

► Coconut Handbook





Coconut Handbook

Market Information

Product Standards

Training Manuals

Compiled by Tendy Gunawan

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COCONUT MARKET

► 1. Coconut Market

1.1. Coconut Fibre

Coco fibre, also known as coir, is a natural fibre extracted from the husk of coconuts. It is the fibrous material found between the hard, internal shell and the outer coat of a coconut. Coco fibre's high content of cellulose and lignin gives it strengths and durability.

Coconut fibre and coconut peat are extracted using machines that mechanically separates the fibre from the hard shell and the outer skin. Another machine shifts to separate the coconut peat out of the coconut fibre.



► Application

Agriculture and Horticulture: Coco fibre is used to make geotextiles, mulch mats, and plant liners. It helps retain moisture in the soil and provides good aeration for plants roots

Erosion Control: Coir mats and blankets are used to prevent soil erosion in landscaping and construction projects

Home and Garden Products: It is used in the manufacture of doormats, brushes, and mattresses

Automotive and Upholstery: Coco fibre is used in car seat padding and other upholstery due to its durability and resilience

Filtration: Coir is used in water filtration systems to remove impurities and improve water quality

The importance of coco fibre stems from:

- **Sustainability:** Coco fibre is a renewable resource, making it an eco-friendly alternative to synthetic materials
- **Biodegradability:** Being natural it decomposes without harming the environment.
- **Versatility:** Its diverse applications across industries make it a valuable material.
- **Economic value:** It provides an additional income source for coconut producing regions, contributing to rural development and employment

1.2. Coconut Charcoal



Coconut charcoal is a specialized form of charcoal derived from coconut shells, a residual product of the coconut industry. These shells undergo a process known as carbonization, where they are heated under controlled, low-oxygen conditions to eliminate volatile compounds and convert them into pure carbon. Renowned for its high carbon content, minimal ash residue, and sustained burning capabilities, coconut charcoal is extensively utilized as a primary fuel source for cooking, heating, and various industrial applications. Moreover, it is integral to water purification systems and is utilized in the formulation of cosmetics and skincare products.

The following paragraphs provide further details regarding the primary applications of coconut charcoal in the industry is as follow:

1. Fuel Source:

Coconut charcoal is highly valued as a fuel due to its high carbon content, which makes it burn hotter and longer than many other types of charcoal. It is commonly used for:

Cooking: In both residential and commercial settings, coconut charcoal is used in grills, barbecues, and traditional cooking stoves where consistent heat and minimal smoke are desired.

Heating: It is utilized for heating purposes in areas where access to conventional fuels like gas or electricity is limited.

Industrial Processes: Coconut charcoal serves as a heat source in various industrial applications, such as metal smelting, kilns for ceramics and pottery, and as a reducing agent in chemical processes.

2. Water and Air Filtration:

Coconut shell charcoal, the source of activated carbon, is in high demand due to the porous structure and high surface area of the charcoal, which enables it to effectively trap and adsorb airborne pollutants, odours, and volatile organic compounds (VOCs) from the air passing through the filter. This makes it an ideal material for a wide range of applications, including water and air purification, gas mask filters, and chemical processing. The activated carbon segment is currently the dominant market player due to the rising awareness of water and air quality issues globally. Industries such as water treatment, healthcare, and environmental protection rely heavily on coconut shell charcoal-based activated carbon to effectively remove impurities, toxins, and contaminants, ensuring cleaner and safer environments.

► Application

Water Purification Systems: Often found in domestic and commercial water filters, coconut charcoal helps remove contaminants, chlorine, and odours from drinking water, improving its taste and quality.

Air purification system: It helps in neutralizing unpleasant odours, making it particularly useful in environments where air quality and freshness are critical, such as homes, offices, hospitals, and hotels

Aquarium Filtration: Used in fish tanks and aquariums to maintain water clarity and remove toxins, ensuring a healthier environment for aquatic life.

3. Cosmetics and Skincare Products:

The fine, activated form of coconut charcoal is used in the cosmetic and skincare industry for its adsorbent properties:

► Application

Facial Cleansers and Masks: Activated coconut charcoal is an ingredient in face masks and cleansers, helping to draw out impurities, toxins, and excess oil from the skin.

Teeth Whitening Products: It is a key ingredient in some toothpaste formulations and teeth-whitening products, where it aids in removing stains and plaque from teeth without damaging enamel.

Hair Care Products: Used in shampoos and scalp treatments to detoxify and remove impurities from the hair and scalp.

These applications demonstrate the versatility of coconut charcoal beyond traditional fuel, highlighting its role in enhancing water quality and contributing to personal care products.

The research conducted by Manoj Phagare from Cognitive Market Research, published in 2023 under the title Global Coconut Shell Charcoal Market Report, estimates that the global coconut shell charcoal market will reach USD 315 million in 2023. The report forecasts a compound annual growth rate (CAGR) of 8.00 per cent from 2023 to 2030.

1.3. Coconut Peat

The coco peat market is defined as the global industry engaged in the production, processing, and distribution of coco peat, also known as coir pith or coir dust. Coco peat is a natural byproduct derived from the processing of coconut husks, primarily in regions where coconut cultivation is prevalent. Coco peat is a valuable resource utilized in horticulture and agriculture due to its exceptional water retention, aeration properties, and environmental friendliness. The market encompasses a diverse array of coco peat products, including blocks, bricks, pellets, and loose fibres, which are utilized in a multitude of agricultural, horticultural, and landscaping applications.

The market forces that drive the coconut peat global market can be influenced by a few factors.

► Factors of growth in coco peat market

Growing interest in sustainable agriculture: The necessity for organic and environmentally friendly growing media has increased because of the growing public awareness of sustainable farming techniques. Coco peat, a renewable and sustainable resource, is favoured for its ability to improve soil structure and promote robust plant growth.

Growth in the floriculture and horticulture sectors: Coco peat is a common substrate utilized by the horticulture and floriculture industries for the cultivation of plants. The increased demand for fruits, vegetables, and ornamental plants is fuelling the growth of these businesses, which in turn is driving the market for coco peat.



Growing acceptance of soilless farming: The growing popularity of soilless farming techniques such as hydroponics and container gardening can be attributed to their ability to conserve water and space. Coco peat's superior aeration and water retention properties make it an optimal substrate for these types of systems.

Benefits for root development and seed germination: Coco peat is an optimal substrate for root growth and seed germination. Its fine texture, water-holding capacity, and aeration properties render it an optimal choice for nurseries and seedling production.

Environmental concerns and peatland conservation: The acceptance of substitutes such as coco peat is influenced by environmental concerns regarding the loss of peatlands and the preservation of wetland ecosystems. The harvesting of coco peat does not result in any damage to natural peat bogs, which is in accordance with conservation initiatives.

Popular lightweight and manageable growing media: Growers appreciate how light and manageable coco peat is. Its tame construction makes it easy to handle, integrate into different production systems and transport.

Water conservation in agriculture: The retention of water by coco peat facilitates the conservation of water in agricultural settings. Coconut peat's capacity to retain moisture and its suitability for use in conjunction with less water are attractive qualities for farmers and producers when water scarcity becomes a pressing issue.

Government programmes and grants: The adoption of coco peat can be expedited by the implementation of governmental programs, incentives, and agricultural legislation that endorse environmentally benign growing media and sustainable farming techniques.

Awareness of improved soil health: Because of its ability to increase aeration, support nutrient availability and improve soil structure, coco peat helps farmers understand the value of healthy soil. Acceptance of coco peat as a soil amendment is driven by this awareness.

