricionales, y reducir la humedad y temperatura de la harina hasta valores apropiados para su almacenaje y transporte. La mayor parte del calor suministrado para evaporar el solvente de la harina está dado por el calor latente de condensación de vapor vivo, el cual aumenta simultáneamente la humedad en la harina para facilitar el tostado. El secado y enfriamiento de la harina se logran pasando aire a través del lecho fluidizado de material. Los vapores de solvente y agua que se liberan en el proceso de desolventización pasan a través de un lavador de gases con el fin de remover partículas antes de ingresar a la destilación para recuperar el solvente. El crecimiento de la capacidad de las plantas es tal que se han desarrollado diferentes equipos y tecnologías para opitimizar el costo operativo en el proceso más costoso de toda la planta de Crushing.

Improving Oil Yield Using Enzymatic Degumming. Danilo Lima[1] and Bent Sarup[2], Brprocess, Brazil; [2]Alfa Laval, Denmark

Traditionally water degumming is used to bring the gum (phosphorous) content in crude soybean oil below the maximum corresponding to 200 ppm phosphorous. And the extracted gums used to produce lecithin for food or feed purposes. Or add the gums to the meal, however the latter option decreasing the protein content in the meal. Therefore, depending on market conditions, it may be advantageous as alternative to apply enzymes and increase the yield of soybean oil. The increased oil yield can takes place by enzymes converting the gums or phosphatides to additional oil components (such as diacylglycerides or FFA), and at the same time reducing the emulsifying tendency and the viscosity of the gums to reduce the oil losses in the high speed separator. Many factors should be considered in the choice of technology, including the capacity and configuration of the extraction plant, commercial destination of by-products, regulatory issues, and the quality of the soybean oil and meal in combination with the enzyme types available on the market. This presentation will cover the current state of this technology and provide more details on the technical and economical considerations for choice of enzymatic water degumming technology.

Harina resistentes a la salmonella. Cintia C. Maltoni, Molinosagro, Argentina

Desde el año 2012, las harinas producidas en Molinosagro son tratadas con salmonellicida biológico.

El objetivo de este tratamiento es prevenir las contaminaciones por Salmonella en toda la cadena logística luego de que la mercadería sea despachada en nuestro puerto.

En el caso que la harina se contamine en alguno de los eslabones de la cadena, el salmonellicida actuaría en el lapso de 72 horas.

El salmonellicida ha sido aplicado en más de 16 MM Tn de harina, protegiéndola en destino, por más de 180 días de potenciales contaminaciones.

Este producto tiene un poder residual de más de 3 meses, es de fácil aplicación, seguro y amigable con el medio ambiente.

Estructura, funcionalidad y aplicaciones en alimentos | Structure, Functionality, and Applications in Food

Martes 12 de septiembre |
Tuesday, September 12, 2017

Mixed Organogels Based On Monoglycerides and Phosphatidylcholine. Jorge F. Toro-Vazquez, Mayra Aguilar-Zarate, Flor Alvarez-Mitre, Miriam A. Charó-Alonso, Universidad Autónoma de San Luis Potosí, Mexico

The development of organogels is the result of molecular self-assembly of gelator molecules, through short-range intermolecular interactions that results in the formation of 3D crystal networks that immobilize organic solvents. The phosphatidylcholine (PC) and monoglycerides (MG) develop viscoelastic organogels in a vast variety of solvents. However, gel formation with these molecules requires of high concentrations and, sometimes the addition of a co-surfactant. We investigated the organogelation of safflower (SO) and mineral oil (MO) using combinations of commercial MG (i.e., monostearate + monopalmitate) and saturated PC at concentrations lower than the critical gelling concentration of each molecule (< 3% MG and < 4% PC). We studied the organogelation of the MG + PC mixtures in SO and MO through infrared spectroscopy, microscopy, solid phase content (SPC), rheological (G', G") and textural measurements. In VO we obtained gels after 24 hours at 15°C in mixtures of 0.25%, 0.5% and 1% of PC in the presence of 2% MG, achieving the maximum G' and textural values in the 2% MG + 0.25% PC organogel. In MO we achieved the maximum G' and texture values in the 2% MG + 2.5% PC organogel. These results showed that under these conditions a synergistic molecular interaction occurred between PC and MG. Nor G' nor the texture parameters observed a particular relationship with the SPC. Additionally, we observed that a low concentration of PC modifies the lamellar organization of MG, resulting in the formation of microstructures that physically trap the oil. The infrared studies showed that MG-PL interaction is mediated through hydrogen bonds. These MG-PL interactions were modified through the addition of low amounts of water, affecting positively the elastic properties of the organogels.

How Optimization Tools can be Used to Obtain Monoglycerides Oleogels as a Solid Fat Substitute in Muffins. Anabella A Giacomozzi, María E. Carrín, and Camila A. Palla, PLAPIQUI - CONICET - UNS, Argentina

Although saturated and trans fatty acids provide desired elasticity and textural properties to bakery products, their negative effects on humans' health forced the industry to reduce them in food preparation. Oleogels -semisolid materials comprising low concentrations of gelator molecules entrapping oil- may represent a promising alternative to satisfy these requirements. The functionality of this interesting materials is affected not only by their chemical composition, but also by the thermal and mechanical conditions established during its processing.

In this work, oleogels from high oleic sunflower oil (HOSO) and saturated monoglycerides were formulated in order to study the influence of the monoglycerides concentration (MG), the speed of

agitation and the cooling temperature (TC) over oil binding capacity and some textural and rheological properties by an incomplete factorial design of three factors with three levels. A fitting model for each response and a multi-objective optimization were made to produce oleogels with textural and rheological properties close to those of a commercial margarine (CM). Muffins were prepared using these optimized oleogels and their textural and physic-chemical properties were measured and compared against those obtained in muffins prepared using CM or only HOSO. Moreover, the amount of oil released from muffins over time was measured to evaluate their stability.

The MV and TC were the most significant factors over each analyzed response. It was found that almost all analyzed properties of oleogel muffins resembled the ones formulated with CM. These results indicate that obtained oleogels offer a potential way for the formulation of healthier bakery products.

A Microstructure-level Study of Monoglycerides Oleogels Using Rheomicroscopy. Camila A. Palla[1], María E. Carrín[1], Juan de Vicente[2], and María J. Galvéz Ruiz[2], [1]PLAPIQUI - CONICET - UNS, Argentina; [2]Universidad de Granada, Spain

Monoglycerides oleogels are semisolid systems containing self-assembled structures formed by crystalline material entrapping liquid oil in a three-dimensional network. The microstructure of the network of these oleogels determines their macroscopic functionality. Interestingly, these oleogels can be tailored by modifying the preparation conditions and, in particular, the cooling rate.

In this work, the effect of the cooling temperature profile (CTP) employed in the production of oleogels from monoglycerides and high oleic sunflower oil was investigated using a torsional rheometer equipped with a polarized optical microscope. This technique allows simultaneously carrying out rheological measurements and recording images of the internal structures of the gels during the gelation process. With this, it becomes also possible to obtain microstructural parameters such as the Avrami index that allows us to determine the dimensionality of the crystal growth process. Once the gelation processed finished, the microstructure of the oleogels was also analyzed by confocal and optical microscopy. Micrographs were processed and analyzed using ImageJ software in order to estimate the fractions of solid crystalline and oil, and to determine the network characteristics such as the crystal length and shape, and the box-counting fractal dimension.

Micrographs obtained using these three complementary microscopic techniques revealed a strong consistency. Generally speaking, monoglycerides crystal aggregates distribute in irregular, elongated, fibrillar or needle-like shape. The analysis of the distribution of crystal sizes resulted in very similar median values, D50, which rose with the increase of the CTP. The highest CTP allowed to obtain oleogels with the highest elastic modulus, a fractal dimension close to 2 and a solid crystalline fraction of about 0.15.

Grasas comestibles cero-trans a partir de aceite de salvado de arroz: análisis de textura. Nicolás Callejas and Iván Jachmanián, Facultad de Química-UDELAR, Uruguay

En este trabajo se estudió la textura de mezclas de aceite de salvado de arroz (RBO) con aceite de salvado de arroz completamente hidrogenado (FHRBO) y el efecto de la interesterificación enzimática (Lipozyme TL-IM) sobre esta propiedad. Se determinó también la composición en triacilgliceroles (HPLC/ELSD), las propiedades térmicas (DSC), características de cristalización (difracción de Rayos-X y microscopía), tanto en las mezclas como en los productos.

Los análisis de textura se realizaron mediante ensayos de penetración (Texturómetro TA.XT2i, provisto de sonda cilíndrica de 3 mm de diámetro) mediante los cuales se determinó la fuerza máxima de penetración o dureza (D). Los valores de D determinados a 25 ºC para las mezclas conteniendo de 90 a 20 % de FHRBO variaron de 67.6 a 0.7 N, respectivamente. Las curvas de penetración de las mezclas conteniendo de 90 a 50 % de FHRBO mostraron numerosas irregularidades, lo que indica que son mezclas “quebradizas”, mientras que aquellas conteniendo de 40 al 20 % de FHRBO las curvas resultaron más regulares y continuas.

Los productos interesterificados resultaron considerablemente menos duros que las correspondientes mezclas, aquellos conteniendo entre 70 y 30 % de FHRBO presentaron curvas regulares (D de 12.6 a 0.1 N, respectivamente), observándose pérdida total de estructura en aquellos con concentraciones de FHRBO menores a 30 %.

La textura de algunos de los productos con contenido moderado de FHRBO sumado a una microestructura y polimorfismo favorables (tendencia ß´), sugiere que varios de ellos pueden resultar atractivos como base para el diseño de grasas comestibles cero-trans.

An Update on the Use of High Intensity Ultrasound to Change Physical Properties of Lipids. Silvana Martini, Utah State University, USA

The objective of this presentation is to summarize and update recent developments on the use of high intensity ultrasound (HIU) to change the crystallization behavior of lipids. Studies have shown over the years that HIU can be used as an additional processing tool to induce lipid crystallization, create small crystals, and generate a hard crystalline network with sharp melting profiles. This presentation will summarize results obtained for various types of fat including anhydrous milk fat, palm oil, palm kernel oil, and interesterified fats. We will discuss differences and similarities obtained between these fats and between various experimental set ups such as crystallization in batch and in-line. We will also show how ultrasound can be used in combination with other processing conditions such as crystallization temperature, agitation, and the addition of emulsifiers. The use of this technology for specific food applications such as to delay phase separation and oil migration and the use of sonicated fat to manufacture cookies, pie crusts, and cakes will be presented. Lastly, we will discuss the fundamentals that drive sonocrystallization of fats including the effect of chemical composition and the formation of acoustic cavities.

Ultrasound to Reduce Eutectic Points and Enhance Physical Properties of Cocoa Butter Binary Mixtures. Nayma I. Murillo-Hernández[1], Elena Dibildox-Alvarado[1], and Silvana Martini[2], [1]Dept. of Food Biopolymers, Chemical Faculty, Autonomous University of San Luis Potosí, Mexico; [2]Dept. of Nutrition, Dietetics, and Food Science, Utah State University, USA

Chocolate type product can be formulated with cocoa butter substitutes (CBS) to reduce cost. CBS are hard lauric fats with chemical composition completely different to CB, however its main physical properties are similar. The objective of this research was to studying phase changes in binary mixtures of CB with 5, 25, 50, 75% (w/w) of CBS. All mixtures were crystallized under thermal process of time-temperature control, and then only mixtures with eutectic behavior were tested with High-intensity ultrasound (HIU) at 400 W/cm2 by 5 seconds, to enhance their physical properties. Phase change was evaluating by variations in melting temperatures (Tm) and solid fat content (SFC) through constructing phase diagrams and iso-solid diagrams, respectively. Both diagrams showed significant eutectic effects with addition of 25% and 50% of CBS. Which was evidenced by reduction in SFC values and low Tm developing low elastic properties (Lower G'). The mixture at 25% sono-crystallized did not show increase in Tm, while 50% showed an increase of 30.48 °C to 32.46 °C. Thereby, its X-RD patterns were characteristic of the .'1IV and .2V form, respectively. Microstructure study showed the development of small and homogeneous crystals generating a strong crystal lattice (5170gforce v.s. 6400gforce), as well as better viscoelastic values (Higher G'). Mixture with 75% displayed the same behavior that 25%, while mixture of just 5% indicated complete compatibility with CB. Thus, the HIU effect was an important factor in decreasing the eutectic points in binary mixtures of fat.

