

Virgin Coconut Oil Processes – Facts and Fictions.

We have been using coconut oil for years but not many are really aware that more than one type is available. When we learn about unrefined coconut oil and realized how superior it is to refined, bleached and deodorized oils, probably you may also be interested in learning about the different types of coconut oil and the methods of their production. This information is necessary in order to inform the public of the many benefits of VCO.

Now that a number of companies are actively marketing coconut oil the landscape has changed and it is necessary to address some of the marketing hype which has appeared. The types of coconut oil are still the same but some of the people selling the oil have become very innovative in describing their products to make them sound superior. In an attempt to sort out some of the hype we would like to address a few basic issues regarding coconut oil. We must stress that we are not saying that the oils which are being "hyped" are poor quality or bad oils because non-copra based coconut oil will naturally be better than refined coconut oil. We do feel, however, that the companies who are marketing them in this manner are doing a disservice to their customers and to the general effort to re-educate the public about coconut oil.

What is Virgin Coconut Oil?

Unfortunately, at this point in time Virgin Coconut Oil is essentially whatever the person selling the oil wants it to be. Even though there is presently an attempt by the Philippine government to set up international standards, we are still mired in uncertainties. But for now, at least, there is some semblance of order for the future of virgin coconut oil. With regard to coconut oil, "virgin" has come to mean essentially that it has not been produced from copra and commercially refined, bleached and deodorized. The term does not address the actual production method which has now become increasingly important. The definition of "virgin" is: - "fresh, unspoiled; especially, not altered by human activity." Our opinion of what constitutes virgin oil depends on our view of the processing method. We described virgin coconut oil as oil produced from fresh coconut meat without the addition of enzyme/bacteria/additive and made without heat. Would coconut oil still be "virgin" if it were heated to remove moisture? Would coconut oil still be "virgin" if it were extracted from coconut which had been dried first? Based on promotional materials from commercial companies we are made to understand the answer is yes. But is this deceptive marketing?

Some marketing hype from companies describing their coconut oil as "cold-pressed, extra-virgin coconut oil ... only minutes from coconut to bottle - direct extraction, pressed fresh daily from natural coconuts." Their websites briefly describe production methods used for different types of oil and begin with the following description of their process....."The nuts are cracked open and the fresh coconut kernel is grated and manually cold pressed." They conveniently leave out the step between grating the fresh coconut and manual pressing, **namely the drying of the coconut meat**, typically in expeller screw-pressed oil. This error of omission is misleading. The "extra-virgin" term is borrowed from the olive oil industry and is just another attempt to make one's coconut oil sound somehow superior to others. Another company advertises this same type of oil as "premium, extra-virgin." In coconut oil the term "extra virgin" accreditation is not approved.

Most companies selling "virgin" coconut oil produced using the traditional fermentation method make similar errors of omission in describing the production of their oil..... "The milk is then fermented for 24-36 hours, and the oil is then separated and filtered from the curds. No chemical or **high-heat** treatment is used in their process....." They say no "high-heat" but they don't say that in fact the oil **is** heated (maybe not so high heat, say only 50-60 deg C ...) in order to remove moisture which is a necessary step to ensure that the oil does not become rancid. How about the one selling "biotechnology process" oil in which enzyme and/or bacteria are added to speed up the process and the oil is then *lightly heated*? The controversy over heated and lightly heated will be quite a contested issue. Hence it is now wise to impose a condition that the processing

method must be specified for the Export market to alert buyers on the “type” of virgin coconut oil they are contracting, and, consequently the price.

By definition pure virgin coconut oil should be processed from fresh mature coconuts. The processing method must be absolutely no heat from beginning to the final product. The process itself must be hygienic with no additives, enzymes, bacteria and/or chemicals added to hasten the process other than the naturally occurring element within the coconut itself. The processing is to be carried out under ambient temperature with no external heat supplied in the total process.

Types of Coconut Oil.....

A. Refined Coconut Oil. The most commonly available oil and the oil you are most likely to find is **RBD** oil (**R**efined, **B**leached & **D**eodorized). This oil is produced from *copra* (dried coconut meat). Due to the drying process (often air or sun drying) the resulting oil, Crude Coconut Oil with high Free Fatty Acid (3 - 5%), must be refined, bleached and deodorized in order to make it suitable for use. The final product is yellowish-white in color with a thick texture and no taste or odor. This was the oil which for many years was used in commercial baked goods and for popping corn.