Companies in the coco peat industry are constantly coming up with new ideas and expanding the range of products they sell. This includes the creation of coco peat products with added value and specific qualities for different crops and uses.

According to research conducted by Verified Market Research in the market value of the coco peat industry was estimated at USD 3.89 billion in 2023 and is projected to reach USD 5.26 billion by 2030, exhibiting a compound annual growth rate (CAGR) of 4.4 per cent during the forecast period of 2024-2030. (Source: Verified Market Research)

1.4. Refined, Bleached and Deodorized (RBD) Coconut Oil



Coconut oil is a widely used ingredient in various countries across the Asia-Pacific region, particularly in the food industry. Its unique composition helps to maintain good cholesterol levels in the body by containing low levels of unsaturated fatty acids, which minimise the risk of heart disease. Furthermore, coconut oil is used in the food industry as a dietary fat for the preparation of infant milk powder, confectionery and bakery products, ice cream, and filled milk. The expansion of the coconut oil market will be driven by the growing demand for coconut oil in various industries, including cosmetics, food, chemical, and personal care.

The following paragraphs provide further details regarding the principal applications of refined, bleached, and deodorised (RBD) coconut oil in several different industrial sectors.

1. Food Industry

Cooking and Baking: RBD coconut oil is widely used for frying, sautéing, and baking due to its high smoke point and stable nature. It is a preferred oil for recipes requiring a neutral taste.

Margarine and Shortening: It's often used as a base for margarine and as a shortening in baked goods.

Confectionery: It is used in the production of chocolates and other confectionery products due to its solidification properties at room temperature.

2. Cosmetics and Personal Care

Skin Care: RBD coconut oil is a common ingredient in lotions, moisturizers, and creams because of its emollient properties. It helps to soften and hydrate the skin.

Hair Care: It's used in shampoos, conditioners, and hair treatments to nourish and strengthen hair, promoting shine and preventing breakage.

Soaps and Detergents: The oil is a key ingredient in soaps and detergents, offering excellent lathering and cleansing properties.

3. Pharmaceuticals

Carrier Oil: RBD coconut oil is used as a carrier oil in various pharmaceutical formulations, including topical ointments and capsules, due to its stability and neutral characteristics.

Health Supplements: It is used in dietary supplements and nutraceuticals for its medium-chain triglycerides (MCTs), which are believed to offer various health benefits.

4. Industrial Applications

Biofuels: RBD coconut oil is used in the production of biodiesel and other biofuels, providing an eco-friendly alternative to fossil fuels. The utilisation of waste coconut oil for biodiesel production represents a sustainable and economically viable solution to the challenges of waste management and renewable energy. The conversion of waste oil into a valuable fuel contributes to environmental protection, energy security, and economic development.

Lubricants and Greases: It is used in the manufacturing of industrial lubricants and greases due to its stability and lubricating properties.

5. Animal Feed

Pet Food: It is incorporated into pet foods and supplements to enhance nutritional value and provide energy.

6. Household Products

Candles: RBD coconut oil is used in candle making due to its clean-burning properties and ability to hold fragrances.

Cleaning Products: It is an ingredient in various household cleaning products for its cleaning and emulsifying properties.

These diverse applications demonstrate the versatility and utility of RBD coconut oil across different industries

According to research by KBV Research with the title of Europe Coconut Oil Market, published in December 2021, The European Coconut Oil Market is expected to grow at a CAGR of 6.5 per cent during the forecast period (2021 - 2027). While, a new report titled Global Coconut Oil Market, published by KBV Research in December 2021, The Global Coconut Oil Market size is expected to reach \$ 4,554.2 million by 2027, rising at a market growth of 7.2 per cent CAGR during the forecast period.





COCONUT PRODUCT STANDARDS

► 2. Product Standards

2.1. Coconut charcoal

2.1.1. The import requirements of coconut charcoal in the Europe Union market.

2.1.1.1. Import Tariff

The coconut charcoal item is classified under HS code 4402.90, export from Timor-Leste the import tariff in Europe according to www.macmap.org is 0 per cent.

2.1.1.2. General Quality Parameter for Coconut Charcoal

The European Union (EU) does not have specific food safety regulations exclusively for coconut charcoal, as it is primarily used for non-food applications such as water filtration, air purification, and as a fuel source. However, there are general quality standards and safety regulations that may apply depending on its intended use. Here are the general parameters and standards that might be relevant for coconut charcoal, especially when used in applications that could impact food or health:

Quality Parameter	
Ash Content	Lower ash content is preferable as it indicates higher purity of the charcoal. Typically, high-quality coconut charcoal has ash content below 5-7 per cent.
Moisture Content	The moisture content should be low to ensure efficient burning and reduce the risk of mold. Usually, it should be less than 10 per cent.
Volatile Matter	The number of volatile compounds should be low, typically below 15 per cent, to ensure stability and reduce the production of smoke and odour during use.
Fixed Carbon	Higher fixed carbon content indicates better quality, as it signifies the efficiency and energy content of the charcoal. High-quality coconut charcoal should have fixed carbon content above 70 per cent.
Particle Size	The particle size can vary depending on the application. For briquettes, uniform size is important for consistent burning.
Impurities	The charcoal should be free from contaminants such as heavy metals, pesticides, and other harmful substances. This is particularly important if the charcoal is used for applications like water filtration.

2.1.2. Regulatory Compliance

Regulatory Compliance	
Chemical Safety	Compliance with the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH) Regulation (EC No 1907/2006) may be required if the charcoal contains or is treated with any chemicals.
Food Contact Materials	If coconut charcoal is used in applications where it comes into contact with food or beverages (e.g., filtration), it must comply with Regulation (EC) No 1935/2004 on materials and articles intended to come into contact with food, ensuring that no harmful substances migrate into the food.
Environmental Standards	Compliance with environmental standards regarding the production and disposal of charcoal, such as air quality regulations, waste management, and sustainable sourcing of raw materials.
Labelling	Proper labelling of the product in accordance with EU regulations, providing information on its composition, intended use, safety instructions, and manufacturer details.
Safety Data Sheets (SDS)	Provision of Safety Data Sheets for products, especially if the charcoal is used in industrial or commercial applications, detailing the chemical properties, handling, storage, and emergency measures.

Applications and Specific Use Cases:

- ▶ **Activated Charcoal:** For activated charcoal used in medical or health applications, compliance with specific purity standards and medical device regulations may be required.
- ▶ **Charcoal Briquettes:** For use as fuel, the focus would be on combustion efficiency, ash content, and the absence of harmful emissions.

For precise and detailed regulatory information, consulting the specific EU regulations and directives relevant to the intended use of the coconut charcoal is recommended. If the charcoal is intended for use in applications impacting food or health, additional standards from relevant EU bodies such as the European Food Safety Authority (EFSA) or specific industry standards may apply.