The Use of Non-invasive Ultrasound to Monitor the Crystallization Structure of Selective Fat Systems. Fernanda Peyronel[1], Michaela Häupler[2], Caspar Winkelmeyer[3], Jasmin Reiner[3], and Alejandro G. Marangoni[1], [1]University of Guelph, Canada; [2]Technische Universität, Germany; [3]Universität Hohenheim, Germany

An ultrasonic generator/analyzer, SIA-7 (V.N. Instruments) was used to monitor the crystallization process of different fat-systems. The uniqueness of this instrument is that it uses a chirp, comprising many frequencies, rather than a pulse of a single frequency. The chirp enables the probing of the material in a single step rather than having to generate a sequence of single pulses. The generator was used in a four-pathway configuration, where each of the two transducers operated as a transmitter and receiver.

We report on the changes in the ultrasound attenuation and velocity signals as a function of frequency and time for 3 different systems: 1) tempered versus non-tempered cocoa butter, 2) tempered (as per seeded) vs non-tempered dark chocolate and 3) palm kernel stearin emulsions in two different polymorphic forms. Tempered chocolate exhibited lower velocities than did the non-tempered samples. Tempered chocolate exhibited lower attenuation at higher frequencies than did non-tempered samples containing the same solid fat content. Opposite results were obtained for cocoa butter, for which case the attenuation at higher frequencies was higher for the non-tempered product. Palm kernel stearin showed more attenuation in the beta form than in the alpha.

We will discuss these results and correlate them to images obtained using light microscopy and results of X-ray diffraction.

This work shows that ultrasound is an effective technique to characterize the structure of fat-systems. These results have direct application in the fat-industry where continuous monitoring can easily be implemented in order to report on the status of the material.

Jueves, 14 de septiembre |
Thursday, September 14, 2017

Engineering the Crystallization Behavior of Triacylglycerols Using High Behenic Acid Stabilizers. Ga Y. Kim and Alejandro G Marangoni*, University of Guelph, Canada

High behenic acid stabilizer (HBS) was diluted in peanut oil (PeO), high oleic safflower oil (HOSO) and sesame oil (SeO) in order to elucidate its mechanism behind liquid oil stabilization. PeO required the least amount of HBS of 6.5% to form gel when cooled at 3°C/min (w/w) while HOSO and SeO required 8% and 10%, respectively. Higher amounts of HBS, from 10% to 11%, were needed to form gel with three oils at a slower cooling rate, 0.6°C/min. When 12% of HBS was added to oils, HBS-PeO gel showed the lowest free energy of nucleation, thus the highest nucleation rate. In fatty acid and triacylglycerol composition analyses, PeO contained the highest level of long chain fatty acids and high melting triacylglycerols. HBS stabilizes liquid oil more effectively when there are more long chain fatty acids within high melting triacylglycerols in the oil to be stabilized and when cooled under a faster rate. Further study was conducted to determine the effect of HBS on crystallization of edible fats and its interaction with specific triacylglycerols. The addition of 1.5% HBS increased the nucleation rate of milk fat, palm oil, and palm kernel oil while only 0.2% of it was needed in palm stearin. The formation of new fraction was observed between HBS and high-melting fraction of palm oil and milk fat. Newly formed crystals were observed under polarized light microscope, making the microstructure denser. HBS interacted with tristearin and tripalmitin, resulting in decreased melting points. The maximum HBS concentrations that can be added before the excess HBS separates out were 50% (w/w) for tristearin and 20% for tripalmitin (w/w). A new crytstal fraction with ß' polymorph was formed when HBS (>5%) was added to high-melting milk fat fraction. The melting point of the new fraction increased as more HBS was added, as expected from solid-state compatibility arguments.

Effect of a Stabilizer Rich In Behenic Acid in Fat Crystallization. Marisol Cordova-Barragan[1], Elena Dibildox-Alvarado*[1], and Alejandro G. Marangoni[2], [1]Dept. of Food Biopolymers, Chemical Faculty, Autonomous University of San Luis Potosí, Mexico; [2]Dept. of Food Science, Ontario Agricultural College, University of Guelph, Guelph, Canada

The stability of fat systems as margarines strongly depends on their crystallization process, which can be favored with the use of additives. Thereon, the effect of a stabilizer rich in behenic acid on the thermal profile of a bread-making margarine fat blend was evaluated and complemented with their triacylglycerides (TAGs) profile. There were elaborated four margarine fat blends added with 0.0, 0.3, 0.6 and 0.9% of stabilizer. The outcomes obtained indicate a significant change in the first exotherm, where a higher amount of stabilizer originated an increase in the onset temperature of crystallization (e.g., 17.85 vs. 21.39°C for 0.0 and 0.9% of stabilizer, respectively, $p<0.05$). Additionally, it was calculated the exothermal heat flow per temperature unit, where it was observed a decrease of it as the amount of stabilizer increased. This suggests that TAG molecules rich in behenic acid present in the stabilizer in admixture with TAG molecules of the fat base for margarine (ie, POP, POS) enhance crystallization requiring less energy to structure the three-dimensional fat network. The effect of the behenic acid-rich stabilizer would then be a benefit in the preparation of W / O emulsions such as margarines.

Effect in the Crystallization of Industrial Margarines Using Hybrid Palm Oil. Elena Dibildox-Alvarado[1], Emma C. Sandoval*[2], Andrés G. Rumayor[2], and Jeovanny Rivera[2], Dept. of Food Biopolymers, Chemical Faculty, Autonomous University of San Luis Potosí, Mexico; [2]Palsgaard Industri de México, Mexico

Currently, margarine manufacturers are beginning to use hybrid palm oil as a new agricultural raw material alternative in the formulation of fat blends, however the use of this oil modify substantially the crystallization patron and the available information is rather limited. This study has as an objective the characterization of hybrid palm oil as a raw material in reference from traditional palm oil. Complimentary, to evaluate the effects of hybrid palm oil and its fractions in the crystallization of margarines with and without crystal promoter. Fatty acid profile, Solid Fat Content (SFC) and melting and crystallization profiles (DSC) of raw materials were examined. Fat blends standard, hybrid and hybrid with crystal promoter were elaborated, and then made margarines (W/O emulsions: 35/65 and 20/80). Solid Fat Content, melting profile, polymorphism, thermal resistance, texture and baking performance were determinate overtime. Margarine with lowest fat content had a melting temperature of 41.20°C (± 3.52 °C), SFC of 18.25% (± 0.209%), hardness 3.09 kg (± 0.16 kg) and the presence of ß' crystals and similar characteristics as traditional margarines, support the use of hybrid palm oil as alternative in the manufacture of baking margarines.

Plasma de alto voltage para la hidrogenacion parcial de aceite de soya sin grasas trans. Ximena V. Yepez[1], Kevin M. Keener[2], and Hanna S. Gracz[3], [1]Purdue University, USA; [2]Iowa State University, USA; [3]North Carolina State University, USA

Las grasas parcialmente hidrogenadas son consideradas no seguras para la formulación de alimentos, debido a su alto contenido de grasas trans. High Voltage Atmospheric Cold Plasma (HVACP) es una nueva tecnología de hidrogenación parcial de aceite de soya, que está siendo investigada para evaluar su aplicación en procesos de hidrogenación de aceite que se desarrollen a temperatura ambiente, presión atmosférica, sin catalizador, y mediante el uso de gases hidrógeno y nitrógeno. Aceite de soya (5g) fue expuesto al tratamiento HVACP durante 0, 0.5, 1, y 1.5 horas, por triplicado. El efecto del tratamiento fue evaluado mediante los métodos de índice de yodo, composición de ácidos grasos, 1H-NMR, y contenido de nitrógeno. Adicionalmente, el método de espectroscopia óptica de emisión fue utilizado para identificar las especies de hidrógeno y nitrógeno producidas en el campo eléctrico y presentes en la reacción. Luego del tratamiento se analizaron dos fracciones de la muestra: una sólida (5%) y otra liquida (95%). Los resultados mostraron una reducción en el índice de yodo en función del

tiempo del tratamiento. En la fracción liquida disminuyo de 130 a 122, con 1.5 horas de exposición, y la fracción solida disminuyo hasta 90. La composición de ácidos grasos en ambas fracciones tuvo un incremento significativo de grasas saturadas. La estructura química de triglicéridos fue observada en todas las muestras mediante H-NMR. Este estudio demuestra que HVACP podría hidrogenar parcialmente aceite de soya sin la producción de grasas trans, sin la necesidad de adicionar calor, a alta presión, y sin el uso de catalizadores.

Evaluación sensorial en grasas | Sensory Evaluation in Fats

Miércoles 13 de septiembre |
Wednesday, September 13, 2017

Fragrance Retention, Release and Sensory Perception from Surfactant-rich Rinse-off Cosmetics. Martin S. Vethamuthu, Sergio Lira, Edward DiAntonio, Hani Fares, and Linda Foltis, Ashland, USA

Objective: This study discusses an effective in vivo methodology including expert sensory evaluation of fragrance release from surfactant rich rinse-off cosmetics.

Method: The instrument used to screen cosmetic compositions for improved fragrance retention components is an Agilent HP7890B GC/5977C MSD with GERSTEL MPS robotic sampler, equipped with a DB-624 capillary column (30m, 250 mm and 1.40µm film thickness). An area of 18cm2 of the inside arm was washed with 3.3 mg/cm2 of a shower gel formulation and rinsed with tap water for 30 seconds and dried. Subsequently the area of the arm was exposed to the twister bar or SPME fiber for 15 minutes, this step is repeated at intervals of 1 hour for a total time of four hours, after extraction the twister bar / fiber is removed and placed into a clean glass thermal desorption tube for GCMS analysis.

Results: The technology screening process helps identify fragrance encapsulates and polymeric deposition aids that capture, interact and retain fragrance ingredients on skin during the wash process.

Discussion and Conclusion: The headspace GC instrumentation coupled with the appropriate SPME fiber or twister bar is capable of monitoring the time dependent release/retention profiles of fragrance ingredients from the substrate. The results from this study show polymeric deposition technology when combined with microencapsulation routes provides the best approach to significantly improve fragrance delivery and perception from rinse-off cosmetics.

Sensorial and Instrumental Spreadability of Brazilian Commercial Margarines. Daniel Barrera-Arellano[1], Rita de Kassia Garcia[1], Kamila Ferreira Chaves[1], Juliana Burger Rodrigues[2], and Helena Maria André Bolini[2], [1]Fats & Oils Lab. DTA-FEA University of Campinas - UNICAMP, Brazil; [2]DEPAN - FEA University of Campinas - UNICAMP, Brazil

The margarine is a foodstuff used for spreading, baking, and cooking. It was originally created as a substitute for butter by Mège Mouriès in 1896. The hardness and spreadability are the main parameters required for table products, such as margarines, butter, and spreads. The objective of this study aimed to verify the sensory spreadability of some margarines sold in Brazilian marketplace using

sensorial Just-About-Right technique and to perform its correlation to instrumental analysis. For this purpose, six commercial margarines with different lipid content were analyzed to fatty acids composition (AOCS method Ce 1-62), consistency and instrumental spreadability using a Texture Analyzer (TA-XTi2 Stable Microsystems, England), and the sensory spreadability by 120 untrained tasters. Margarines showed trans isomers (varying between 0.26 and 9.69 media 2.44±3,57) and polyunsaturated fatty acids levels (varying between 27.51 and 49.86 media 40.87±9,75). All margarines showed higher saturated fatty acids levels (varying between 27.33 and 47.76 media 32.65±7.56). In general, the commercial margarines showed low/medium sensory notes (3.93±0,92) for spreadability at refrigeration temperature. The margarines with higher levels of polyunsaturated fatty acids presented higher scores for sensorial spreadability. Additionally, it was observed that the results of instrumental analysis for spreadability were in accordance with those obtained in sensorial test (Significative Correlation r=0,99). Therefore, instrumental analysis will be as a great tool to evaluate the spreadability of margarines, without requiring the use of sensory panel, once it is a laborious technique.