B. Cold Pressed Coconut Oil – Virgin Coconut Oil. This category can be further subdivided to reflect differences in the starting materials used to produce the oil and the methods of production. Although the term "cold pressed" is commonly used to describe "virgin" coconut oils, it really doesn't mean much in the overall scheme of things. One aspect of the production of "virgin" oil which is constant regardless of the method used is the need to reduce the final moisture content of the oil to 0.25% or less. This is necessary to prevent the oil from becoming rancid. The manner in which this requirement is met depends on the extraction method used as described below.

- ***Traditional Fermentation.*** In this process, fresh coconut meat is grated and pressed to produce a coconut milk which is a mixture of oil, water, proteins, etc. This mixture is allowed to ferment for approximately 48 hours at ambient temperature of about 35 deg C which causes the solids and water content to separate from the oil. The oil is then **heated** to remove the remaining moisture. The oil must be heated at a high enough temperature and for a long enough time to reduce the moisture content to a point which will prevent rancidity. The fact that this oil is produced in small batches by many different individuals may result in considerable variation from one batch to another. The texture of this oil is medium to thick. However there is a couple of company in the Philippines that do produce excellent grade virgin coconut oil using the fermentation and absolute no heat method which takes an awfully long time to produce, about 4 weeks.
- ***Screw Pressed from Dried Coconut Meat.*** Rather than extracting the oil from coconut milk, the fresh coconut meat is dried by hot air to bring the moisture down from 50% to 10% or less. The dried coconut meat is then fed into a screw press where the oil is extracted. The pressed oil is then normally heated to remove the remaining moisture. Currently most operators in Philippines, Indonesia and Pacific Islands are using this route as it is the easiest way to produce fairly good oil. By virtue of the drying process for the coconut meat, this method can never be touted as absolutely no heat. “Cold Pressed” yes because no external heat is supplied to the press but friction within the pressing cage will raise the temperature automatically. The oil will have quite strong odor due to the heat generated in the pressing cage. Sometimes, to reduce the smell, a carbon filtration is necessary.

- ***Decanting Centrifuge/Physical Cold Extraction.*** This process produces oil with the least amount of processing so that the natural vitamin E, antioxidants and fresh coconut "essence" are retained. Fresh coconut meat is grated and cold pressed to produce coconut milk. The coconut milk is then centrifuged using a proprietary process to separate the oil from the other components. This oil has a very light texture and since no heat at all is applied it retains all the flavor and scent of fresh coconut. It has low moisture content hence heating is not necessary. When combined with good agronomy practices and 24 hours time frame processing with freshly harvested coconut it produces the most natural coconut oil available today, just like nature. Unlike many village processed "virgin" coconut oils, this oil is produced under strict hygienic conditions. It has such a light delicate flavor and aroma that you can literally eat it by the spoonful. It is quiet difficult to source for such quality due to the closely held proprietary operation. The most common variation of this method is the Decanting Centrifuge system where the coconut milk is decanted over 3-5 times to obtain the oil. Because the oil is decanted (re-run) many times most of the nutrients will be lost but the oil has extremely smooth flavor and fine quality. Oil produced by these methods will be expensive but you will get top quality product.
- ***Biotechnology Process.*** This method uses cold pressed coconut milk which is then mixed with a protease enzyme, bacteria or both under ambient temperature to slightly higher temperature. The enzyme and bacteria will assist in the process of breaking down the protein-water-oil bonding so that the oil can be released in a shorter time frame. This method runs in quite similar fashion to traditional fermentation (in which the oil release is naturally occurring after about 36-48 hours). It is necessary to heat the oil collected so that water can be removed to prevent rancidity. Filtration of the oil can be done several times to give a clear liquid. However the classification of such oil as virgin coconut oil is doubtful because of addition of enzyme and/or bacteria.