2.1.2.1. Mandatory regulation

To export coconut charcoal from Timor-Leste to Europe, the exporter must comply with several mandatory requirements set by the European Union (EU). These requirements are designed to ensure product safety, quality, and environmental protection. Here are the key mandatory requirements:

Mandatory Regulations	
REACH Compliance: If the charcoal contains any chemical substances that fall under the Registration, Evaluation, Authorisation, and Restriction of Chemicals (REACH) regulation, it must be registered with the European Chemicals Agency (ECHA). This ensures that any chemical risks are properly managed.	Source: [European Chemicals Agency - REACH] (https://echa.europa.eu/regulations/reach)

Mandatory Regulations	
General Product Safety Directive (GPSD): According to Directive 2001/95/EC, all products sold in the EU must be safe for use. This includes ensuring that the coconut charcoal does not pose any risks under normal usage conditions.	Source: [European Commission - General Product Safety] https://ec.europa.eu/info/law/law-topic/consumers/product-safety-and-labelling/product-safety-rules_en
Packaging and Packaging Waste Directive: The packaging used must comply with Directive 94/62/EC, which focuses on minimizing packaging waste and promoting recycling and reuse.	Source: [European Commission - Packaging Waste] https://ec.europa.eu/environment/topics/waste-and-recycling/packaging-waste_en
Phytosanitary Requirements: To prevent the introduction of pests and diseases, a phytosanitary certificate issued by the relevant authority in Timor-Leste may be required. This certificate ensures the charcoal meets EU plant health standards.	Source: [European Commission - Plant Health] https://ec.europa.eu/food/plants/plant-health_en
Customs Documentation: Proper customs documentation, including a commercial invoice, packing list, bill of lading, and certificates of origin if applicable, is essential. Correct use of HS code 440290 is necessary for tariff classification.	Source: [European Commission - Import Procedures] https://trade.ec.europa.eu/access-to-markets/en/content/customs-procedures-import
CE Marking (if applicable): If the charcoal is intended for specific uses that fall under product categories requiring CE marking (e.g., certain devices or machinery), it must comply with the relevant EU directives and bear the CE mark.	Source: [European Commission - CE Marking] https://ec.europa.eu/growth/single-market/ce-marking_en
Chemical Safety Standards: The product must adhere to EU regulations regarding chemical safety, including limits on hazardous substances. This could involve compliance with directives such as the Restriction of Hazardous Substances (RoHS) if applicable.	Source: [European Commission - Chemical Safety] https://ec.europa.eu/environment/chemicals/index_en.htm
Environmental Regulations: Depending on the production process, there may be additional environmental regulations to comply with, especially related to emissions and waste management.	Source: [European Commission - Environment] https://ec.europa.eu/environment/

By meeting these requirements, exporters from Timor-Leste can ensure their coconut charcoal is eligible for entry into the European market. For the most current and detailed information, it is advisable to consult the specific EU regulations and guidelines through the provided sources.

2.2. Coconut Oil

2.2.1. The import requirements for coconut oil in the European Union market.

2.2.1.1. Import Tariff

The coconut oil item is classified under HS code 151319 , export from Timor-Leste the import tariff in Europe according to source of EU Access2Markets is 0 per cent.

2.2.1.2. Mandatory quality parameter set by European Commission for RBD cooking oil

The European Union (EU) has specific quality standard parameters for Refined, Bleached, and Deodorized (RBD) cooking oils regulated by the European Commission for Food Safety. These standards are outlined in various regulations and directives that aim to ensure the safety, quality, and authenticity of cooking oils. Here are the key quality standard parameters:

Key Quality Parameter for RBD Cooking Oils in the EU	
Free Fatty Acids (FFA)	The FFA content should be very low, typically below 0.1 per cent. High levels of FFA indicate poor quality and degradation of the oil.
Peroxide Value	This measures the extent of primary oxidation. The peroxide value should generally be less than 10 milliequivalents of active oxygen per kilogram for RBD oils.
Moisture Content (MC)	The moisture content should be very low, usually less than 0.1 per cent, to prevent microbial growth and ensure stability.
Colour	RBD oils should be light in colour due to the refining process, which removes pigments. The Lovibond colour index or similar measurements are often used.
Odor and Flavour	RBD oils should be neutral in Odor and flavour, indicating that undesirable compounds have been effectively removed.
Smoke Point	The smoke point should be high, typically above 200°C, making the oil suitable for high-temperature cooking.
Trace Metals	Levels of trace metals like iron and copper should be minimal, as they can catalyse oxidation. Specific limits are set to ensure stability.
Additives and Contaminants	RBD oils must comply with EU regulations on allowable additives and contaminants, including limits on pesticide residues, heavy metals, and other potentially harmful substances. Regulation (EC) No 1881/2006 sets maximum levels for certain contaminants in foodstuffs.

2.2.1.3. Regulatory Compliance:

Labelling: Oils must be properly labelled with nutritional information, country of origin, and any allergens in compliance with Regulation (EU) No 1169/2011 on the provision of food information to consumers.

Safety Regulations: Compliance with general food law, including Regulation (EC) No 178/2002, which lays down the general principles and requirements of food law, establishes the European Food Safety Authority, and lays down procedures in matters of food safety.

These standards ensure that RBD cooking oils in the EU are safe, high-quality, and meet consumer expectations for both health and culinary use. For precise and detailed regulatory information, consulting the specific EU regulations and directives is recommended.

2.2.2. Recommendations to establish RBD cooking oil factory

Considering market demand and the quality standards established by the EU Commission, it is recommended to establish an RBD cooking oil factory utilizing the physical refining process instead of the chemical refining process.

The advantages of producing cooking oil using the physical refining process compared to the chemical refining process include:

1. Environmental Benefits:

- ▶ **Reduced Chemical Use:** Physical refining does not require the use of chemicals like phosphoric acid, which reduces the environmental impact.
- ▶ **Less Waste:** The process generates fewer hazardous waste products, making it more environmentally friendly.

2. Quality of Oil:

- ▶ **Better Nutritional Profile:** Physical refining helps retain more natural nutrients and antioxidants in the oil, resulting in a healthier product.
- ▶ **Improved Flavour and Aroma:** The absence of harsh chemicals preserves the natural flavour and aroma of the coconut oil.

3. Cost-Effectiveness:

- ▶ **Lower Operating Costs:** Physical refining can be less expensive in terms of operational costs since it avoids the need for chemicals and the associated handling and disposal costs.
- ▶ **Energy Efficiency:** The process may consume less energy compared to chemical refining, leading to cost savings.
- ▶ **Physical refining, combined with pre-treatment of the raw material (coconut meat), eliminates the need for the degumming step. This approach reduces both process and consumable costs.**

4. Simplicity and Safety:

- ▶ **Simpler Process:** Physical refining involves fewer steps and is generally simpler to operate and control.
- ▶ **Safer for Workers:** The absence of harmful chemicals creates a safer working environment for employees.

5. Product Consistency:

- ▶ **Consistent Quality:** Physical refining produces a more consistent quality of oil, as the process is less variable than chemical refining.

Overall, physical refining of coconut oil is often preferred for its environmental, health, and economic benefits, as well as its ability to produce high-quality cooking oil that meets the standards quality of European market.

2.3. Coconut Peat

2.3.1. The import requirements of coco peat in the Europe Union market.

Coco peat, also known as coir pith or coir dust, is a natural byproduct derived from the coconut husk. While coco peat is widely used in horticulture as a soil amendment and growing medium, it is not directly regulated under food safety standards by the European Union (EU). However, if coco peat is used in applications related to food production, such as in organic farming or as a substrate for growing food plants, certain quality and safety parameters may be indirectly applicable.

2.3.1.1. General Quality Parameters for Coco Peat:

General Quality Parameter for Coco Peat	
pH Level	Coco peat typically has a slightly acidic to neutral pH, generally ranging from 5.5 to 6.5 . This pH range is suitable for most plants.
Electrical Conductivity (EC)	EC is a measure of the salt content in coco peat. Low EC levels are preferred for horticultural use, ideally below 0.5 mS/cm for high-quality coco peat.
Moisture Content	The moisture content of coco peat should be controlled to prevent mold and bacterial growth. It is usually kept below 20 per cent for packaged products.
Organic Matter	High-quality coco peat should have a high organic matter content, typically above 90 per cent .
Particle Size	The particle size can vary depending on the intended use. Fine coco peat is used for seed starting, while coarser grades are used for potting mixes and soil amendments.
Absence of Contaminants	Coco peat should be free from harmful contaminants such as heavy metals, pathogens, pesticides, and other toxic substances.