Saltiness Perception in Oil-in-Water Emulsions at Threshold and supra-threshold Levels. Silvana Martini, Department of Nutrition, Dietetics, and Food Sciences, Utah State University USA.

The objective of this study was to evaluate the effect of (a) lipid addition on saltiness threshold values and (b) oil content on saltiness perception. For the first part of the study, saltiness thresholds were determined in 20% oil-in-water emulsions using soybean oil (SBO), anhydrous milk fat (AMF), or a combination of SBO and AMF. The addition of lipid did not affect detection thresholds ($p > 0.05$) for any of the lipid phases tested with values of 0.019 % of NaCl for the emulsions and 0.013 % of NaCl for the aqueous phase. However, when NaCl was tasted at supra-threshold levels saltiness intensity was significantly higher in the emulsions compared to the saltiness perceived in the aqueous phase for the emulsion formulated with AMF and AMF/SBO mixture but not for the sample formulated with SBO alone. For the second part of the study, saltiness perception was measured as a function of oil content (10, 20 and 40% of oil in water) and NaCl concentration ([NaCl]) and results were fitted to the Steven's power law. As expected, saltiness intensity increased as [NaCl] in the aqueous phase ($[NaCl]_{aq}$) increased, for a constant type of sample. All types of samples (0, 10, 20 and 40% oil-in-water emulsions) were well fitted to the Stevens' power law with exponent values of 0.87, 0.76, 0.66 and 0.47 for the 0, 10, 20 and 40% oil-in-water emulsions, respectively. Saltiness intensity decreased with oil addition, especially for $[NaCl]_{aq} >$ 0.5% suggesting that perception is driven by [NaCl] in the emulsion rather than the $[NaCl]_{aq}$. However, when experimental saltiness intensity was compared to the theoretical values due to a dilution effect caused by the incorporation of oil, the perception was significantly increased ($p < 0.05$) for emulsions formulated with 20 and 40% oil.

Oxidación de lípidos y antioxidantes en alimentos | Oxidation of Lipids and Antioxidants in Foods

Miércoles 13 de septiembre | Wednesday, September 13, 2017

***In vitro* Study of Bioaccesibility and Oxidative Stability of Squalene in Microencapsulated Oil.** Francisca Holgado[1], Joaquín Velasco[2], M. Victoria Ruiz-Méndez[2], and Gloria Márquez-Ruiz*[1], [1]ICTAN-CSIC, Spain; [2]Instituto de la Grasa - CSIC, Spain

Squalene is an important bioactive lipid present in minor amounts in vegetable oils and concentrated in oil deodorizer distillates, which have potential applications in functional foods.

However, squalene is a polyunsaturated hydrocarbon highly susceptible to oxidation and may be affected by the prooxidant conditions of the digestion process. The objective of this work was to examine the effect of simulated gastrointestinal conditions on squalene stability in sunflower oil microencapsulated with caseinate-lactose (CL) or modified starch (MS) by spray-drying. Squalene and its saturated analogue, squalane, were added to the oil (10,000 mg/kg oil) before microencapsulation. Encapsulation efficiencies obtained were 94.7 and 99.2% for CL and MS, respectively. For in vitro assays, simulated gastric and intestinal fluids were used, and released oil was extracted with organic solvents following gastric and intestinal digestions. Results showed that bioaccesibility of squalene was similar for CL and MS (about 70%) but oil was mostly released under gastric conditions for CL whereas this occurred under intestinal conditions for MS. While only 39% of squalene in non-encapsulated oil remained intact after the whole digestion process, 54 and 67% of total squalene was bioaccesible and unaltered in CL and MS, respectively. In both CL and MS, the greatest oxidation degree of the squalene released occurred in the gastric medium. No significant oxidation was detected on the squalene not released from microcapsules throughout the complete digestion process. In conclusion, microencapsulation increased oxidative stability of squalene, especially in the case of MS due to its lower release rate under gastric conditions.

Extracción supercrítica con dióxido de carbono asistida con ultrasonido de antioxidantes naturales de romero (*Rosmarinus officinalis*). Ignacio A. Vieitez[1], Lucia K. Maceiras[1], Juliane Viganó[2], Francisco M. Barrales[2], Iván Jachmanián[1], and Julian Martínez[2], [1]Facultad de Química, UdelaR, Uruguay; [2]Faculdade de Engenharia de Alimentos (FEA), UNICAMP, Brazil

La extracción con fluidos supercríticos, particularmente con dióxido de Carbono (SCCO2), ha sido propuesta como una alternativa conveniente ya que no presenta toxicidad y permite realizar el proceso a temperaturas moderadas, preservando la integridad de los compuestos de interés. La utilización de ultrasonido puede resultar beneficiosa ya que se crean ondas que pueden causar cavitación y romper la matriz vegetal favoreciendo la penetración del solvente y la transferencia de masa.

En este trabajo se obtuvo extractos con SCCO2 de romero (Rosmarinus officinalis), elegido por su conocido elevado poder antioxidante. Para la extracción se trabajó en un reactor supercrítico de escala de laboratorio. Para cada experimento la celda de extracción se llenó con 35 g de hojas molidas de romero, a P = 250 bar y T = 50 °C, variando la potencia de ultrasonido (0 a 400 W).

Para medir el potencial antioxidante de los extractos, los mismos se adicionaron a 500 ppm a un aceite de girasol purificado (P-SFO, libre de antioxidantes comerciales o nativos), al cual se determinó la estabilidad oxidativa mediante el método Rancimat a 100°C. Para cada extracto se determinó el período de inducción (IP) y el período de inducción relativo (RIP, igual a cada IP relativo al del P-SFO = 1,7 h). Los resultados se compararon con el obtenido al aditivar el P-SFO con 500 ppm de BHT, BHA y ð-tocoferol.

Cuando el P-SFO fue aditivado con los extractos de romero obtenidos aplicando ultrasonido a 0, 200, 280 y 400 W, se obtuvieron RIP de 4.6, 5.2, 5.1 y 3.6, respectivamente. Se observó que un aumento la potencia de ultrasonido hasta 280 W durante la extracción con SCCO2 provoca un aumento del IP, pero a 400 W este valor disminuye.

Estos extractos presentaron un adecuado potencial antioxidante, levemente inferior al de algunos antioxidantes sintéticos de uso común como el BHT y BHA (RIP= 7.9 y 8.3, respectivamente), y similar que el ð.-tocoferol (RIP= 5.2).

Metodologia novedosa para la evaluacion de tiempo de vida de alimentos con alto contenido de grasa. Percival Andrade, Elizabeth Marcillo, Elizabeth Bucheli, and Cecilia Ulloa, La Fabril, Ecuador

Los olores de los alimentos son una importante señal sensorial y parte integral de la percepción humana del sabor. Olores y sabores indeseables se desarrollan durante la oxidación de lípidos en alimentos con alto contenido de grasa como la mayonesa. El presente trabajo realizó un

seguimiento de los compuestos volátiles de mayonesas comerciales sometidas a una prueba acelerada para su correlación con características fisicoquímicas de oxidación, tiempo de vida y evaluación sensorial.

Muestras de mayonesas de tres marcas comerciales fueron sometidas a una prueba de oxidación acelerada usando un equipo Oxipress a 100 °C. Se tomaron muestras después de 2, 4, 5, 6 y 7 horas. Este experimento se hizo por duplicado. Se analizó el índice de peróxidos y los compuestos volátiles usando cromatografía gaseosa de espacio de cabeza. Se realizó la evaluación sensorial de cada una de las muestras usando un panel entrenado. Adicionalmente se analizó por espectrofotometría la concentración de antioxidante TBHQ de las muestras iniciales de mayonesas.

Los resultados mostraron que el trans-2-nonenal, 3-metilbutanal y 2,3,5,6-tetrametilpirazina fueron los compuestos volátiles con mayor incremento al final del tiempo de vida. Esta información estuvo correlacionada con los resultados de la evaluación sensorial.

Evaluación de cambios producidos en aceites de fritura de papas andinas con y sin recubrimiento comestible. Sonia R. Calliope[1], Nadia Segura*[2], Bruno Irigaray[2], Maria D Jiménez[1], Norma C. Sammán[1], and María A. Grompone[2], [1]Facultad de Ingenieria- UNJu, Argentina; [2]Facultad de Química - UdelaR, Uruguay

Las transformaciones que ocurren en los aceites de fritura pueden deberse a diversos factores como temperatura/tiempo, tipo de alimento, relación aceite/alimento; reposición de aceite, tipo de aceite, entre otros. El objetivo fue evaluar el efecto en el aceite de la fritura de papas naturales y recubiertas con película comestible (PC). Se utilizaron papas andinas variedad Waicha e Imilla negra, originarias de Jujuy, Argentina. Con variedad Waicha se estudió el efecto del recubrimiento. La película se formuló con mezcla de carboximetilcelulosa/almidón de papa andina/glicerol (1,4/1,4/0,4%p/v) y antioxidante comercial (1 mg/mL). Los aceites utilizados fueron: aceite de girasol (AG) y mezcla girasol/soja (AM); se realizaron 40 frituras a 180°C durante 3 minutos y se determinó compuestos polares (CP) (Método IUPAC 2.507), estabilidad oxidativa (Calorimetría diferencial de barrido) y pérdida de tocoferoles (HPLC). En los aceites iniciales se determinó Índice de acidez y perfil de ácidos grasos (Técnica IUPAC 2.301). Al final de las 40 frituras se encontraron valores de CP entre 11-13%, en ambos aceites con papas con y sin recubrimiento. El contenido de tocoferoles disminuyó en todos los casos, aunque en papas con recubrimiento no hubo pérdida significativa en AM quedaban 2.763 mg/kg mientras que en AG quedaba 659 mg/kg, lo que supone un 14% de pérdida. La velocidad de oxidación fue mayor para ambos aceites usados con la variedad Imilla. La cobertura en papa Waicha redujo la velocidad de oxidación en AM. Estos resultados permiten concluir que la PC no modifica la calidad de los aceites en las condiciones seleccionadas.

Desarrollo y evaluacion funcional de un aceite vegetal agricola en el control de la sigatoka negra. Freddy Toro, Javier Chavez, and Luis Macias, La Fabril, Ecuador

Los aceites minerales han sido utilizados por décadas como coadyuvantes en la aplicación de herbicidas, insecticidas, funguicidas, fertilizantes foliares, hormonas, etc. Sin embargo, el desarrollo de coadyuvantes de origen vegetal para estas aplicaciones es una necesidad creciente debido a problemas de abastecimiento de los aceites minerales y a restricciones de ingreso a mercados de exportación por presencia de residuos de compuestos policíclicos aromáticos y azufre en los productos agrícolas. En este trabajo se expone el desarrollo experimental y evaluación funcional de un aceite agrícola de origen vegetal.

Varias mezclas de oleína de palma y fracciones de aceite de palma modificadas fueron formuladas para alcanzar las especificaciones de densidad y viscosidad de aceites minerales agrícolas. Las mezclas que mejor se ajustaron a estas especificaciones fueron utilizadas para la formulación de emulsiones con 60-70% de agua usando polisorbato 60 (0.5-1.5%) como emulsificante y se evaluó el grado de dispersión e impregnación en hojas de banano. Las emulsiones más estables fueron evaluadas en la prevención y tratamiento de la sigatoka negra en plantaciones de banano de la provincia de los Ríos en Ecuador. Estas

emulsiones contenían mezclas de dos fungicidas comerciales al 5%. Paralelamente se realizaron también pruebas de fitotoxicidad de las mezclas emulsionadas.

La emulsión a partir de la mezcla 50% oleína de palma y 50% fracción modificada de aceite de palma fue la que mostró mejores resultados en cuanto a estabilidad, funcionalidad, fitotoxicidad y eficiencia en el tratamiento para la sigatoka negra. No se observaron diferencias significativas con aceites minerales comerciales.

