Uses of cocoyam pdf

Cocoyam has a high nutritional value when compared to others such as cassava and yam, with large vitamins, minerals and protein content. As a relatively well-known staple crop in underdeveloped and developing countries, it can serve as a weaning food and its leaves are sometimes used as vegetables for cooking. Cocoyam belongs to the Araceae family and several species including Xanthosoma sagittifolium, taro, Alocasia, tannia, Amorphophallus, Colocasia esculenta, eddoe or eddo (Colocasia antiquorum), tarul, arum, elephant ears, Alocasia macrorrhis, alocasia macrorrhis, alocasia Akar cocoa and crop Many of them offer high nutritional benefits that can help bridge the gap and balance certain nutritional needs. Among the beneficial roots and tapioca crops are cocoa. It is aroid because it is grown mainly for edible corms, however, their leaves can also be used for both medical and culine purposes. This root crop was originally from tropical and sub-tropical countries and studies revealed that it was among the least studied root plants. It is mostly plunted in countries such as Nigeria, Asia, the Pacific Islanders, Ghana and Japan due to its high stakes. It produces two edible parts i.e. corems (tapioca) and leaves containing approximately 25% of starch and are consumed mainly as thickeners, pure or whole. Cocoyam is a great source of dietary fiber and canji that can generate energy to the body. Surveys report that cocoa production has increased significantly from the 1990s until now and this number is expected to increase even more. The highest proof of cocoa production is recorded in Africa with minorities from Asia and the least part of the Caribbean. Cocoyyam is usually available year round with other similar staple root crops such as yam, potatoes and cassava. Cocoa bears corms, stems and leaves, however, they are distinguished by their leaf attachments as some species have their leaves appearing near the centre while others have their trunks attached. Like any other crop and plants, cocoa is vulnerable to pesticidal attacks and common pests including slugs that attack the corpses thereof providing the entrance for micro-organism attacks. Moreover, pesticid attacks can cause the quorum to begin to decay two weeks after the wing. Cocoa can also suffer losses after harvest due to mechanical damage and microbial attacks on the corpse during storage. Insecticides and cocoa microbes can be prevented by using bacterial poisons, insecticides, disease-free cultivation materials, fungicides and proper cultivation methods. NUTRITIONAL VALUES OF COCOYAMCocoyam kanji, which makes them an excellent source of carbohydrates. It contains dietary fiber and a higher protein content than the majority of tropical root crops. It also contains thiamine, calcium, niacin, manganese, B vitamins, vitamin C, C, E, magnesium, copper and riboflavin. Consuming nutrient-packed foods such as cocoa is essential for maintaining a healthy immune system, which helps our body to use proteins, carbohydrates and other nutrients in the foods we eat. Dietary fiber maintains a healthier digestive process and helps in a simple stool pathway. BENEFITS OF COCOYAM cocoa (TARO| COLOCASIA ESCULENTA)PurposesCocoyam Cuisine can be eaten in different ways through grilling, cooking, funneling, burning, pounding and manufacturing etc. Cocoa can also be processed into a variety of food products used for industrial and dying purposes. Africans usually combine cocoa and use them as a thickener for baking and cooking soups such as oha soup and bitter leaf soup and so on. It can also be cooked as porridge and leaves can be used for cooking soup. Suitable for diabetics An interesting question that usually appears is if a diabetic can eat cocoa? The answer is YES! This is based on the following reports from great researchers who have studied the effects of cocoa on diabetics. Ekwe et al., (2009) reported that cocoa has minimal starch seeds that are easily digestible and therefore make it an ideal source of carbohydrates for diabetics. Furthermore, Eleazu et al., (2013) past works on the potential ameliorative cocoyam (Colocasia esculenta L.) and plantain unripe (Musa paradisiacal L.) on the growth of kidneys and liver in diabetic mice Stemming from streptozotocin supports that diabetics can eat their studies show that the consumption of cocoa and plantain unripe flour to manage diabetes mellitus can be a breakthrough in the search for plants that can prevent the development of diabetes nephropathy. Help Easy DigestionEmmanuel-Ikpeme et al., (2007) reports that cocoa starch cereals are relatively small, which shows why they help simple food digestion. Due to its simple discourse factors for cocoa, these root crops are suitable for producing baby food as well as food for patients