2.3.1.2. Regulatory Compliance in the EU:

Regulatory Compliance in the EU	
Plant Health and Safety	Coco peat used in agriculture and horticulture must comply with plant health regulations. This includes being free from pests and diseases. Regulation (EU) 2016/2031 on protective measures against plant pests may apply.
Organic Farming Standards	For use in organic farming, coco peat must comply with Regulation (EU) 2018/848 on organic production and labelling of organic products. This includes ensuring that the coco peat is free from prohibited substances and meets specific organic standards.
REACH Regulation	Compliance with the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH) Regulation (EC No 1907/2006) may be required if coco peat is treated with any chemicals.

Regulatory Compliance in the EU	
Contaminants in Food Production	If coco peat is used as a substrate for growing food plants, it must not contribute to the contamination of food products with harmful substances. Regulation (EC) No 1881/2006 sets maximum levels for certain contaminants in foodstuffs.

2.3.1.3. Specific Standards and Testing:

Microbiological Safety:

- ▶ Testing for microbial contaminants such as E. coli, Salmonella, and other pathogens to ensure safety for use in food production environments.

Heavy Metals:

- ▶ Testing for heavy metals such as lead, cadmium, and arsenic to ensure that coco peat does not introduce these contaminants into the food chain.

Pesticide Residues:

- ▶ Ensuring that coco peat is free from pesticide residues that could be harmful if used in the cultivation of edible plants.

2.3.1.4. Labelling and Documentation:

Product Labelling:

- ▶ Proper labelling of coco peat products, including information on pH, EC, moisture content, and intended use.

Safety Data Sheets (SDS):

- ▶ Provision of Safety Data Sheets for products, detailing the chemical properties, handling, storage, and safety measures.

For precise and detailed regulatory information, consulting the specific EU regulations and directives relevant to the intended use of coco peat is recommended. If the coco peat is intended for use in organic farming or food production, additional standards from relevant EU bodies such as the European Food Safety Authority (EFSA) or specific industry standards may apply.

To export coco peat from Timor-Leste to Europe, several mandatory requirements must be met to ensure compliance with European Union (EU) regulations. These requirements cover product safety, quality, and environmental standards. Here are the key mandatory requirements:

Mandatory Regulations	
Phytosanitary Certificate: Coco peat is a plant-based product, and it must be free from pests and diseases to prevent the spread of plant pests. A phytosanitary certificate issued by the relevant authority in Timor-Leste is required to certify that the coco peat complies with the EU's plant health standards.	Source: (https://ec.europa.eu/food/plants/plant-health_en) European Commission - Plant Health

Mandatory Regulations	
REACH Regulation: If the coco peat contains any chemical substances that fall under the Registration, Evaluation, Authorisation, and Restriction of Chemicals (REACH) regulation, those substances must be registered with the European Chemicals Agency (ECHA). This ensures that any chemical risks are properly managed.	Source: https://echa.europa.eu/regulations/reach [European Chemicals Agency - REACH]
General Product Safety Directive (GPSD): According to Directive 2001/95/EC, all products sold in the EU must be safe for use. This includes ensuring that the coco peat does not pose any risks under normal usage conditions.	Source: (https://ec.europa.eu/info/law/law-topic/consumers/product-safety-and-labelling/product-safety-rules_en) [European Commission - General Product Safety]
Packaging and Packaging Waste Directive: The packaging used must comply with Directive 94/62/EC, which focuses on minimizing packaging waste and promoting recycling and reuse.	Source: (https://ec.europa.eu/environment/topics/waste-and-recycling/packaging-waste_en) [European Commission - Packaging Waste]
Labelling Requirements: Proper labelling is essential to ensure that the product is correctly identified and meets EU standards. Labels must include the product name, origin, quantity, and any relevant safety and usage information.	Source: (https://ec.europa.eu/food/safety/labelling-and-nutrition_en) [European Commission - Food Labelling]
Customs Documentation: Proper customs documentation must be prepared, including a commercial invoice, packing list, bill of lading, and certificates of origin if applicable. Ensuring that the HS code for coco peat (530500) is correctly used is essential for tariff classification and compliance.	Source: (https://trade.ec.europa.eu/access-to-markets/en/content/customs-procedures-import) [European Commission - Import Procedures]
Environmental Regulations: Depending on the production process, there may be additional environmental regulations to comply with, especially related to emissions and waste management. Compliance with environmental standards ensures the product's sustainable production and environmental friendliness.	Source: (https://ec.europa.eu/environment/) [European Commission - Environment]

By meeting these requirements, exporters from Timor-Leste can ensure their coco peat is eligible for entry into the European market. It is advisable to consult the specific EU regulations and guidelines regularly to stay updated on any changes or additional requirements.

2.3.2. The quality parameter of coco peat in the Australian market

To ensure the highest standards are met, the following guidelines and standards can provide a framework for quality assurance:

General Quality Parameter for Coco Peat	
pH Level	Coco peat typically has a slightly acidic to neutral pH, generally ranging from 5.5 to 6.5 . This pH range is suitable for most plants.
Electrical Conductivity (EC)	EC is a measure of the salt content in coco peat. Low EC levels are preferred for horticultural use, ideally below 0.5 mS/cm for high-quality coco peat.
Moisture Content	The moisture content of coco peat should be controlled to prevent mold and bacterial growth. It is usually kept below 20 per cent for packaged products.
Organic Matter	High-quality coco peat should have a high organic matter content, typically above 90 per cent .
Particle Size	The particle size can vary depending on the intended use. Fine coco peat is used for seed starting, while coarser grades are used for potting mixes and soil amendments.
Absence of Contaminants	Coco peat should be free from harmful contaminants such as heavy metals, pathogens, pesticides, and other toxic substances.

2.3.2.1. Regulatory Compliance in Australia:

1. Biosecurity and Plant Health:

- ▶ Compliance with the Department of Agriculture, Water and the Environment (DAWE) biosecurity requirements to ensure that coco peat is free from pests and diseases. Import conditions and treatment methods must be followed to prevent the introduction of biosecurity risks.

2. Organic Farming Standards:

- ▶ For use in organic farming, coco peat must comply with the National Standard for Organic and Bio-Dynamic Produce. This includes ensuring that the coco peat is free from prohibited substances and meets specific organic standards.

3. Contaminants in Food Production:

- ▶ If coco peat is used as a substrate for growing food plants, it must not contribute to the contamination of food products with harmful substances. The Food Standards Australia New Zealand (FSANZ) sets maximum levels for certain contaminants in food.

4. Chemical Safety:

- ▶ Compliance with the Australian Pesticides and Veterinary Medicines Authority (APVMA) regulations if coco peat is treated with any pesticides or chemicals.

2.3.2.2. Specific Standards and Testing:

Microbiological Safety:

- ▶ Testing for microbial contaminants such as E. coli, Salmonella, and other pathogens to ensure safety for use in food production environments.

Heavy Metals:

- ▶ Testing for heavy metals such as lead, cadmium, and arsenic to ensure that coco peat does not introduce these contaminants into the food chain.