Continuous Treatment of Fryer Oil for Extending Fry Life. Monoj K. Gupta, MG Edible Oil Consulting Int'l Inc., USA

Oil in frying process undergoes continuous degradation through free radical oxidation, hydrolysis and thermal polymerization. Researchers have attempted to extend the fry life of the oil via various means including infusion of antioxidants into the fryer oil during frying. While this has produced limited success, it has also posed certain regulatory challenges because addition of antioxidants in the fryer also requires the antioxidants to be declared and in some cases, it may even exceed the allowable legal safe limit for the antioxidant (synthetic antioxidants).

The new and improved-process of treating the fryer oil continuously through a specially designed media reduces the rate of increase of the degradation products in the oil and extends the fry life of the oil. This directly impacts the shelf life of the fried products.

The presentation describes the unique features of a simple device that conveniently accomplishes the oil treatment in a continuous frying process, improves product shelf life and reduces cost.

Refinación y procesamiento | Refining and Processing

Martes 12 de septiembre |
Tuesday, September 12, 2017

Cold Enzymatic Degumming. Alexey Shevchenko and Bent Sarup*, Alfa Laval Copenhagen A/S, Denmark

Physical refining is the most economical refining process in terms of losses and utilities consumption. Degumming is key to overall process performance. Any variation of "special", "deep", "uni" degumming are quite demanding in terms of feed oil quality. Uniform feed oil quality with minimum variation is required for a stable process.

Such a demand is less critical for an enzymatic degumming process. Even switching feed from crude to water degummed oil does not required much change in the process. The process still stable and easy to manage. That is a reason why enzymatic degumming becomes the preferred process for physical refining.

For wax containing oils (sunflower, corn) dewaxing is required and in wet dewaxing (high speed separator based process) this is combined with neutralization or washing after neutralization (cold neutralization or cold washing). There are some benefits with this process, but soapstock handling issues are often pushing the industry towards physical refining.

Alfa Laval has successfully combined enzymatic degumming with the wet dewaxing process for sunflower oil. Prolonged contact time between enzymes and oil in cold conditions shifts the reaction to the "safe area" when P content after first separator is below 5 ppm and washing does not bring value. 75% waxes are removed simultaneously with the gums. If prolonged cold test is required (48h and longer) a polishing filtration step can be installed after the degumming. Filter aid consumption for this (app. similar amount of oil losses in spent cake) does not exceed 0.1%. This is drastically reduced compared to dry dewaxing (using filters for wax removal).

The Power of Controlled Flow Cavitation to Reduce Operating Costs, Increase Yield, and Improve The Performance of Degumming, Refining, and Biodiesel Operations. Darren J. Litle and Oleg Kozyuk, Arisdyne Systems, Inc., USA

An overview of the application of controlled flow cavitation and compression-decompression jet atomization phenomenon for the intensification of chemical processing applications is presented. For vegetable oil acid degumming and/or neutralization reactions, the reasons for enhanced performance of the refining operation, reduced environmental impact, observed reduction in necessary acid and/or caustic addition as well as decrease in oil loss, potential savings in steam consumption and decrease in maintenance opex is discussed and industrial scale examples given. The efficient removal of residual soaps, phosphorus, ffa and metals while minimizing and in some cases even eliminating the need for water washing or silica addition is also described. Finally, the power of controlled flow cavitation to reduce catalyst consumption, increase throughput, and reduce monoglyceride content in finished biodiesel is also described.

An Alternative Filtration Technology Versus Pressure Leaf Filters in Bleaching and Other Filtration Processes. Jaap 't Hart, FiltrationGroup BV, The Netherlands

The pressure leaf filters, in horizontal, vertical and rotating execution are replacing filter presses in many edible oil filtration processes for over a century now. The Cricket®filter is mainly known in this industry in catalyst removal at hydrogenation and as polishing filter instead of bag filter with consumables. In this presentation we will show the advantages of this Cricket®filter when used as main filter in the removal of bleaching earth. If compared to a pressure leaf filter, a clean filtrate will be reached faster and easier due to the direct filtration on filter cloth. Back pulsing instead of using vibration or scrapers, makes cake discharge easier and more successful. There is no necessity of using an extra pre-coat layer. Reduction of maintenance cost as there are no moving parts. No more cleaning of elements in hot caustic. The Cricket®filter is already a proven technology in many other industries.

Short Path Distillation. Niazahmed Shaikh[1], Hiren Patel[1], and Udaya Wanasundara[2], [1]Batavia Bio Processing Limited, USA; [2]POS Bioscience, Canada

Distillation is the separation of two or more volatile materials by the process of vaporization and subsequent condensation. Distillation process involves: Application of heat to a liquid mixture; Vaporization of a portion of the mixture and Removal of heat from the vaporized portion to yield a liquid condensate.

Short path distillation is a thermal separation technique operating at a process pressures in the range of 1 to 0,001 mbar. It lowers the boiling temperature and is an excellent method for gentle thermal treatment of heat sensitive, high boiling products. The Short Path Evaporator consist basically, of a cylindrical body with a heating jacket, a rotor and condenser inside. On the supporting structure of the rotor mobile precision wiper blades are mounted. They are forced by centrifugal force to fold open in direction of the inner shell.

The wiper blades creates a mechanically agitated, thin product film on the heating surface inside of the body. By means of gravity the product flows in a spiral path downwards, whereby the volatile portion of the product evaporates.

The vapour passes by the shortest route and with practically no pressure drop to the internal condenser where it is recipitated on the tubes. The non-volatile portion reaches the lower part of the evaporator and leaves it through the bottom product outlet. The residual vapours and inert gases flow through the vacuum nozzle to the vacuum system.

Parámetros de selección y diseño eficiente de los sistemas de vacío para el procesamiento de aceites. Hernan Algarra, Croll Reynolds Company, USA

El vacío es esencial durante las etapas del procesamiento de aceite entre las cuales podemos citar la hidrogenación, Interesterificación, blanqueo, desodorización, fraccionamiento y desacidificación.

Hoy en día, la refinación física de algunos aceites, como soja o pescado, opera con vacío

profundo para desodorización óptima. Otros procesos más exigentes como la destilación molecular, también llamada destilación de via corta, requieren alto vacío operando normalmente entre 1 y 20 Pa.

La recuperación eficiente de ácidos grasos y aceites arrastrados presenta ventajas económicas al minimizar la pérdida de producto y la contaminación en el agua de condensación. Para determinar los parámetros de diseño y operación de una unidad de producción, debemos establecer correctamente los caudales, la presión, el vacío, la temperatura, la carga y otros factores.

Haremos referencia a los diferentes tipos de sistemas de vacío, criterios de selección y realizaremos una comparación basados en la disponibilidad de servicios y costo óptimo de operación como factor determinante en el momento de elegir el equipo adecuado.

Como enfrentar la nueva legislación de "trans" con procesos de modificación amigables. M. Hendrix, V. Gibon, G. Calliauw, and M. Kellens**,** Ballestra Group, Belgica Straat 3, 1930 Zaventem, Belgium

La industria de los aceites y grasas buscan hoy en día procesos industriales adaptados para mejorar la calidad de los productos de grasas para comida, de acuerdo con criterios estrictos de salud, funcionalidad y sostenibilidad.

La utilización de productos con ácidos grasos trans, no más es una opción; por lo que la hidrogenación parcial no se puede aplicar. También existe una tendencia a reducir la hidrogenación completa. Así contamos más con la inter-esterificación y el fraccionamiento. Con el fin de mantener una alta calidad de los productos obtenidos estudiamos la inter-esterificación enzimática frente al inter-esterificación química. Mostramos los pro y contras de ambos.

En muchos casos hay la necesidad de utilizar el proceso de fraccionamiento. En esto la industria tiene a disposición hoy un proceso de fraccionamiento en continuo mucho más sensible, más económico y con parámetros aun más suaves. Mostramos la aplicación de esto proceso y su ganancia por algunos aceites.

Con esto mismo proceso es posible de hacer winterización de aceite de algodón y de arroz con alto rendimiento en oleína y alto valor agregado a la estearina.

Mostramos también el camino de dar valor a la winterizacion de aceite de girasol y maíz sin la utilización de tierra de filtrado, por lo tanto sin perdida de aceite y con la ganancia de una fracción de ceras.

Mostramos algunos combinaciones de la utilización de los procesos de modificación y sus productos obtenidos y la utilización en algunos productos de mantecas y margarinas.

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Technical Solutions and Developments in Edible Oil Processing to Minimize Contaminants in Refined Food Oil. Blake Hendrix, Desmet Bellastra North America, Inc., USA

The food oil industry is today facing a period of challenge that is one of the highest in its history. With the today's advanced analytical technology, we can measure many components and at lower concentrations than we could in the past. The consumer market is focusing more on healthy foods with good nutritional properties that are free of food contaminants regardless of the source.

The food oils being produced today are analyzed in detail and "new" components like PHA, dioxins, 3MCPD, GE, and mineral oil appear in the food oil. Consumers are monitoring these developments and asking that their products be assured to meet the new "normal" for "safe" products.

Some of these contaminants are coming from the environment, some of them are coming from the seed processing and others are produced in the refining because of process conditions

Industry has to adapt its refining processes to this challenge with new process conditions and in some cases with new technology.

The presentation will present some process strategies to mitigate or eliminate these contaminants from the oil to meet the consumers' demands for safe food oils with high nutritional quality.

Impact of Bleaching Process Protocols on 3MCPD Fatty Esters in Palm Oil. David Brooks, Oil-Dri Corporation, USA

Laboratory scale prescreening techniques can be a valuable tool for the plant manager wishing to optimize plant scale operations. This presentation will discuss lab scale testing protocols we have developed for evaluating the impact of dry-degumming, bleaching, and deodorization conditions on reducing the formation of mono-chloropropandiol fatty esters (MCPD-FEs) and meeting typical quality specifications of color and trace elements.

Mitigacion del contenido de 3-MCPS y glicidil esters en las refinerias de aceites vegetales. Leon Pablo Espinosa Ch, Desmet Ballestra NA, Inc., EEUU

En los últimos meses en el mercado de aceites, especialmente en el mercado final del aceite de palma, se llegado a un tipo de histeria, pues a través de medios de comunicación se han mencionado ciertos componentes como precursores del cáncer, contenidos en alimentos para niños. Estos componentes son los 3MCPD y los GE. Antes de caer en el alarmismo es necesario recordar que el aceite vegetal es un producto legal y que está permitido internacionalmente.
Bajo estas circunstancias lo mejor es estudiar lo que ocurre y estudiar las posibilidades que existen de eliminar o mitigar este tipo de componentes.

Los 3MCPD y los GE no están presentes en los aceites crudos, por esta razón en un poco más complicado entender que como tratarlos. Esta presentación quiere mostrar de una manera resumida y concisa de que se trata este tipo de componentes y la manera o maneras de mitigarlos en las refinerías de aceite.

Como generar alto valor a su aceite de palma y palmiste con la producción de grasas especiales; alternativas de manteca de cacao. M. Hendrix, V. Gibon, G. Calliauw, and M. Kellens, Desmet Ballestra Group, Belgica Straat 3, 1930 Zaventem, Belgium

Hoy en día hay una excelente oportunidad de valorizar los productos de aceite de palma y palmiste utilizando el proceso de fraccionamiento. Especialmente la escasez de manteca de cacao y la prohibición de utilizar productos grasos con alto trans presentes en los reemplazantes de manteca de cacao (CBR), da grandes oportunidades a la utilización de aceite de palmiste como substituto de manteca de cacao; CBS, y la fracción intermedio duro; HPMF, de aceite de palma, como componente en el equivalente de manteca de cacao; CBE.

El fraccionamiento es un proceso físico natural, completamente reversible y muy económico.

El camino más fácil para la producción de un sustituto de manteca de cacao es utilizando el Statolizer como cristalizador estático completamente automático para fraccionar el palmiste. En solo una etapa es posible de obtener substituto de manteca de cacao. Hay la posibilidad de diversificación en esto con un fraccionamiento en dos etapas o/y con hidrogenación de los productos. Mostramos estos procesos y la utilización de los productos obtenidos. Destacaremos la versatilidad de la tecnología Statoliser (cristalización estática) que se puede aplicar a los aceites crudos o refinados.