If you are purchasing Virgin Coconut Oil seek clarification on the process used by your supplier. Please note that “cold pressed” and “cold processed” is not the same. “Cold Pressed” means the no external heat is used to extract the oil but then after extracting the oil some HEAT will be used to dry it so that it will not turn bad. The cold pressed method does not mention the final heating of the oil. The oil is sold as “no heat” which we think is not right. “Cold Processed” means that the oil is produced with Absolutely No Heat throughout. Hence look for terms like “Cold Processed Absolute No Heat” or “Physical Cold Extraction Absolute No Heat” or “Traditional Fermentation Absolute No Heat”. The Absolute No Heat guarantee is important to ensure that you are getting high grade oil if you are using it for raw consumption.

HOW TO CHOOSE VIRGIN COCONUT OIL

With such a wide variety and variation in processes for production of virgin coconut oil in the world today, it is getting difficult for consumer to actually know what to choose. Normally if your requirement is more general purpose (like cooking baking) but you are concern about healthy cooking fats, then the expeller Screw-pressed oil will be suitable as the price is lower. However if you are looking more towards raw consumption, culinary and therapeutic purposes; then you should consider traditional fermentation, normal centrifuge or physical cold extraction processes.

Here we will explain the differences in the Traditional and Normal Centrifuge VCO. Both processes utilize the Absolute No Heat (ANH) method. The Traditional Fermentation process is explained earlier (minimum 21 Days to produce plus another 21 days to be naturally dried). The Normal Centrifuge Extraction Process is a centrifugal decanting process which is repeated over 4-5 times at low temperature to concentrate the product into VCO. Now as can be seen below consumer have a choice on Premium ANH VCO – Traditional or Normal Centrifuge.

Now what happen if they like both types? A new proprietary Revolutionary Physical Cold Extraction Technology with Absolute No Heat and short processing time (to prevent loss of nutrient compounds and vitamins) is the answer. This process combines all the qualities from the Traditional Fermentation Process (without going through fermentation) together with the Normal Centrifuge Extraction Process so that you have a very high grade of VCO suitable for health therapy as well as culinary and general purpose. Hence there are three types of very high quality VCO that are truly produced with absolutely no heat.

1. Traditional Fermentation,

2. Normal Centrifuge Extraction, and

3. Physical Cold Extraction.

Traditional Fermentation Process	Normal Centrifuge Extraction Process
Absolute No Heat	Absolute No Heat
<ul style="list-style-type: none">• If vitality or "life force" is important to you, traditional virgin coconut oil rates the highest of all virgin coconut oils.	<ul style="list-style-type: none">• If taste is the most important to you, and especially if you use the coconut oil raw, you will probably want the Centrifuge Extracted Virgin Coconut Oil. Most discrete customers who have very sensitive and discerning taste buds seem to prefer the Centrifuge Extracted Virgin Coconut Oil to all other virgin coconut oils. The taste is very smooth, a true delicacy.
<ul style="list-style-type: none">• If trace minerals are important, the amount of trace minerals appears to be the highest in the virgin coconut oil.	<ul style="list-style-type: none">• If medium chain fatty acids are the most important thing to you, especially lauric acid, then the centrifuged virgin coconut oil will give you a higher percentage of lauric acid than any other coconut oil.

<ul style="list-style-type: none"> • If price is the most important, the Traditional Virgin Coconut Oil costs less. 	<ul style="list-style-type: none"> • Most vegetarian customers who do not like fermented foods should choose the centrifuge extracted oil. This process is quick and high tech, yielding a very high quality product
<ul style="list-style-type: none"> • This process has been used for centuries in the Philippines to make virgin coconut oil. Many people like using the “old traditional ways” because they are often times the healthiest. 	<ul style="list-style-type: none"> • If you are looking for a coconut oil with the highest heat stability of all coconut oils, this is the one. Standard coconut oil still contains about 6% mono-unsaturated fat and 2% polyunsaturated fat. The polyunsaturated fats are not heat stable, and the monounsaturated fats, though fairly stable can still oxidize. This Centrifuged coconut oil contains virtually no polyunsaturated fat, and half the mono-unsaturated fats when compared to other coconut oils