Pesticide Residue:

- ▶ Ensuring that coco peat is free from pesticide residues that could be harmful if used in the cultivation of edible plants.

Product Labelling:

- ▶ Proper labelling of coco peat products, including information on pH, EC, moisture content, and intended use.

Safety Data Sheets (SDS):

- ▶ Provision of Safety Data Sheets for products, detailing the chemical properties, handling, storage, and safety measures.

Compliance and Reference:

- ▶ FSANZ: Food Standards Australia New Zealand (for food contaminants)
- ▶ DAWE: Department of Agriculture, Water and the Environment (for biosecurity)
- ▶ APVMA: Australian Pesticides and Veterinary Medicines Authority (for chemical safety)
- ▶ National Standard for Organic and Bio-Dynamic Produce: For organic farming compliance

For precise and detailed regulatory information, consulting the specific Australian regulations and standards relevant to the intended use of coco peat is recommended. If coco peat is intended for use in organic farming or food production, additional standards from relevant Australian bodies such as FSANZ or specific industry standards may apply.





COCONUT TRAINING MANUALS

► Training Manuals

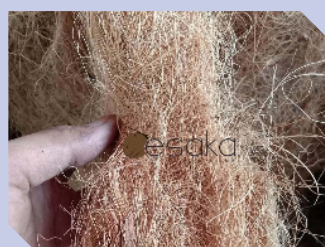
3.1. Coconut Fiber Products

Training videos were made available in ILO YouTube¹ by the EU-funded Agroforestry Skills for Employment and Resilience Project. Training was delivered by Oesaka Indonesia.²

Training videos

► Coconut Fibre & Peat

- Coconut fibre and peat is produced using machines, now also available in Timor-Leste
- The training video is on how to use the machine
- Coconut fibre and peat could also be produced manually
- For video, click on the picture or follow this link: <https://youtu.be/4D4SMen7F0?feature=shared>



► Coconut Rope

- Coconut rope could be use as it is or processed into various kinds of products
- The training video is on how to produce 1 ply coconut rope using simple machines
- Coconut rope could also be produced manually
- For video, click on the picture or follow this link: <https://youtu.be/pfTEsRSVa6Q?feature=shared>



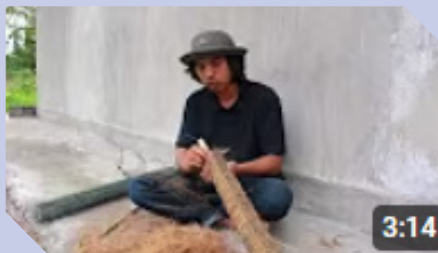
¹ ILO -Timor -Leste - Oinsá atu Produz Produtu Oi-oin hosi Fibra no Kulit Nuun nian - YouTube

² [Oesaka Indonesia: Cari disini](#)

Training videos

► Coconut Pole/ Tutor

- Coconut tutor can be used to support climbing plants such as vanilla
- For video, click on the picture or follow this link: <https://youtu.be/YRmjGASE3NI?feature=shared>



► Coconut Sheet

- Coconut sheet could be use as it is or processed into various kinds of products like bag, pot, hats, etc.
- The training video is on how to produce coconut sheet
- Latex glue currently not available in Timor-Leste
- For video, click on the picture or follow this link: <https://youtu.be/o7SxO51iiqo?feature=shared>



► Thick Coconut Rugs using Coconut Fibre and Rope

- There are various kinds of products could produce using coconut fibre and ropes
- The training video is on how to produce thick coconut rugs/ mats using coconut fibres and ropes. You will find this thick rugs, for example outside hotels
- For video, click on the picture or follow this link: <https://youtu.be/8ybMpssZZzM?feature=shared>



Training videos

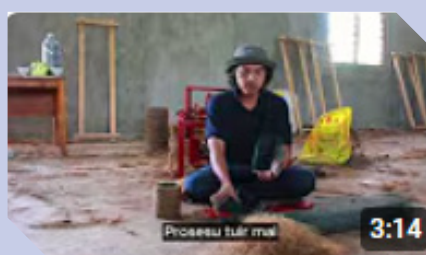
► Coconut Mat using Coconut Rope

- The training video is on how to produce simple foot mat using coconut ropes
- For video, click on the picture or follow this link: <https://youtu.be/Wkby2er6Apw?feature=shared>



► Coconut Pot using Coco Fibre

- Various kinds of pots for plant can be made from coconut fiber
- For video, click on the picture or follow this link: <https://youtu.be/ZcDZKziltmE?feature=shared>



► Coconut Pot using Coconut Rope

- Coconut rope could be used to create various products
- The training video is on how to produce pot for plants using coconut ropes
- For video, click on the picture or follow this link: https://youtu.be/5ZUEk6_qqCc?feature=shared



3.2. Coconut Charcoal

How to make Coconut Briquettes

► How to make Coconut Briquettes

- Step-by-step instructions on how to make Briquettes from Coconut Shell
- Click on picture or follow this link : <https://youtu.be/ZnK9kTi17m8?feature=shared>



Preparation of materials and tools to make the charcoal:

1. 200 Liter Metal Drum:

- This drum will be used for the burning process. It is recommended to use an old or used drum, as long as it is not leaking.
- Ensure the drum is clean from chemicals or flammable paint.



2. Coconut Shells:

- Collect dry coconut shells. These shells are the main raw material. If they are still wet, dry them under the sun until they are completely dry to ensure good burning.