Con aceite de palma es posible de obtener un rango de productos de alta valor aplicando un proceso de fraccionamiento en múltiples etapas. En cuatro pasos es posible producir HPMF que es un buen base por la producción de equivalentes de manteca de cacao; CBE. Es importante también de encontrar el valor y la aplicación de los productos intermedios. Con el fraccionamiento en solvente es posible de disminuir estos productos intermedios y obtener un HPMF de más alto valor. Enfocamos en los procesos de fraccionamiento, los diferentes aparatos a utilizar, la utilización y la economía de los productos obtenidos.

Physical Refining of Palm Oil with Co-generation and Zero Residues. Pedro Miquel Bernal and Elkin Bernal, Del Llano, Colombia

(abstract not available)

Reuse of Spent Bleaching Earths, Key Data and Economic Challenges to Consider Anibal Urizar, Clariant, Mexico

Nowadays is a common practice to look deep into reusing spend bleaching earth, some of the most common practices are to use a lead lag configuration in filter presses where spent BE act as a pre-bleaching step removing highly polar

impurities, while the fresh filter coming in the second sequential step acts as a polishing filter to reduce mainly secondary oxidation products.

During the above process several adsorption reactions may occur, the removal of impurities is performed with different rates of adsorption, some impurities have a higher adsorption rate when compared to another's, therefore the managing and understanding of this rates is essential for maximizing clay usage.

The main drivers of taking advantage of residual activity in spent bleaching earth are dictated by quality of finished oil, the type of oil and impurities to be removed

This study will present innovative data on efficiency of several types of spent bleaching earth on removing impurities like chlorophyll, hydroperoxides, secondary oxidation compounds and metallic elements.

Salud y nutrición | Health and Nutrition

Martes 12 de septiembre |
Tuesday, September 12, 2017

Omega 3 in Health and Disease and Requirement for Increased Omega 3 Intakes. Doug Bibus, Lipid Technologies, LLC, USA; and University of Minnesota, USA

Omega 3 fatty acids and particularly long chain omega 3 fatty acids, EPA, DPA and DHA, are vitally important nutrients for maintained health and wellness. Our own populational studies report wide spread variation in intake of omega 3 and resulting omega 3 status. The so called deficiency of omega 3 in the diet and resulting tissues, is in fact wide spread throughout the world including some countries in Latin America. Poor omega 3 status limits the ability of developing children to thrive and challenges the health and wellness of populations. Improving omega 3 status relies on consumption of foods naturally enriched in omega 3 and potentially the use of dietary supplements including fish and algal oils and food enriched with omega 3 oils.

Long Chain PUFAs, Essential for Optimal Infant Development and Maternal Health. Michael I. McBurney, DSM Nutritional Products, USA

Expert groups recommend adults consume 250-500 mg omega-3 fatty acids, eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA), daily and a minimum of 200 mg DHA per day during pregnancy and lactation. Many adults, including pregnant women, fail to meet this recommendation. Low DHA intake during pregnancy has implications on fetal development. Gestational age at birth is the most important determinant of survival and long term neurodevelopment in babies with preterm births being one of the leading causes of infant deaths worldwide. Omega-3 supplementation has been shown to reduce preterm delivery by 58% and preterm delivery by 17% with a statistically significant increase in mean birth weight (122 g). After birth, DHA and arachidonic acid (ARA) are required for brain, eye, and immune development. The important role of dietary fat during pregnancy and early life nutrition will be reviewed.

PUFAs in Diabetes Mellitus. Undurti N. Das, UND Life Sciences, USA; BioScience Research Centre, GVP College of Engineering Campus, India

Essential fatty acid (EFA) deficiency prevents development of autoimmune type 1 DM (type 1 DM) because of low levels of n-6 arachidonic acid (AA) that results in decreased production of pro-inflammatory and chemoattractant leukotrienes (LTs) and prostaglandin E2 (PGE2) and suppression of macrophage function and migration. Our studies revealed that AA is more potent than eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA) in inhibiting alloxan-induced type 1 DM and streptozotocin-induced type 1 and type 2 DM in experimental animals by decreasing plasma interleukin-6 (IL-6) and tumor necrosis factor-α

(TNF-α) levels and suppressing expression of NF-κB and increasing production of lipoxin A4 (LXA4), a potent anti-inflammatory lipid mediator. LXA4 is a physiological antagonist of LTs. Based on these evidences, it is proposed that EFA deficiency leads to decreased production of AA-derived LTs and PGE2 with little or no decrease in LXA4 formation, a situation that is like events that occur following AA supplementation. Resolvins and protectins, derived from EPA and DHA, are also effective in preventing alloxan-induced type 1 DM and possibly, other autoimmune diseases but are less potent that LXA4. Thus, maintaining a balance between pro- and anti-inflammatory lipid mediators such that it is tilted more towards LXA4/resolvins/protectins/maresins that suppress type 1 DM and other autoimmune diseases and type 2 DM.

High Oleic Soybean Oil: Function and Nutrition for the 21st Century. Frank J. Flider, United States Soybean Export Council (USSEC), USA

High oleic oils are becoming increasingly more important in the food supply and as replacements for PHOs because of their high stability, functionality and nutritional aspects. Exemplifying high oleic soybean oil, this presentation will focus on nutritional aspects of high oleic oils and present recent health findings on high oleic soybean oil. Recent research on the functionality of high oleic soybean oil in a variety of baking and deep frying applications and its suitability as a functional and nutritional replacement for PHOs will be presented.

Avocado Oil Yield and their Correlation to Liposoluble Bioactive Compounds During Different Posharvest Ripening Stages. Braulio Cervantes Paz, Universidad Autónoma de Querétaro, Mexico

Avocado is consumed around the world, mainly by its creamy flavor and high oil content. Avocado oil is used in the pharmaceutical and cosmetics industry, and it is characterized by a high content of liposoluble bioactive compounds (LBC) such as fatty acids (FA), carotenoids, and tocopherols. These LBC exert benefit effects in human health; however, its content and the oil yield are effected by fruit ripening stage due to avocado is a climacteric fruit. Thus, our aim was to evaluate the changes in oil yield and their LBC content affected by the postharvest ripening, in order to suggest an optimum ripening state of fruit, in which the avocado oil present the best phytochemical characteristics. Avocado oil was extracted from fruits at five postharvest ripening stages (M1, M2, M3, M4 and M5) by Soxhlet and homogenization methods and their yield was determined. Avocado oils were analyzed by GC and HPLC to identify the LBC and to determine their changes during ripening. The higher oil yield was obtained in M2, M4, and M5 with no significant differences; however, violaxantin, lutein, and □-tocopherol were the most abundant LBC in M2 (14, 9, and 12%, respectively), while oleic acid was higher in M1 (80%). The best Pearson correlations between oil yield and LBC was observed for FA (r=0.74), followed by carotenoids (r=0.70), and tocopherols (r=0.36). Thus, the LBC type in oil is dependent on ripening, since a FA- rich oil could be obtained from M1, while M2 is highly abundant in carotenoids and tocopherols.

Control of the Lipidemic Index of Oils using Ethylcellulose Oleogels Alejandro G Marangoni[1], Chloe M. O'Sullivan[1], Tan Sze-Yen[2], and Henry J. Christiani[3], [1]Unviersity of Guelph, Canada; [2]Singapore Institute for Clinical Sciences, Singapore; [3]National University of Singapore, Singapore

The in-vitro lipolysis and ß-carotene (BC) transfer from oil to aqueous phase of canola oil ethylcellulose (EC) oleogels were measured using a static monocompartmental model simulating oral, gastric, and duodenal digestive stages. Oleogels made with 10% 10 cP and 10% 20 cP did not differ significantly in their extent of lipolysis or BC transfer compared to canola oil; however 10% 45 cP and 15.5% 20 cP had a significantly lower extent of lipolysis and BC transfer compared to other formulations. The structure and mechanical strength of the oleogels were both determined to be factors affecting lipolysis and transfer. The presence of BC did not significantly affect the mechanical strength of the gels and EC oleogelation delayed BC degradation under accelerated storage conditions compared to a heated canola oil control. This was followed by a feeding study comparing the effects of ingesting coconut oil in a liquid (CO) or an oleogel form (CG) on blood triglycerides, glucose, insulin, and appetite when co-ingested with a

carbohydrate-rich meal. This was a randomised, controlled crossover study where eligible participants attended a baseline visit where baseline demographics were measured. After test meals, glucose, insulin, triglycerides and appetite sensations changed significantly (time effects, $p<0.001$). Significant time X treatment effects were found only in postprandial glucose ($p=0.015$) and triglycerides ($p=0.001$) changes. CO reduced the peak of glucose response, and increased the incremental area under the curve for postprandial triglycerides. CG produced outcomes comparable to those of the control treatment. Appetite sensations did not differ between all treatments. The gelling of coconut oil with ethylcellulose into an oleogel form reversed its effects on postprandial glucose and triglycerides excursions.

Jueves, 14 de septiembre |
Thursday, September 14, 2017

New Dietary Lipids. Review of Sources and Applications in Food, Supplements and Pharma. Ernesto M. Hernandez, Advanced Lipid Consultants, USA

There is a better understanding today of the biological properties and health benefits of lipids in general, and in particular of the potential application in health and disease prevention of new forms of lipids and lipid soluble compounds. These new sources of some specialty lipids contain higher amounts of desirable components such as new antioxidants and other bioactive phytochemicals, that include new phospholipids, sphingolipids and phytoestrogens. New sources of these functional specialty lipids include marine products, tree nuts, cereals, and berry plants. These new products are now being used in pharmaceutical, nutraceutical and cosmetic fields worldwide for applications that include bioactive coadjuvants, excepients, transdermal carriers and skin emolliency agents. This presentation will review new sources of these bioactive lipids as well as their benefitial health effects and some of their mechanisms of action.

Cyclic Fatty Acid Monomers from Heated Vegetable Oils Increase F2-Isoprostanes Production in the Rat. Jean Mboma[1], Helene Jacques[1], Nadine Leblanc[1], Amandine Rocher[2], Claire Vigor[2], Camille Oger[2], Guillaume Reversat[2], Joseph Vercauteren[2], Jean Marie Galano[2], Thierry Durand[2], and Paul Angers[1], [1]Laval University, Canada; [2]Institute of Biomolecules Max Mousseron, France

Cyclic fatty acid monomers (CFAM) are mixtures of di-substituted five- or six-carbon-membered ring structures. They are mainly formed during heat treatment of edible oils such as frying and refining. The objective of this study was to assess whether CFAM from heated vegetable oils are associated with oxidative stress (OS) and inflammation and whether these effects are modulated by dietary lipids. To this end, 36 male Wistar rats were fed diets containing canola oil (CO) or CO and 0.5% CFAM (CC), and soybean oil (SO) or SO and 0.5% CFAM (SC). F2-Isoprostanes (F2-IsoPs) and F4-neuroprostanes (F4-NeuroPs) were measured in plasma and urine using microLC-MS/MS and plasma inflammatory markers IL-6 and C-reactive protein (CRP) were determined by ELISA. Rats fed CFAM diets had higher levels of plasma and urinary 2,3-dinor-15-F2t-IsoP and 15-F2t-IsoP compared with rats fed non-CFAM diets ($P<0.05$), but rats in the SC diet group had higher levels than those in the CC diet group ($P<0.05$). No difference was observed in plasma CRP levels ($P>0.05$). Rats in the SC diet group had higher plasma levels of IL-6 than the other three diet groups ($P<0.05$). Plasma 2,3-dinor-15-F2t-IsoP and 15-F2t-IsoP levels were positively correlated with plasma IL-6 levels ($r=0.45$, $P = 0.006$; $r = 0.38$, $P = 0.023$, respectively) and plasma 2,3-dinor-15-F2t-IsoP levels were positively correlated with total plasma n-6 PUFA ($r = 0.33$, $P = 0.049$). These results suggest that CFAM are associated with OS and inflammation, and these effects are exacerbated when CFAM are supplemented with SO compared to CO.