CAUTION:-

If you want the attributes of coconut oil as what nature intended it to be i.e. ALL the quality of Traditional ANH Fermentation and ALL the quality of Centrifuge Process, consider the Physical Cold Extraction Technology (which is an Absolute No Heat Process). The oil produced by this third method is as close to nature as possible and is therapeutic-grade oil. *If you are taking raw VCO as a daily food supplement it is wise to consider only the best grade. Do not take chances with your health.* Go only for the best and know how your oil is produced. Always remember to look for the production method (e.g. Traditional Fermentation) and **ABSOLUTE NO HEAT guarantee in addition to **NO ADDITIVE & NO ADDED ENZYME or BACTERIA.****

(If you are buying VCO from a dealer find out the origin of their oil and the processing method. A reputable dealer will not hesitate to put this information in print. To date no dealers have been able to import true Absolute No Heat processed oil, as manufacturers in this category will normally want to sell this high grade oil under their own brands. Hence in spite of the marketing hype, repackaged oil available through local dealer is basically general purpose grade, suitable for cooking, garnishing, baking and occasional raw consumption).

How To Produce Virgin Coconut Oil: Traditional Fermentation with Absolute No Heat (21 days to produce)



1. Choosing nuts: Picking the right nuts is the first and most crucial part of the VCO production. The right maturity and variety of coconuts ensure good quantity and quality of oil harvest.



2. Cracking of coconuts: After the nuts are cracked and the juice is obtained, the nuts are grated within 10 minutes to ensure the coconut meat's freshness.



3. Grating: Using a motor-powered grater, coconut meats are grated into fine strands.



4. Putting the meat in nets: The grated coconut meats are placed in nets and are ready for pressing.



5. Pressing: Using a manually operated machine, the nets with the grated coconut meat are pressed to gather the coconut milk.



6. Mixing and placing the milk in the culturing cabinet: The coconut milk of the 1st press and 2nd press are mixed in a container. The containers are covered with cloth and placed in the culturing cabinet.



7. Checking the temperature: The temperature of the culturing cabinet is regularly checked and maintained at 35-38 degrees Celsius.



8. Harvesting: After 21 hours in the culturing cabinet, the coconut milk is separated into layers of protein, oil, and water. The protein layer is scooped first and set aside, followed by the oil and water layers.



9. Filtering: The harvested oil is filtered three times using fine filter papers. The filtered oil is then set aside in the curing cabinet for 21 days. After 21 days, the oil is filtered again and is now ready for bottling.

Please note that in this process Traditional Fermentation Process of Absolute No Heat it will take minimum of 21 days (Step 9) at ambient temperature of 35 deg C to produce VCO of good quality. This is necessary due to the fact that there is inherent moisture in the VCO and allowing it to naturally dry for about 21 days will normally reduce the moisture to below 0.20% to obtain stable oil.

If you are running a commercial production for Traditional Fermented VCO it is not feasible to wait for 21 days of natural drying, hence there will be a need to heat the oil externally to about 50 deg C to quickly remove the moisture. Hence when a Traditional Fermentation product is sold as no heat it is not true, unless it is specifically stated as ABSOLUTE NO HEAT.

Please note that it is important to know the process involved in the production of your VCO. Hence when a commercial product is placed in the market the process must be clearly stated. Different processes give rise to differences in quality and prices. As a consumer you have the right to know.



Virgin Coconut Oil Production- From dried gratings.... mostly for export.

Process Flow



Coconut



Splitting



Grating



Filtering



Pressing



Drying



Virgin Coconut Oil

*Source: Chemicals and Minerals Division
Industrial Technology Development Institute (ITDI), 2003*

This is the standard process of manufacturing VCO on a commercial scale. It does not go through the cold press coconut milk process first but the gratings (coconut meat powder) will be heated to dry up the moisture content. The heating and drying process will need heated air to be forced into the gratings (inside a tumbler or a drying plate) over a period of time so that moisture can be reduced from the original 50% to less than 10%. The dried gratings will now be passed through a mechanical expeller Screw Press to extract the oil. Normally such process gives good yield but lower price of VCO. Nutrients-wise they will be lacking in some minor elements and vitamins. Such oil would also give a stronger coconut smell. It is good for usage as general purpose oil such as cooking and baking but lately it is marketed as a nutraceutical and functional product.

Generally most producers will market this grade of oil as extra virgin, additive-free and no heat (even though external heat is applied to dry the VCO to make the oil stable).

Normally Screw Pressed VCO is priced lower and will be ideal as general purpose oil.