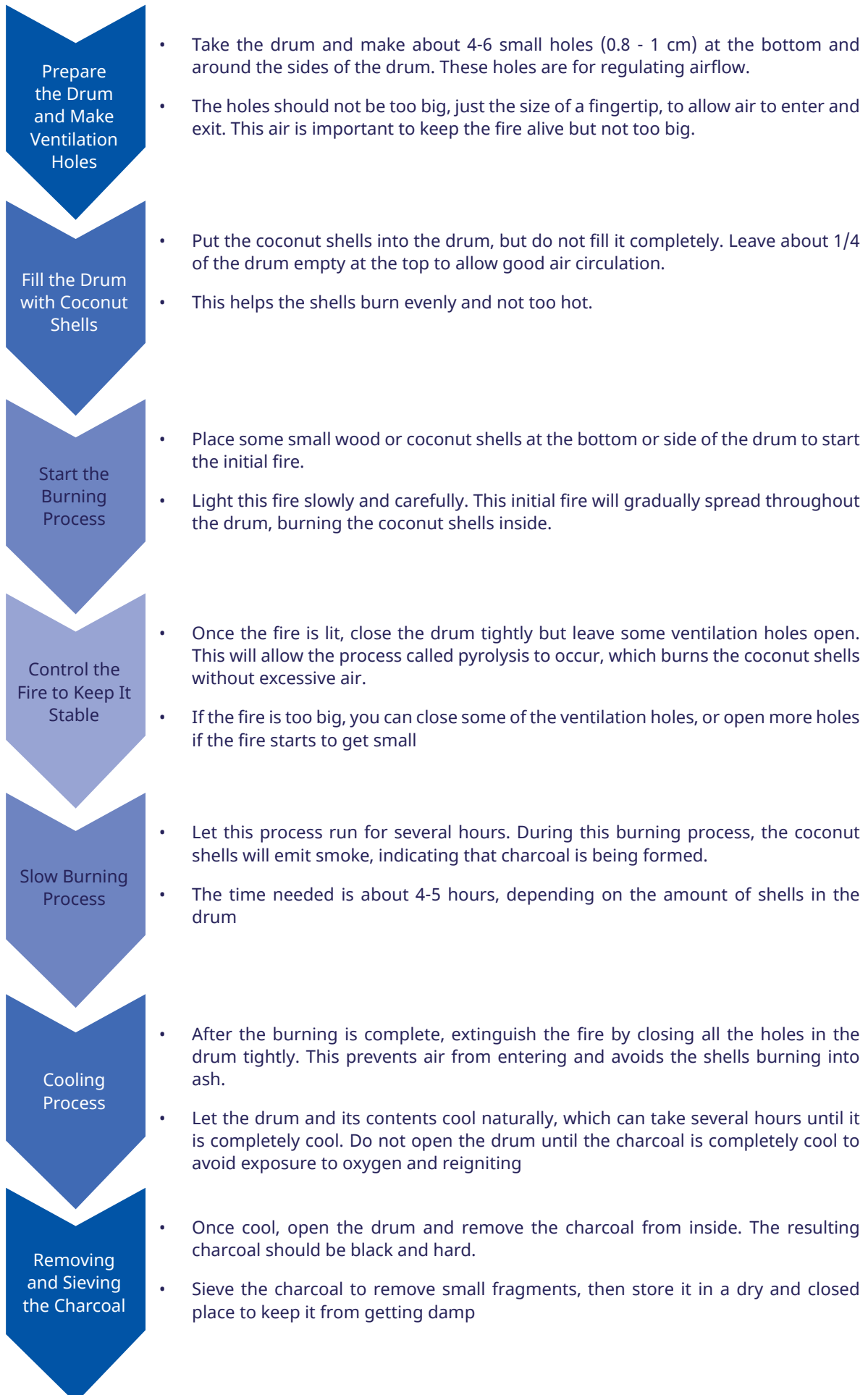


3. Safety Equipment:

- Wear gloves, a mask, and protective clothing to protect yourself from smoke or hot sparks.

Additional Notes for Best Quality

- **Dry the Shells Well:** Wet shells will produce more smoke and result in imperfect charcoal.
- **Control Air Well:** Too much oxygen will turn the shells into ash, while too little will result in undercooked charcoal.
- **Store Charcoal in a Dry Place:** Charcoal exposed to water will absorb moisture and reduce its quality.



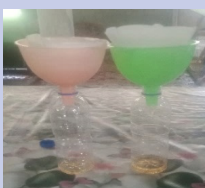
3.3. Coconut Oil

3.3.1. Coconut Crude Oil

Raw materials and equipment required

Raw Materials	Equipment
- Coconut fat (weight/fat) - Water - Oil	- Frying pan - Stove - Spoon - Aqua bottle - A 5L jerrycan - Filter paper - Tin basin - Measuring cup - White linen

Process	Description	Picture	Raw materials and equipment	Picture
PREPARE THE STOVE	Remove the stove from the box; Check the leak turbine and mount the leak;		Fatty oil: used to produce brown coconut oil	
FILL KEROSENE 3L	Place the funnel and pour 3 liters of kerosene into the stove.		Water: used for washing materials and equipment.	
TURN ON THE STOVE	Take a frying pan or iron pan and light it on fire to burn the turbine of the stove.		Kerosene: used to cook the brown coconut oil.	

Process	Description	Picture	Raw materials and equipment	Picture
PREPARE THE FRYING PAN AND HEAT IT UNTIL HOT	Clean the frying pan and place it on the stove to heat.		Frying pan: used to cook brown coconut oil.	
POUR THE COCONUT FAT INTO THE FRYING PAN	Pour the fat into a preheated frying pan.		Stove: used to cook coconut brown oil.	
HEAT THE OIL IN FRYING PAN UNTIL IT TURNS BROWN	Continue stirring until the fat turns into liquid and the oil separates from the brown coconut dregs in the frying pan. Cook until the dregs turn golden.		Spoon: used to stir and drain the coconut oil from the frying pan.	
REMOVE AND POUR THROUGH THE CLOTH	Remove the coconut oil from the frying pan. While holding the white cloth, pour the oil through it into the prepared basin. Let the oil sit until it cools.		Aqua bottle: used to filter oil internally.	
COVER WITH PAPER FILTER 1	Pour the oil into the bottle through the paper filter to remove dregs, residue, fat, and dark particles. This helps prevent the oil from spoiling during storage.		5L jerrycan: used to fill and store the coconut oil.	
COVER WITH PAPER FILTER 2	Pour the first filtered oil through the paper, remove any remaining dirt, fat, and brown residue.		Filter paper: used to filter the coconut oil.	

Process	Description	Picture	Raw materials and equipment	Picture
	The oil will flow quickly into the bottle. Ensure the quality of the brown oil.			
COVER WITH FILTER PAPER 3	Pour the second filtered coconut oil through the filter paper to further remove any remaining fat or impurities. This helps the oil drip more quickly into the bottle. The result is a thicker, smoother oil. With proper filtering and storage, the quality of the coconut oil can last for up to 2 years.		Paper cup: used to measure coconut oil.	
BROWN COCONUT OIL PRODUCTS	The oil products are ready.		Tin basin: used to hold the hot oil after removing it from the frying pan. White cloth: used to cover the brown oil after removal from the frying pan.	 

3.3.2. Virgin Coconut Oil (cold press)

Step 1

Process	Description	Picture	Raw materials and equipment	Picture
Measure 1 liter of water for the second batch (2)	Measure 1 liter of water and add it to the grated coconut from the first press (or batch).		5L jerrycan: used for white and brown coconut oil.	
Pour the coconut oil into the basin containing the coconut grated	Pour the coconut water into the grated coconut in the basin and mix evenly.		White cloth: used for filter and press the coconut.	
Mix until the mixture is homogeneous	Mix the coconut milk and grated coconut until the mixture is homogeneous.		Filter paper: used to filter and purify the oil.	
Fill the cloth and press until dry	Fill the machine or cloth to press for the second time until the coconut milk is extracted. Pour the coconut dregs into the basin.		Tablespoon: used to separate fat and white oil	

Step 2

Process	Description	Picture	Raw materials and equipment	Picture
Remove the jars from the room	Take the jars from the room to the production area for processing the oil products.		Plastic gloves: used to keep the product clean by preventing contact with dirty hands.	
Open the jar lid	Open the jar to begin processing the coconut oil.		Funnel: used to hold filter paper and filter the oil.	
Take the table-spoon to open and remove the fat; and put it in the basin	Use the tablespoon to remove the fatty oil and place it in the basin.			
Prepare the bottles and filter paper	Prepare and clean the Aqua bottle with water to remove any dirt. Rinse thoroughly until clean and allow it to dry completely. Place the funnel into the bottle, then insert the filter paper into the funnel to be used for filtering the oil.			
Drain the white oil and place it in a filter paper until it is finished	Take the white oil and pour it into the filter paper. The filtered oil will drip into the bottle. Continue pouring the white oil from the jar until all of it has been filtered.			

Process	Description	Picture	Raw materials and equipment	Picture
First oil filtration (1)	Filter the first batch of white oil to prevent any fatty oil and impurities from entering. Allow the white oil to drip through until the process is complete.			
Second white oil filtration (2)	Filter the first batch of white oil to prevent any fatty oil and impurities from entering. To ensure the quality of white oil.			
Third white oil filtration (3)	"Filter the third batch of oil to remove any remaining fatty oil and dirt. This step helps ensure the best quality of white oil (VCO), which can be preserved for up to 3 years.			
White Oil Products (VCO – Virgin Coconut Oil)	VCO oil products are ready to use.			