Subproductos: Proteína, lecitina, fibra, tocoferoles y más | By-products: Protein, Lecithin, Fiber, Tocopherols, and more

Martes 12 de septiembre |
Tuesday, September 12, 2017

Effect of Co-products of Enzyme Assisted Aqueous Extraction of Soybeans on the Quality of Dried Distillers Grains (DDG). Jasreen M.I. Sekhon[1], Tong Wang[2], Kurt A. Rosentrater[2], and Stephanie Jung[3], [1]Drexel University, USA; [2]Iowa State University, USA; [3]California State Polytechnic University, USA

Oil from soybeans has conventionally been extracted mechanically using a screw press or by using an organic solvent such as hexane. While, mechanical extraction can result in low oil recovery and denatured proteins; EPA has regulated hexane emissions from oilseed-processing plants. These drawbacks affect profit margins and/or increase soybean oil and meal costs. Enzyme-assisted aqueous extraction processing (EAEP) has recently received interest as an environmentally-friendly alternative to conventional oil-extraction technologies. It can achieve ~97% oil recovery from soybeans, by using enzymes to free the oil from solid matrix, and the process allows simultaneous extraction of both proteins and oils using water as an extracting medium. One limitation to the EAEP process is the production of surplus amounts of skim and insoluble fiber (IF). Utilizing skim and IF in corn fermentation has shown promising results with significant increase.

A Natural Emulsion and its Enzymattically-modified Version made from Sunflower Seeds: Integrated Process and caracterizacation. Audrey Cassen, Zéphirin Mouloungui, Eric Lacroux, and Jean-François Fabre, Laboratoire de Chimie Agro-Industrielle, France

Emulsions obtained from oil seeds can be used as useful agents to vectorize active substances in an ecofriendly way. The properties of such emulsions highly depend on their chemical composition. In this context, this work has two main objectives. First of all, we aim at describing two processes built to produce natural and modified emulsions from non-classic sunflower seeds containing 92% of oleic fatty acid (C18:1). Secondly, our goal is to characterize these new emulsions and evaluate the impact of an enzyme-assisted hydrolysis step during the integrated process on the molecular profile of the emulsion, especially on the phospholipidome.

The profiling of the phospholipids containing fraction extracted from both emulsions is achieved by SPE followed by HPLC-ELSD in order to quantify phospholipids based on their polar head group, showing that the phosphatidylcholine is the major phospholipid in each case. A complementary UPLC-MS study is also performed to describe the fatty acid profile of the phospholipids. Most of phospholipids show a C18:1-C18:1 fatty acid pair, in accordance with the global fatty acid profile determined for the sunflower seeds we study here. However, the quantity of phospholipids recovered in the case of the natural emulsion is higher than the quantity of phospholipids recovered from the enzymatically-modified emulsion. This result may give an indication about the stabilization mode of both emulsions as it is observed in cryo-MEB images.

Use of Sacha Inchi Press-Cake as Wheat-Flour Replacer for Enhancing the Nutritional Value of Cakes. Luis Felipe Gutierrez Alvarez and Jairo Lindarte-Artunduaga, Instituto de Ciencia and Tecnología de Alimentos, Universidad Nacional de Colombia Sede Bogotá, Colombia

Cakes are mainly composed of carbohydrates, lipids, proteins, water and air, which interact during the mixing and baking processes to confer the typical structural properties of these baked products. Refined soft wheat-flour is the most important ingredient of cakes, accounting 30% in standard recipes. However, there is an increasing interest in finding wheat-flour replacers (WFR), due to the health problems related to the gluten intake, and to the positive correlations found between the increase in the glycemic index and the consumption of high-carbohydrate foods, such as cakes. In this work, we studied the use Sacha Inchi press-cake (SIPC) as WFR in cakes.

Extracción supercrítica de aceite, carotenoides y tocoferoles de residuo de chontaduro (*Bactris gassipaes*). Hugo A. Martinez, Deivis Guitierrez, y Hermes Cuastumal, Universidad Nacional de Colombia, Colombia

Fue estudiada la influencia de la presión y la temperatura de la extracción de CO_2 supercrítico del epicarpio de chontaduro, del rendimiento global (%R) de extracción, carotenoides total (TC), de los contenidos fenólicos totales (TPC), perfil de ácidos grasos (AG) y tocoferoles, usando por técnicas espectrofotométricas y cromatografícas. Las extracciones se realizaron a presiones entre 50 y 441 bar y temperaturas entre 36 °C y 60 °C, con flujo constante de solvente de 20 g/min. Se empleó metodología de superficie de respuesta, con ANOVA y test de Tukey ($p<0.05$). Los resultados permitieron obtener %R entre 7,4 % y 12,3 %, CT estuvo entre 9,51 mg eq β caroteno/g extracto y 13,1568 mg eq β caroteno/g extracto y TPC entre 250,4526 mg GAE/g extracto y 371,8397 mg GAE/g extracto. Los mejores resultados se obtuvieron a condiciones de (400 bar y 40°C).

A la condición óptima se encuentra un 75. 7% de acidos grasos insaturados, destacándose ácido oleico (C18:1) (58,6%), seguido del ácido palmítico (C16:0, 19,1%) y acido linoleico (C18:2, 11,3 %). %). Se encontraron tocoferoles en oncentraciones de 375,1 y . 1161,2 mg/kg para gamma-tocoferol y alfa-tocoferol. Se identificaroin 9 tipos de carotenoides, fitoeno (3,474 - 5,299 mg/mL) y b-caroteno (1,124 - 2,653 mg/mL), la extracción de estos compuestos se vio favorecida por el aumento de presión y disminución de la temperatura.

Recuperación de fitonutrientes de aceite de palma y recuperación de tierras de blanqueo. Anderson D. Imbachi-Niño[1], Angela Diaz-Guevara[2], and Paulo C. Narváez-Rincón, [1]Universidad Nacional de Colombia, Colombia, [2]C.I. Sigra S.A., Colombia

El estudio comprende la determinación de la etapa del proceso de refinación del aceite de palma en la cual se tiene la mayor concentración de fitonutrientes para evaluar la factibilidad de recuperación de los mismos. Igualmente contempla determinar la factibilidadde reuso de las tierras de blanqueo en un nuevo proceso de refinacvión mediante un tratamiento de limpieza y reactivación.

Total Phenolic Content and Antioxidant Activity of Sacha Inchi Shell Extracts Obtained by Microwave-assisted Extraction. Luis-Felipe Gutiérrez, Zain Sanchez-Reinoso, William-Isidro Mora-Adames, and Carlos-Alberto Fuenmayor-Bobadilla, Instituto de Ciencia y Tecnología de Alimentos, Universidad Nacional de Colombia Sede Bogotá, Colombia

Phenolic compounds are an important group of phytochemicals associated to many health benefits, meanly due to their antioxidant capacity. They are found in plants and plant-materials. Sacha inchi (Plukenetia volubilis L.) is a plant with a great economic expansion in Central and South America, whose seeds have been largely studied. However, the shell has been barely investigated, and it constitutes a by-product of the oil processing, which has been considered an attractive source of natural antioxidants. This work aimed to evaluate the microwave-assisted extraction (MAE) of phenolic compounds from the Sacha inchi shell. A Box–Behnken design was used for investigating the effects of the microwave power (500, 1000, and 1500W), ethanol concentration (30, 60, and 90%v/v), and extraction time (60, 90, and 120s), on the total phenolic content (TPC), and the antioxidant capacity, evaluated by means of the FRAP and TEAC assays. The analysis of the response surface indicated that under the optimal extraction conditions (1500W, 62.9% ethanol concentration, and 120s) the TPC reached up to 49.63 mg caffeic acid/g shell, FRAP (up to 96.09 mg Trolox/g shell), and TEAC (up to 0.37 mmol Trolox/g shell). These results indicated that the Sacha Inchi shell is an interesting source of natural compounds with antioxidant activity, and that emerging technologies such as MAE could be used for their extraction in very short times in comparison to the traditional extraction processes.

Técnicas analíticas y control de calidad | Analytical and Quality

Miércoles 13 de septiembre 2017 | Wednesday, September 13, 2017

Estrategias para la obtencion de aceite de palma con bajos contenidos de 3-mcpd y. Elizabeth Marcillo, Cecilia Ulloa, Ivan Zambrano, Genesis Molina, and Percival Andrade, La Fabril, Ecuador

El control de 3-MCPD y ésteres glicidílicos en aceite de palma y sus fracciones se ha convertido en un requerimiento para la venta en mercados internos y de exportación. Es por esto necesario implementar sistemas de control desde las materias primas, proceso de refinación y producto terminado. Sin embargo, este sistema de control involucra el análisis de estos contaminantes con equipo instrumental de alto costo y tiempos rápidos de respuesta. Este trabajo presenta la implementación in situ de un sistema de monitoreo y metodologías analíticas de costo accesible para medir estos contaminantes y potenciales precursores para la obtención de aceite de palma y subproductos con contenidos de 3-MCPD y ésteres glicidílicos bajo los regulaciones internacionales.

Se monitoreó la calidad de aceite crudo de palma mediante el análisis de ácidos grasos libres, porcentaje de humedad, contenido de mono y diglicéridos, índice de anisidina y potenciales precursores de 3-MCPD y ésteres glicidílicos. El aceite crudo de palma fue blanqueado usando una tierra natural o tierra activada con bajo contenido de cloruros y posteriormente fue desodorizado a 220-230 °C a 1.3-1.5 mbar. Se analizó el contenido de 3-MCPD y ésteres glicidílicos del aceite desodorizado y subproductos fraccionados con las metodologías analíticas desarrolladas in situ. Estos resultados fueron validos por laboratorios acreditados externos. Este monitoreo se realizó por 6 meses.

Los resultados indicaron que es posible establecer parámetros de control a la cadena de abastecimiento para la obtención de productos con bajo 3-MCPD y ésteres glicidílicos.

Control de calidad de cera de candelilla para aplicación como estructurante de aceites. Daniel Barrera-Arellano y Julia Cristina Zuin, Laboratório de Óleos e Gorduras. Departamento de Tecnologia de Alimentos, Faculdade de Engenharia de Alimentos. Universidade Estadual de Campinas – UNICAMP. Brasil.

La cera de candelilla está entre los materiales más ampliamente utilizados en la estructuración de aceites, entretanto se observa una variación en la calidad de la misma, que afecta fuertemente su capacidad de estructuración de aceites. El objetivo de este trabajo de investigación fue evaluar los principales parámetros de calidad de ceras de candelilla y su relación con la capacidad estructurante, tratando de establecer una rutina de análisis, para estimar esta propiedad. En ceras de candelilla de 5 proveedores fueron determinados: Espectro Infrarrojo (IR), Punto de fusión (PF), Comportamiento Térmico (curvas de fusión y cristalización por DSC) y Microestructura (microscopia luz polarizada). Organogeles de aceite de soja estructurados con las 5 ceras fueron preparados y determinados: Estabilidad visual (7 días 25 y 35C), Consistencia, Microestructura, Comportamiento Reológico y Polimorfismo (Difracción de rayos X). Los resultados indicaron grandes diferencias entre las ceras a respecto de su capacidad de estructuración. En la previsión de la capacidad estructurante, el comportamiento térmico, específicamente la curva de cristalización de las ceras, fue el que mejor indico estas diferencias.

Caracterización de cinco variedades de aceites de palma de híbridos interespecíficos (*Elaeis oleifera* x *Elaeis guineensis*). Nathalie Quezada[1], Olga Leon[2], Ivan Zambrano[1] Genesis Molina[1], Shone Morales[1], and Francisco Orellana[2], [1]La Fabril, Ecuador; [2]Energy Palma, Ecuador

Estudios preliminares mostraron diferencias significativas en el perfil de ácidos grasos y triglicéridos, el contenido carotenos y tocoferoles de aceites de palma de diferentes variedades de híbridos interespecíficos (*Elaeis oleifera* x *Elaeis*

guineensis). Este hecho podría causar problemas durante la refinación y procesos de modificación a nivel industrial. El objetivo de este estudio fue la caracterización de cinco variedades de aceites de palma de híbridos interespecíficos.