As a consumer you have the right to know how your VCO is made. Normally a reputable supplier will provide this information on the packaging.

Another view of the process of VCO production in Central America and most Pacific Islands.....
This is just another variation of the screw press process however the quality of the coconuts may not be desirable due to the length of time in collecting the coconut.

How Is Virgin Coconut Oil made in Xaibe Village, Belize, Central America.

We start with "peeling" coconuts from our storage pile. This pile is kept replenished with coconuts brought in from the Turneffes -- roughly 100 miles away -- by the small sail boat towing an even smaller work boat. Both loaded full. The coconuts are searched for, collected, then loaded onto the boats. In complete form. That is still in the "husk". Normal procedure is to "peel" (de-husk) coconuts where found. But they stay "live" much better when kept in husk. This greatly reduces the amount of coconuts that can be hauled any one trip. With our two boats we bring in around 2000 coconuts per trip. Rather than 4000 peeled coconuts. Coconuts are peeled of their husks by pressing down on a hard wood stick with one end deeply embedded in ground and the high end being carved into a wedge shape. The "base" end of the coconut is pressed down onto this wedge and twisted. It takes practice. After "peeling", the naked coconuts are moved into the processing shed where they are swiftly broken into two halves.



The coconut is held in one hand and sharply struck with the back of a machete as rotated in the hand. This eventually causes the coconut to break into two halves. The coconut water falls out into the container. The two halves move up the "line" to the grating station. Again -- it takes some acquired skill to perform this function. During this part of the process many coconuts are rejected. It is only once the coconut is opened that we know if it meets our requirements. A careful inspection by a knowledgeable person is required with each breaking.

Grating can be technically described as "wet milling". It involves moving the coconut up against a rotating grating head. This grinds out fine/thin shreds of coconut meat which is a very wet/soggy mass. The grater head has very sharp serrated edges and rotates at 500 RPM with great force. The coconut half is held with both hands firmly and moved against the head causing grated coconut to fly out in all directions. Again -- it is a skilled job requiring much practice to perform efficiently. The coconut must be pressed into the powerful rotating milling head while held firmly. It is then "wobbled" against the head so as to grate/wet-mill out all the meat. But not scrape out coconut shell in to the gratings. Following is an over all view of grater station and process.



From the wet milling station the fresh gratings are moved to the surface of the large hot plate drier. Here two woman continuously keep turning it so as not to burn. The following picture shows the grater station in relationship to drier. The fresh "wet" gratings are moved from the hottest part to the cooler part exactly in progression with the drying process. The large hole in the side of this drier furnace holds a large wash pan which is for hot storage of dried gratings. The smaller wash pan holds fresh gratings ready to dry. It takes 30 minutes to move wet gratings at one end to dry gratings coming off the other end. The two woman "turn" the gratings continuously. For a normal run of 20 liters yield of finest virgin oil this takes 9 hours or more.





This view of the drying operation is from the hot end. Note the large fan which operates continuously to present fresh air to carry off water humidity from heated gratings. One can also see the fire door to the stove. The stove is a small unit built into one end. The fire box only extends 20 inches into the body of the drier -- before the flue gasses are directed beneath the steel plates on which the gratings rest -- to the far end where they rise up the 18 foot tall chimney. This drier plate is 32 inches wide by 12 feet long. The last four feet of which is stabilized to 150 F for fine drying of residual humidity in the gratings. The stove is fueled using the cleaned coconut shells. This is a continuous process of adding just the right amount of shell so the fire is never too hot or too cold. The hottest part of the plate is directly over the firebox. This is where the fresh wet gratings are placed in a thick layer. As the gratings

dry they are continuously moved towards the end with plate temperature descending accordingly. The last four feet of plate has a thin layer of gratings we call the "sprinkle" where final drying is done. They are then collected in the small pan shown and put in the holding pan in the oven.

The "Expressing" of Oil from the dried gratings

After nine hours of grating and drying the batch is ready for "oil-expressing". This is accomplished in our Sri Lanka made screw press specially designed for this process. Below is a picture of the screw extracted after a pressing. The machine is stripped down and cleaned after each "run".