3.4. Feedstock

A simple training manual on the use of coconut dregs as a feed material for pigs and poultry was developed with financial support from the International Labour Organization (ILO) Timor-Leste. This manual aims to facilitate breeders to better understand basic information and simple practices related to the use of coconut dregs as animal feed, particularly for pigs and poultry.

This training manual covers information such as a simple definition or explanation of coconut dregs and the reasons why they should be used. It also presents information related to the following topics: the nutritional value of coconut dregs, their benefits and limitations, how to use coconut dregs as animal feed mixed with other feed ingredients, simple ration formulation, basic methods for calculating protein and energy content, and a conclusion.

Coconut dregs are a by-product of the extraction process of coconut meat to obtain coconut milk and virgin coconut oil. They contain nutritional components such as fat, protein, energy, and fiber, making them a potential feed material for animals, especially poultry and pigs.



3.4.1. Nutritional Value of Coconut Dregs

Key Nutrient Components of Coconut Dregs:

- Fiber
- Carbohydrate
- Protein
- Fat

Coconut Dregs Nutritional Value

Nutrition Component	% Nutrition
Protein	5-6 per cent
Crude Fiber	10-15 per cent
Fat	5-8 per cent
Energy Metabolism	1.800 – 2000 Kcal/Kg

Limitations and Benefits of Using Coconut Dregs

Benefits

- Provides good nutritional value
- Affordable
- Easy to find in areas where coconuts are abundant

Limitations

- Low in protein; must be combined with other feed materials
- High crude fiber content may hinder digestion
- Most effective when used in combination with other feed ingredients

3.4.2. Mixing Coconut Dregs with Other Feed Ingredients

Coconut dregs can be used directly or dried before use to make handling easier. The drying process involves placing the coconut dregs under the sun

Coconut dregs need to be mixed with other feed materials before being offered to animals. This is important to improve the overall nutritional quality and to ensure a balanced diet, particularly by providing sufficient protein and energy to meet the needs of pigs and poultry.

Feed materials often used by animal owners to mix with coconut dregs include:

Corn



Cassava



Rice Husk



Fish Powder



Lamtoro leaf powder



Animals Blood Powder



3.4.3. Simple Method on How to Formulate Animal Feed

Before formulating animal feed, there are two important aspects we need to understand:

- Nutritional value of the feed materials to be used
- Nutritional requirements of the animals we are raising

Key information in the table helps livestock owners determine the composition of each feed ingredient used to formulate rations.

1. Nutritional Value of Feed Materials for Animals

Nutrition Component	% Nutrition
Protein	5-6%
Crude Fiber	10-15%
Fat	5-8%
Energy Metabolism	1.800 – 2000 Kcal/Kg

Feed Materials	Protein Value (%)	Energy Value (Kkal/Kg)
Corn	8-10	3.300-3.400
Coconut Dregs	5-6	1.800-2000
Casava	2-3	3.000-3.200
Rice Husk	12-14	2.500-2.800
Fish Powder	60-65	2.800-3.000
Animals Blood Powder	80-85	2.500-2.800
Lamtoro Leaf Powder	20-25	2.000-2.200

2. Nutrient Requirements for Local Poultry and Pigs

Components	Week 0-12	Week 12-22	Week > 22
Protein (%)	15-17	14	14
Energy (kkal/kg)	2.600	2.400	2.400-2.600

Components	Heavy 10 Kg	Heavy 20-30 Kg	Heavy 35	Heavy > 35
Protein (%)	16-18	16	12	10
Energy (kkal/kg)	3.200		3.100	

Composition of Feed Materials and Calculation of Nutritional Value

Example a. Composition of Each Feed Material in Ration Formulation

Feed Materials	Composition (%)	Ration Mixing Example 10 Kg
Coconut Dregs	25%	$10 \times 25\% = 2.5 \text{ Kg}$
Corn	40%	$10 \times 40\% = 4.0 \text{ Kg}$
Fish Powder	5%	$10 \times 5\% = 0.5 \text{ Kg}$
Rice Powder	20%	$10 \times 20\% = 2 \text{ Kg}$
Lamtoro Leaf Powder	10%	$10 \times 10\% = 1 \text{ Kg}$
Total	100%	10 Kg

Calculation Example

Calculation of protein value:

Coconut Dregs	0.25×6	= 1.5% (Protein Contribution of Coconut Dregs)
Corn	0.40×9	= 3.6% (Protein Contribution of Corn)
Fish powder	5×60	= 3.0% (Protein Contribution of Fish Powder)
Rice powder	20×12	= 2.4% (Protein Contribution of Rice Powder)
Lamtoro	10×20	= 2.0% (Protein Contribution of Lamtoro Leaf Powder)
		12.5% (Protein Contribution of Materials from All Feed Ingredients)

Example b. Composition of Each Feed Material in Ration Formulation

Feed Materials	Composition (%)	Ration Mixing Example 10 Kg
Coconut Dregs	20%	$10 \times 20\% = 2.0 \text{ Kg}$
Corn	50%	$10 \times 50\% = 5.0 \text{ Kg}$
Fish Powder	15%	$10 \times 15\% = 1.5 \text{ Kg}$
Rice Husks	15%	$10 \times 15\% = 1.5 \text{ Kg}$
Total	100%	10 Kg

Calculation of protein value:

Coconut Dregs	20×1.900	= 380 Kkal (Protein Contribution of Coconuts Dregs)
Corn	50×3.350	= 1.675 Kkal (Protein Contribution of Corn)
Fish Powder	15×2.800	= 4.20 Kkal (Protein Contribution of Fish Powder)
Rice Powder	15×2.500	= 375 Kkal (Protein Contribution of Rice Powder)
		Kkal (Total Energy from Coconut Dregs, Corn, Fish Powder, and Rice Powder)

CONFIRM WHETHER THE TOTAL ENERGY OF THE FEED MEETS THE ANIMAL'S ENERGY REQUIREMENTS

If it's sufficient: = Start mixing or prepare feed for the animals.

If it's not sufficient: Make adjustments to the composition of the feed materials being prepared.

Calculation of protein value:

Coconut Dregs	20 x 6	= 1.2% (Protein Contribution of Coconut Dregs)
Corn	50 x 9	= 4.5% (Protein Contribution of Corn)
Fish Powder	15x* 60	= 9.0% (Protein Contribution of Fish Powder)
Rice Powder	15 x 12	= 1.8% (Protein Contribution of Rice Powder)

16.50% (Protein Contribution of Materials from All Feed Ingredients)

CONFIRM WHETHER THE TOTAL ENERGY OF THE FEED MEETS THE ANIMAL'S ENERGY REQUIREMENTS

If it's sufficient: = Start mixing or prepare feed for the animals.

If it's not sufficient: Make adjustments to the composition of the feed materials being prepared.

Important Note on Using Coconut Dregs

The use of coconut dregs for pigs should be between 5–25%, depending on the growth phase. For poultry, the recommended range is between 10–20%.