Se colectó diez racimos maduros de cinco variedades de híbridos interespecíficos (H1, H2, H3, H4 y H5) de la plantación localizada en San Lorenzo, Ecuador. Se extrajeron los aceites crudos de cada racimo usando un autoclave y prensa manual. Los aceites crudos fueron filtrados y secados al vacío. Se determinó el índice de iodo, perfil de triglicéridos, perfil de ácidos grasos, contenido de sólidos, concentración de carotenos y tocoferoles y Dobi de los aceites crudos. Aceite crudo de palma E.Guineensis fue utilizado para comparación.

La variedad H1 mostró el mayor índice de iodo y contenido de ácido oleico, carotenos y triglicéridos de tipo UUU. La variedad H4 mostró el mayor contenido de tocoferoles. Estos resultados permiten el diseño de procesos hechos a la medida dependiendo de la variedad de híbrido y además, posibilitan el desarrollo de aceites con mayores beneficios nutricionales y alto contenido de antioxidantes naturales y carotenos.

Accreditation and Quality Enforcement in Fats, Lipids, and Oils. Roger Muse, ANSI-ASQ National Accreditation Board, USA.

One of the drives of the AOCS Congress is to understand today's environment but also how to prepare for the future. Industries and regulatory authorities are increasingly relying on internationally recognized independent third party accreditation and certification to support their enforcement and monitoring activities. Nowhere is this trend more evident than in fats, lipids and oils industry.

Since we have an international food safety concern, many governments are planning and preparing as we speak. For example, in the US, the Food Safety Moderizaiotn Act (FSMA), which is hosted by the FDA, is the most recent example where accreditation is being incorporated into mandatory federal rules. This affects imports significantly. FDA FSMA rule on the Accredited Third-Party Certification was published November 2015, establishing program for the accreditation of third-party certification bodies, to provide certification to foreign facilities and the foods for humans and animals they produce.

Internationally a global coalition, Global Food Safety Initiative (GFSI), comprised of food experts from retail, manufacturing, service companies, as well as international organizations, governments, and academia has been created to share knowledge and promote a harmonized approach to managing food safety across the industry. The objectives of the initiative is to reduce food safety risks, manage costs and to develop competencies and capacity building in food safety in order to create consistent and effective global food systems.

Although the use of ISO 22000 - Food safety management systems -- Requirements for any organization in the food chain requirements for certification of food manufacturing facilities is increasing, the use of ISO 9001 certification for testing laboratories has been rapidly declining around the world. The main reason in this move is in the fundamental difference between ISO 17025 and ISO 9001. Both are explained briefly below:

ISO 9001 Certification: ISO 9001 is an international management systems standard, widely used in manufacturing and by service organizations to evaluate management systems for ability to consistently produce products and provide services.

Management system standards intendent to deal with a particular scope of an organization's output and not the organization as a whole. ISO 9001 Certification is certification of the management system of an organization and not the organization or its products and services.
ISO 9001 does not provide the means for evaluating the technical competence of an organization. While effective as a management evaluation tool, the evaluation of a laboratory against the requirements of ISO 9001 does not provide assurance that test or calibration data are accurate and reliable.

ISO 17025 Accreditation: ISO 17025 is what referred to as a competence base standard. All competence based standards include management system requirements such as those addressed in ISO 9001. There are a number of competence based standards, developed specifically to the type of

conformity assessment body. ISO 17025 is the competence standard for laboratories.
Unlike ISO 9001 certification, laboratory accreditation uses criteria and procedures specifically developed to determine the technical competence of laboratories. ISO/IEC 17025 accreditation specifically addresses factors relevant to a laboratory's ability to produce precise, accurate test and calibration data, including:

- Technical competency of staff
- Validity and appropriateness of the methods
- Traceability of measurements and calibrations to national standards
- Appropriate application of measurement uncertainty
- Suitability, calibration, and maintenance of test equipment
- Testing environment
- Sampling, handling, and transportation of test items
- Quality assurance of test, inspection, or calibration data

This presentation will tie together the concerns for companies engaged with the production, testing or servicing within the fats, lipids and oils community.

Determinación directa y rápida de BHT en aceites y grasas mediante HS-GC. Iban Zambrano, Genesis Molina, Nathalie Quezada, and Percival Andrade, La Fabril, Ecuador

El análisis de antioxidantes en aceites y grasas tiene una relativa complejidad por la larga etapa de preparación de la muestra y la exposición del analista a solventes con cierto grado de toxicidad. Es por esto que la tendencia de los últimos años es desarrollar métodos con etapas preparativas simples u omitiéndolas (metilación de muestra o purga y trampa seguido de cromatografía gaseosa). Este trabajo presenta un método directo y rápido de determinación de concentraciones de BHT en aceites y grasas comestibles.

Muestras refinadas y desodorizadas de oleína de palma, aceite de soya y girasol se inyectaron directamente a un sistema de cromatografía gaseosa de cabeza volátil estática (HS) en modo estático a 150 °C por 8 minutos en un tiempo total de corrida cromatográfica de 30 minutos. Se utilizó una columna convencional polar de polietilenglicol. La cuantificación se realizó con la ayuda de un patrón interno. El método propuesto exhibió una lineabilidad en el rango de concentraciones de 2 a 350 ppm (r2=0.995) y una recuperación del 88% para concentraciones inferiores a 20 ppm y del 98% para concentraciones superiores a 250 ppm. El límite de detección (LOD) fue de 1.2 ppm y el límite de cuantificación (LOQ) fue de 4 ppm. El método expuesto presentó superior sensitividad al método por cromatografía líquida. Adicionalmente, esta metodología mostró mayor porcentaje de recuperación, mayor rango de concentración al que se puede aplicar, menor tiempo de respuesta y no requiere del uso de reactivos químicos y preparación de muestras.

Oleum Project: Advanced Solutions for Assuring the Overall Authenticity and Quality of Olive Oil at a Global Scale. Wenceslao Moreda[1] and Tullia Gallina Toschi[2], [1]Instituto de la Grasa (CSIC), Spain; [2]University of Bologna, Italy

The EU Parliament resolution of 14 January 2014 on food crisis, fraud in the food chain and the control thereof listed olive oil (OO) in the top of foods subjected to fraudulent activities.

Strongly aligned with the main challenges recognized in the Action Plan for the EU OO sector and the major outcomes identified during the workshop on OO authentication held in Madrid.

The experts define numerous challenges, named: legislative and regulatory, harmonization. Analytical, regarding illegal blends with soft deodorized OOs and with other vegetable oils due to a lack of performance and/or efficiency and lab proficiency, absence of markers and methods for fighting specific and emerging fraud. Organoleptic assessment, due to reproducibility of results among different Panels, critical attribution of the category, costs and lack of reference materials.

The main objective of the project is to resolve these issues and will be with the aim of increasing the consumer and market confidence.

The project have been funded with 4.878.862 € from the program H2020.

Jueves, 14 de septiembre 2017 |
Thursday, September 14.2017

The Use of the Ultra Small Angle X-ray Scattering Technique to Study the Solid Structure of Edible Fat Systems. Fernanda Peyronel[1], Alejandro Marangoni[1], and David Pink[1,2], [1]University of Guelph, Canada; [2]St. Francis Xavier University, Canada.

Researcher are always on the search for new analytical techniques to help characterize soft materials. One area of interest is the quantification, at the micro-scale, of the structures in edible fat systems. Even though much work has been done using microscopy, some systems do not permit the use of light microscopy. A relatively new technique is Ultra Small Angle X-ray Scattering (USAXS). The USAXS technique has the ability to detect an X-ray beam scattered by a sample at very small angle to the incident beam. This technique differs from microscopy in that opaque systems can be studied and sample preparation protocols are minimal. Another requirement that appeals to researchers is the ability to perform experiments on a time scale of minutes.

The most widely used set up for USAXS is a Bonse-Hart instrument, where two sets of a paired crystals (collimator and analyzer) are used to direct the X-ray beam into the sample and from the sample into the detector. The scattering angles are always less than 1 degree, which requires very precise control of the displacement of the pair of analyzer crystals and the detector. Utilizing a Synchrotron facility guarantees a high flux of X-rays on time scales of few minutes, whereas using a bench top instrument would require many hours. A high flux is needed in order to have a good statistics in the data collection.

Our group has used the USAXS technique to characterize *in situ* the supramolecular solid structures in mixtures of liquid and solid edible fats. The scattering intensity, I(q), is characterize by the X-ray scattering vector q, which is a measure of the very small angular difference between the incoming and the scattered X-ray beam.
The length scale, L, studied by USAXS is related to the X-ray scattering vector, q. via $L = 2\pi/ q$. Using this equation, one can see that small angles (small q) imply large length scales, typically in the micro-range. We have probed length scales up to 6 μm.

In this work, we present experimental results for some edible fat systems (tristearin in triolein, mixtures using hydrogenated canola oil and/or cotton seed oil together with tristearin) made under static conditions. Static conditions indicates that the material was crystallized on its own without introducing any external forces. We have explained how to interpret the results based on mathematical models and computer simulations, by modelled the basic scattering unit, crystalline nanoplatelets (CNP), and simulating their aggregation. The scattering structure function of the CNP aggregates was computed and compared with the experimental I(q). The simulated predictions were confirmed by the data collected. Time permitting, we will also touch on some sheared experimental results.

Fast and Straightforward Determination of the Oxidation Stability of Fats and Oils. Carolin Edinger, Anton Paar ProveTec, Germany

The quality of fats and oils strongly depends on their oxidation stability. In this contribution a new method for evaluating the oxidation stability by determining the induction period is introduced. Under accelerated conditions (elevated temperature and pure oxygen pressure) a sample of 5 mL is examined in a sealed stainless steel test chamber. Typical conditions of the method are temperatures between 120 °C – 140 °C and an initial oxygen pressure of 700 kPa. Application of these conditions allows for initiation of a rapid oxidation process, which is monitored by recording the pressure until a predefined pressure drop.

It was found that the elapsed time until the pressure drop is directly related to the oxidation stability of the sample. In order to compare our new approach to the AOCS method Cd12b_92_13, we have studied seventeen edible oils at 120 °C and 140 °C. Comparison to the data collected using the abovementioned AOCS method reveals a linear relationship. Due to defined oxygen volume in the closed test chamber, the oxygen consumption can be calculated. Furthermore, we found Arrhenius behaviour with regard to the applied temperature,

enabling the user to determine the activation energy of a specific oxidation process.

The significantly reduced measurement time and a high repeatability of the method represents the major advantages of our method, allowing for quick and direct measurement of the oxidation stability for research, process and test bench control.

Estudio comparativo de períodos de inducción oxidativa de aceites vegetales por oxidógrafo, rancimat y DSC. Genesis Molina, Iban Zambrano, Elizabeth Marcillo, and Percival Andrade, La Fabril, Ecuador

Numerosos métodos han sido desarrollados para la determinación de la estabilidad oxidativa. Los métodos del Oxidógrafo (O), Rancimat (R) y Calorimetría Diferencial de Barrido (DSC) evalúan tres aspectos muy diferentes del proceso de oxidación. La determinación de los períodos de inducción oxidativa, velocidades de oxidación y consumo de oxígeno permiten establecer las diferencias innatas de la susceptibilidad de los aceites con diferente composición de ácidos grasos y antioxidantes. El objetivo de este trabajo fue el estudio comparativo de los periodos de inducción de oleína de palma y cuatro aceites vegetales por los métodos mencionados y la correlación entre ellos.

Muestras refinadas y desodorizadas de oleína de palma, aceite de maíz, soya, girasol y canola de la planta de refinación se utilizaron para la determinación de los periodos de inducción. La temperatura de análisis para los tres métodos fue de 110 °C. En el caso del DSC se utilizó un flujo de oxígeno de 50mL/min. Estos análisis se realizaron por triplicado. Adicionalmente, se analizó el contenido de tocoferoles, perfil de ácidos grasos e índice de iodo de cada muestra de aceite. Se observaron que existen correlaciones de los PI obtenidos entre Rancimat y Oxidógrafo y entre Rancimat y DSC con una regresión lineal con r^2 de 0.998 para ambos casos. A 110 °C la conversión del PI del Oxidógrafo a Rancimat se expresó por la ecuación PIR = 1.2776PIO + 0.7523 y de DSC a Rancimat mediante la ecuación PIR= 0.0742PIDSC – 0.6191.