The large hopper is where the dried gratings are dropped in and fed to the screw expresser. The hanging sheet of metal separates the prime drive from the expresser. The two are connected by 10 foot long drive belts. The primer mover is Lister Diesel "copy" made in India. They first built these style engines in England in the late 1800's and stopped

making them in England in 1948. Various 3rd world countries continue production of these extremely hardy diesels as they are sturdy design, very reliable, often operate for 50 years or more and very low maintenance. Below is a picture of the Lister "copy" used as prime mover for this expresser -- along with a few of our younger "helpers".



This Stationary Power Plant weighs 1340 lbs and develops all of 12 HP of power at a very slow 650 RPM. I like to call it my "Forever-Machine". It has no electric starter -- rather one gets some good exercise hand crank starting. It has no water pump, fan or belt drives for such. Rather a 45 gallon drum on a stand, off to the right of this picture (the hoses lead to it) and the engine cools by convection through this water "reservoir". It has no "electrics" so no generator or battery. After 9 hours or so of processing coconuts to dry gratings this engine is started, drive belts dropped in place and then the expresser is slid forward by a lever to tighten belts and engage machine. It takes 45 minutes to one hour to process the gratings to oil with a 20 liter yield. That period is very intensive!! It takes 3 people to operate this process and the screw expresser must be kept in perfect adjustment always. Or else much oil is lost. The gratings are passed through three times to progressively squeeze the oil out. This also keeps operating temperatures low as



friction from a high pressure extraction can quickly increase temperatures of oil to over 200 F. This is what the expresser looks like when in operation. This is a first pass. Two more to go. The coconut "press-meal" to the right, the oil to the left. The coconut meal is almost completely extracted of oil by the 3rd pass and is very dry. It is a very nutritious high protein food and we use it here for feeding all our animals. That is Pigs, chickens, turkeys and yes, even the dogs. I have purchased an old style grinding mill to also run from this same prime mover and eventually will be grinding the meal to a flour for making high energy bread, cookies and other products. This is done at present in India and Sri Lanka and has found to be of great nutritional supplement for young children in villages.

Purifying and clarifying the oil

The raw oil as it comes from the expresser is full of fine particles of coconut gratings. Yet the product we ship is crystal clear. Purifying oils can destroy them. As you might have read in the links supplied in regards to health benefits of virgin cold pressed coconut oil. We use a very "gentle" process for purifying our oil. It is not normal procedure as it is slow and labor intensive. The process I use is called "racking" and is the same used for making fine wines. The oil pan that collects the day's run is covered and the oil is allowed to settle for 18 hours before being transferred to the next container. All large particles have collected to the bottom during this period and just the oil on top is decanted off. The container with this first "rack" sits for one week and then is siphoned off (decanted) to the next container where it is then stored for 3 weeks. Finally that container is decanted into the one liter bottles the oil is shipped in.



This final product is of exceptional quality with rich odors and flavors locked in place. Has an indefinite shelf life as it is still a "living" oil. And is of exceptional medicinal properties due to the extreme care in manufacturing. This quality of medicinal virgin coconut oil can not be made by automation processing. It must be slow and labor intensive. And the results are well worth the effort.

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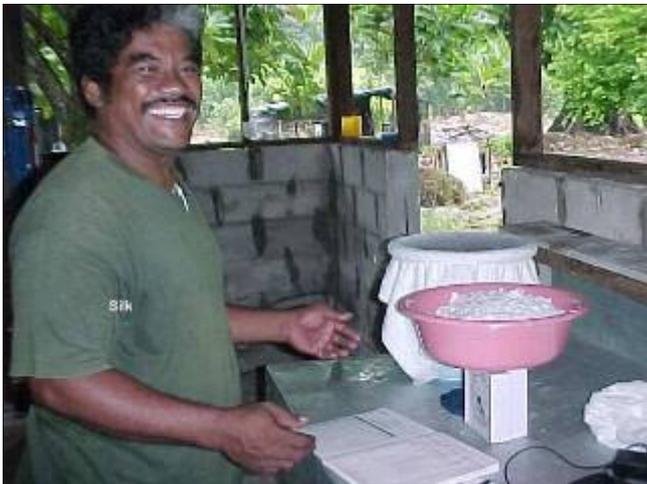
Pictorial Flow Chart



1. De-husk and Split



2. Grate



3. Weigh Batch



4. Dry



5. Load



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