Steps in the process of mixing feed materials

steps to prepare animal rations by mixing feed materials include:

1. Determine the total amount of ration to be produced (Example 10 Kg)
2. Calculate the portion of each feed material to be used (Corn, rice powder, coconut dregs, fish powder)
3. Prepare feed materials
 - a. Hygiene, Filter (if needed)
 - b. Remove debris and impurities (such as small stones and other foreign materials).
 - c. Crush the feed materials so they are uniform in size.
 - d. Mix the feed materials.
 - e. Use a machine (feed mixer) or mix manually
 1. Start with the feed material that has the largest proportion (corn) as the base.
 2. Follow with the feed material that is in the second largest quantity.
 3. Finally, add feed materials in smaller quantities, ensuring good distribution.
4. Start the mixing process until the feed materials are well mixed (Fully Homogeneous)
 - a. Examining consistency (no longer detecting each feed material in the ration)
 - b. Send to the laboratory for testing if possible.
 - c. Examining uniformity of color and texture by visualization

5. *If the ration is to be processed into pellets::*
 - a. *Prepare machine conditions to pellet (Feed Mixture)*
 - b. *Mix the ration with a little warm or warm water to maintain moisture (5-10%) soften the pellet, strengthen the pellet texture and digestibility.*
6. *Start the process of mixing and compressing the ration to produce pellets (size of pellets, depends on...)*
7. *Spread the pellet on dry, clean medium to reduce moisture. To prevent mold growth, moisture should not pass through 12%.*
8. *Storage: store pellets in an airtight container or carton, store in a dry place and away from pests such as flies.*

Prepare feed materials and equipment

Prepare feed materials and equipment

Feed Materials	Measure Using Scale
Corn 	$10 \times 20\% = 2.0 \text{ Kg}$
Coconut dregs 	$10 \times 50\% = 5.0 \text{ Kg}$
Fish Powder 	$10 \times 15\% = 1.5 \text{ Kg}$

Feed Materials	Measure Using Scale
Rice Powder 	$10 \times 15\% = 1.5 \text{ Kg}$
Total: 10 Kg Protein = 16.5% Energy = 1850 Kkal	

Coconut Dregs is considered as a feed material for monogastric animals (Pigs and Poultry) that has good nutritional value, is easily available in areas with abundant coconut plantations, and at a reasonable price. Combining Coconut Dregs feed materials with other feed materials for animals, poultry and pigs can help reduce the cost of preparing and supplying animal feed and at the same time can maintain animal productivity.

The process of producing pig feed

Raw materials and equipment required

Raw Materials	Equipment
• Dry coconut dregs	• Mortar and Pestle
• Dried Fish	• Blender
• Green Bean	• Pellet Machine
• Rice Powder	• Plastic Bag
• Corn Powder	• Sack
• Tapioca Powder	• Scale
	• Big Bucket
	• Tarpaulin
	• Corn Stone
	• Needle for sewing rice sacks and candle for sealing plastic tightly
	• Cotton

Process	Description	Picture	Raw materials and equipment	Picture
Step 1				
Pound or grind the fish into powder.	Dry the fish until it is very dry. Use a blender or mortar and pestle to make the into powder.		Dried Coconut Dregs: used for mixing in animal feed.	
Pound or grind the green beans into powder.	Dry the green beans until it is very dry. Use a blender or mortar and pestle to make the into powder.		Dried fish: used to adulterate animal feed	
Measure Raw Materials	Measure : - Rice husks 300 gr - Coconut dregs 200 gr - Corn powder 200 gr - Green bean 100 gr - Fish powder 100 gr - Tapioca 100 gr		Green beans: used as an ingredient in animal feed mixtures.	
Mix the raw materials until the mixture is homogeneous.	The measured raw materials are placed on a tarpaulin or in a basin and mixed until homogeneous.		Rice husks: used as an ingredient in animal feed mixtures.	
Animal Feed products – Ready for Use	Fill the sack, and the animal feed products are ready		Corn Powder: used as an ingredient in animal feed mixtures.	

Process	Description	Picture	Raw materials and equipment	Picture
Step 2				
Bring it to the production room	Bring the mixed product to the production room.		Tapioka Powder: used as an ingredient in animal feed mixtures.	
Operate the pellet machine	Check and operate the pellet machine before use.		Mortar and Pestle: used to pound fish.	
Dry the pellets	Dry the pellets under the sun.		Blender: used to grind green beans.	
Add each kilogram into the machine	Load the mixed product into the machine, per kilogram.			
Pellet production process	Shape the mixed feed into pellet products.		Pellet machine: used to produce Pellets	

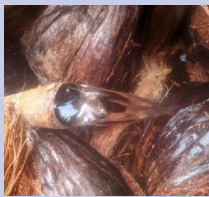
Process	Description	Picture	Raw materials and equipment	Picture
Pellet products – Ready for Use and Sale	The pellet products are ready for use and sale.		Plastic bag: used to pack animal feed in small quantities. Sack: used to store large quantities of animal feed	
Weigh pellet	Weigh 1 kilogram of pellet and place it into a plastic bag or sack, then seal it (depending on the order).		Scale: used to weigh raw materials and products.	
Pellet products – Ready for Use and Sale	The pellet products are ready for use and sale.		Large bucket: used for mixing small quantities and for washing equipment.	
			Tarpaulin: used to dry corn and green beans, and to mix raw materials for animal feed.	
			Candle: used to seal plastic bags.	

3.5. Organic Fertilizer

Processing coconut peat for fertilizer

Raw materials and equipment required

Raw Materials	Equipment
Coconut skin	Machete
Water	Water Tank
	Large Basin
	Bucket
	Coco peat machine
	Sack or plastic bag
	Scale

Process	Description	Picture	Raw materials and equipment	Picture
Step 1				
Soak the husks in the tank for 24 hours	Soak the coconut husks for 24 hours to soften them, remove dirt, reduce tannins (brown color), and minimize smoke during production.		Coconut husks: used to produce coco peat.	
Take out the husks and dry them	Remove the coconut husks from the tank and drain the water from the husks. Soak for 1-2 hours.		Water: used for washing and soaking raw materials.	
Bring the husks to the production room	Fill the husks into a sack or a basin and bring them to the production room.		Machete: used to open coconuts.	

Process	Description	Picture	Raw materials and equipment	Picture
Put the coconut husks one by one into the grinding machine.	Put the coconut husks one by one into the grinding machine until they become fine (coco peat).		Water tank: used to soak coco peat	
Coco peat products	The prepared coco peat product will be transferred to the filtering area.		Large basin: used to put coco peat and also to wash the product.	
Step 2				
Add the coco peat to the filter machine	Filter the crushed coconut husks again using the filter machine to separate any remaining coconut fibers included in the coco peat.		Bucket: used to carry water, store coco peat, and take it to dry.	
Fill the coco peat into a bucket or sack.	Fill the coco peat into sacks or buckets to make it easier to carry to the fermentation area (soaking).		Coconut peat machine: used to grind or crush coconut husks.	
Step 3				
Carry the coco peat to the water tank	Carry the coco peat to the soaking area.		Sack/plastic bag: used to store and package the product for sale.	
Add the coco peat to the tank and fill it with water until it is full	Add coco peat to the tank or inside bucket B2, then add water until full. Stir until all the water is absorbed.			

Process	Description	Picture	Raw materials and equipment	Picture
Soak for 24 hours	Soak for 24 hours to remove or reduce tannins (brown color) from the coco peat.			
Step 4				
Remove and wash until the brown color is gone	Remove the coco peat from tank or bucket B2, then wash and rinse it 3–4 times to remove the tannins (brown color). After washing, place the coco peat in a bucket and take it to the bathroom for further processing.			
Step 5				
Remove and spread until dry	Remove the coco peat from the bucket and spread it on a tarpaulin or iron sheets until dry, which can take 1 to 5 days depending on sunlight or climate conditions.			
Weigh coco peat	Weigh 1 kilogram of coco peat and place it into a plastic bag or sack, then seal it (depending on the order).			
Coco peat products	Coco peat products are ready for use or sale.			



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