Tecnologías relacionadas con productos no alimenticios | Technologies Relating to Non-Food Products

Readily Biodegradable Builders—Selecting the Right One(s). Patrick Kincaid, James LePage, Butch Dery, Baltazar Ramirez, Kuntal Chatterjee, and Jeanne Marie McVeigh-Hollis, AkzoNobel, USA

Today's cleaning formulators are fortunate to have a wide range of safe and readily biodegradable builders to choose from. Narrowing the field of choices prior to formulation development is an important 1st step in the process. Besides safety and regulatory implications, and 'green' and biobased certifications, several important physical / chemical properties to consider are strength of binding with Ca and other metal ions as well as Ca chelation value, if a solid or liquid / gel is needed, solubility of the builder at a specific pH and other considerations. A review of the attributes and properties of 'green' commercial builders – including citrate, MGDA, GLDA, IDS, EDDS and polyitaconic acid will be presented. Acceptance and use of these products in commercial formulations is growing rapidly with their specific usage tending to fall into specific cleaning products and applications – such as gel and solid ADW products, I&I cleaning and water softening.

Study of Biosourced Wood Particles for Oil-in-Water Emulsion Stabilization. Francisco A. Vasquez, Romain Valentin, Elisa Re, and Zéphirin Mouloungui, Unité de Chimie Agro-Industrielle, France

Biosourced particles have been the subject of an increasing amount of studies in recent years due to their ability to replace toxic and harmful substances by ecofriendly, biodegradable and renewable equivalents with analogue properties or applications for emulsion stabilization. Wood particles obtained from a top—down protocol of biomass mechanical deconstruction are used to

stabilize oil—in—water Pickering emulsions. The physicochemical properties and characteristics of the particle such as granulometry, surface behavior and composition were studied to understand macroscopic scale phenomena. The particle's size distribution after deconstruction were analyzed by DLS presenting a monodisperse size distribution around 150 nm in diameter, resulting from a mechanical deconstruction process. ATR Infra-red analysis revealed the presence of vibration bands corresponding to hydroxyl, carboxylic acid and ester functions present at the biomass surface. Unusual wetting behavior was highlighted by contact angle deposition, explained by determination of adhesion forces for both liquid-immersed and air immersed materials. The complex composition of wood biomass, caused by the lignin—cellulose—hemicellulose matrix and the presence of water soluble compounds, led to the study of competitive and synergetic interactions between lignocellulosic nanoparticles and native co-surfactants through dynamic tensiometry studies and their roles in emulsion stabilization. Resulting emulsions analyzed by optical microscopy, presented long term shelf storage stability superior to 6 months, with internal phase volume content up to 80%. The use of the studied systems therefore present viable and environmentally friendly solutions towards potential industrial domains for which emulsions and emulsification process are key technologies.

Estudio de los lípidos de los alimentos para perros del mercado Uruguayo. Nadia Segura, Alexandra Cerveró, Bruno Irigaray, and María A Grompone, Facultad de Química - UdelaR, Uruguay

Se realizó un relevamiento de raciones de mantenimiento para perro adulto que se encuentran en el mercado uruguayo (16 marcas diferentes). Se estudió el contenido de lípidos, su perfil en ácidos grasos y su deterioro oxidativo (en base al índice de peróxidos, K232 y K268), ya que los peróxidos formados pueden generar dermatitis en las mascotas.

Según bibliografía el contenido lipídico de estas raciones debe ser superior al 5 % del alimento (expresado en base seca). Se consideran ácidos grasos esenciales para estos animales los ácidos linoleico, linolénico y araquidónico. Se establece un requerimiento mínimo para el ácido linoleico del 1 % en base seca de alimento. Se encontró que, a excepción de 2 raciones, el contenido lipídico superó el 8 %. Asimismo todas las raciones cumplían con el contenido mínimo del acido linoleico.

En general los valores del índice de peróxidos fueron bajos (en el entorno de 3 meqO2/kg) en función de lo establecido como límite máximo para aceites comestibles en el Uruguay (10 meqO2/kg), lo que se acompañó con valores de K232 en el entorno de 8 y de K268 de 2.

Se puede concluir que en general las raciones vendidas en el mercado uruguayo están en buen estado y cumplen con las necesidades lipídicas de un perro adulto.

Sustentabilidad en la producción de aceites y grasas | Sustainability in the Production of Oils and Fats

Jueves, 14 de septiembre 2017|
Thursday, September 14, 2017

Sustainable Origination of Oilseeds in Commercial Agriculture Challenges for Sustainable Sourcing in South America, Standards, Market Demands, and Commitments for Production of Oilseeds. Focus on Soybean. Michel H.R. Santos, Bunge Limited, USA

Challenges for sustainable sourcing in South America, standards, market demands and commitments for production of oilseeds. Focus on soybean.

Sustentabilidad en el rendering de grasas animals. Fernando Mendizábal Fernández, Asociación Nacional de Rendidores S.A., Mexico

Ante la situación actual en que los avances científicos permiten a los seres humanos vivir por mas tiempo y que derivado de esto el volumen de población llega a ser suficiente para demandar los recursos totales del planeta, es indispensable trabajar en incrementar simultáneamente la productividad y sustentabilidad de todas las cadenas de valor involucradas en la producción de alimentos.

Un actor que en ocasiones aparece invisible es la industria de reciclaje de subproductos animales la cual tiene como objetivo el generar productos de alta calidad y valor nutricional a precios atractivos cuando se comparan contra productos provenientes de otras fuentes.

Dependiendo de las costumbres alimenticias de cada país y de las regulaciones sanitarias, la cantidad de subproductos que se reciclan en esta industria varia sustancialmente. Los mercados de países del primer mundo son muy distintos a los de países en vías de desarrollo y la industria se ha adecuado a ambos. Los procesos utilizados en el reciclaje han ido evolucionando para hacerse eficientes en uso de energía y para lograr productos terminados con mejores características nutricionales.

Los principales mercados en los que participa la industria son el de grasas comestibles para usos como la fabricación de pan y el freído profundo la de Alimentos Balanceados para animales donde se ofrecen harinas de carne y hueso con alto contenido nutricional, la Oleoquímica que incluye la fabricación de jabones así como ácidos grasos y glicerina, . entre otros.

Las proyecciones de producción animal limitadas por recursos naturales y económicos nos obligan a analizar como se vera el futuro de la industria así como de las industrias que ofrecen productos equivalentes a los mercados que atendemos. Al mismo tiempo que los seres humanos requerimos un balance nutricional entre el consumo de aceites vegetales y grasas animales, tenemos que ocuparnos en mantener un planeta sustentable.

Parte de los esfuerzos de medición de sustentabilidad se reflejan en la medición de la huella de carbono. Se presentan algunos comparativos de la Huella de Carbono y experiencias respecto a la medición del impacto ambiental de la producción de grasas animales y de productos sustitutos relacionados.

Adicionalmente, se presentan escenarios que analizan la sustentabilidad de la Industria en situaciones especificas, entre otras:

i. Cambios en los hábitos de alimentación humana, que pudieran impactar en el consumo de grasas de origen animal

ii. Cambios climáticos que afecten la producción ganadera

iii. Incrementos significativos en la demanda de otras industrias (oleoquímica, minería, construcción, etc.) que restrinjan el volumen disponible de grasas de origen animal para alimentación humana

iv. Adecuación a nuevos requerimientos de trazabilidad y de certificación por parte de los consumidores

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Intensificación sostenible de las cadenas de valor. María E. Martínez Murillo Cuervo[1], Maria M. Reyoso Martínez[2], Carlos N. Oddone[3], and Laura Flores Fuentes[2], [1]The Nature Conservancy (TNC), Mexico; [2]Alianza México REDD+, Mexico; [3]Alianza México REDD+, Argentina

Los bosques y selvas del planeta cumplen múltiples funciones y servicios ambientales tales como la regulación del clima, recarga de acuíferos, estabilidad y supervivencia para la biodiversidad y captura de carbono. Dichos macizos forestales albergan más carbono
del que se encuentra disponible en la atmosfera, lo que hace evidente la importancia de su conservación. A la par, la demanda por alimentos es creciente a nivel global para poder abastecer a una población que alcanzará los 9 billones de habitantes al 2050, con el mayor crecimiento en los países en desarrollo. Para enfrentar este reto es importante tomar un enfoque de cadenas de valor que permita incrementar la productividad agrícola conservando la biodiversidad. The Nature Conservancy compartirá información relevante sobre los retos, las experiencias sobre el análisis de cadenas de valor, alianzas con diversos actores y experiencias para el subministro
responsable.

Viabilidad economica del uso de biomasa como alternativa energetica en una refineria de aceites vegetales. Percival Andrade, Fredy Toro, Javier Chavez, and Elias Rivadeneira, La Fabril, Ecuador

La demanda energética en las plantas refinadoras de aceites y grasas constituyen un rubro que bordea del 10 al 15% del costo total de producto. Este hecho genera la oportunidad de evaluar económicamente el uso de alternativas sostenibles para generar vapor en reemplazo de los combustibles fósiles. En el presente trabajo se evalúo el cambio de la matriz de generación de vapor para una refinería de aceites y grasas vegetales para un consumo de 200,000 TM de vapor por año. Adicionalmente se desarrolló un modelo logístico de producción y de densificación de la biomasa.

Para establecer los modelos económicos a evaluar, se realizó un análisis de las cantidades y tipos de biomasa disponibles de 4 extractoras de aceite de palma y una extractora de palmiste de la región Norte-Centro de Ecuador. También se realizó un análisis de los requerimientos energéticos y de vapor de cada una de las extractoras y refinería así como también logística de transporte de la biomasa entre extractoras, centros de acopio y refinería. En base a toda la información se estableció tres modelos: densificación de la biomasa en la extractora de mayor producción de biomasa y traslado a planta refinadora para generación de vapor, cogeneración en la extractora de mayor producción y transporte de energía eléctrica para la refinería, y transporte de biomasa a refinería para generación de vapor.

El presente trabajo propone una ecuación de valor para escoger el mejor aprovechamiento de la biomasa sea para cogeneración, producción de vapor y/o energía eléctrica.

Generación de vapor con efluente liquido. Anibal A. Demarco, Desmet Ballestra, Argentina

El agua residual que sale del proceso de extracción por solvente se dirige típicamente hacia la trampa de agua residual, y luego a una instalación de tratamiento de efluentes. En las plantas de procesamiento de semillas oleaginosas con una capacidad limitada para el tratamiento de agua residual, y/o con una limitación en la disponibilidad de agua fresca para producir vapor en la caldera, el sistema de generación de vapor con agua residual puede ser aplicado. El sistema de generación de vapor con agua residual evapora la mayor parte del agua residual del proceso de extracción en un vapor de baja presión que se reutiliza en la desolventización de harina, y la pequeña corriente del concentrado de agua caliente remanente se pulveriza sobre la harina desolventizada. Esto permite reducir completamente el efluente líquido

de la planta de Extracción y al mismo tiempo minimizar la reposición de agua de caldera.

Ahorro 10% consumo vapor en plantas de Crushing. Anibal A. Demarco, Desmet Ballestra, Argentina

En el procesamiento de soja, la harina es necesaria ser secada hasta valores de 12,5 a 10% dependiendo del nivel de proteínas contenido en la semilla. Los vahos provenientes de ese proceso normalmente son enviados a la atmósfera perdiendo completamente la energía remanente. Se ha desarrollado la tecnología necesaria para poder re utilizar parcialmente la energía de los vahos mencionados de manera tal de poder ahorrar algo más del 10% del vapor necesario para el proceso integral de una planta de Crushing de Soja. Además de ese valor que de por sí es significativo se logra minimizar a la mitad el aire utilizado en el proceso convencional de Secado de harina , que en algún caso puede ser de hasta 400.000m3/h para plantas de grandes capacidades.