recovering from diseases. Gluten-free Cocoyam is suitable for individuals who are allergic to gluten. DiseasesEmmanuel-Ikpeme et al., (2007) reveals that cocoa starch is suitable for patients with pancreatic disease, peptic ulcer patients, patients with gallbladder disease, individuals with chronic liver problems and patients suffering from inflammatoric bowel disease. PURCHASE GUIDE1. Check the corpse carefully to ensure that the corpse is firm and you are satisfied with the healthy.2. It is the right claim that the softness of the corpses either partially or whole is a clear sign that cocoa is damaged.3. Press the right round corm to ensure that the firmness is indiscrigious.4. Make sure you buy the cocoa have as many cracks and physical wounds as you can. REFERENCE1] Braide W. and Nwaoguikpe R. N. (2011), Ethanol Production from Kokoyam (Colocasia esculenta), International Journal of Plant Physiology and and Vol. 3(3), pp. 64-65.2] Eleazu C. O., Iroaganachi M., and Eleazu K.C. (2013) Ameliorative Potential of Cocoyam (Colocasia esculenta L.) and Unripe Plantain (Musa paradisiaca L.) on The Weight of Relative Tissue streptozo indebted Diabetes Rats, Journal of Diabetes Research, pp.1-4.3] Ekwe K, Nwosu K, Ekwe C, Nwachukwu L (2009). Check the poorly fortunate koko values (Colocasia and Xanthosoma spp.) to improve the safety of home-filled food, food and the economy of InNigeria. In: Jaenicke H, Ganry J, Zeledon Hoeschle I, Kahare R (eds). The proceedings of the International Symposium on underused lojis are used for food safety, income and mampan development. ActaHorticulture 86: 71-78.4] Eleazu, C. O., Iroaganachi, M. and Eleazu, K.C. 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Babalola 2 1Department of Animal Expenditure, University of Ilorin, Nigeria2Department of Mercu University of Animal Science, Omu-Aran, Nigeria Correspondence to: D. F. Apata, Department of Animal Expenditure, University of Ilorin, Nigeria.Email: Copyright © 2012 Scientific & Scientific Academic Publishing. The copyright is preserved. Abstract As a search for alternative energy sources for non-ruminants continues, this study was carried out to examine the potential value of cassava utilissima Pohl.), potato tapioca (Ipomea boundaries Poir.), cocoyam (Xanthosoma sagittifolium Schott.) and their ancillary products as supplements for non-ruminants. Studies on these roots and tapioca show that, based on dry weight, contains 2.0 – 7.9% of raw protein, 0.3 – 3.1% crude fiber and 72.4 – 77.9% starch. The practical use of these roots and tapioca in non-ruminant feeds is generally low. This level of consumption is caused by low protein and dry matter and potentially toxic cyanogenic glycosides in fresh and irritating cassava in cocoa. Processing techniques such as fermentation, soaking, boiling, twisting and drying the sun are used to remove eliminated substances, and the effects on animals. Comparable performance of pigs and poultry is fed various levels of roots and tapioca and their ancillary products with those maintained on corn indicate that they can be used as a substitute in a non-ruminant diet at a certain level without adverse effects. To achieve the increased consumption of these root crops and their ancillary products to grab replacement in non-ruminant intensive production systems, adequate protein supplements and proper processing are essential. Keywords: Small Products, Cassava, Cocoayam, Non-Ruminant, Largest prostituted Sweet Potatoes Cost in livestock production are spent on feeding, except for ruminants whose feeds are based on grass. In non-ruminant animals such as pigs and poultry, feed ingredients represent 65 to 70% of the total cost in Nigeria's intensive production system as in many developing countries.[1]. Energy sources are between 45 and 60 percent of finished feed for these animals[2], and currently, corn is a commonly used source of energy in livestock feed.[3]. The growing pressure on the consumption of corn by human population and feed manufacturers coupled with the cost of corn changing with this year's time, thus turning cereals into either difficult or expensive, stimulates the use of alternative energy sources that can be found locally, especially the roots of starch and tapioca that overflow in many areas in addition, their products such as kupas , grapes and leaves are uncompressive feed ingredients that can be developed as chicken components and pig feed. Although roots and tapioca are an inexpensive source of energy, the extent of their practical use in non-ruminant nutrition has been limited. For example in Nigeria, 5% of total cassava production is used as food. The presence of toxic cyanogenic glycosides and other unwanted ingredients, dry product dustiness, mouldiness during processing and high fiber peel accounts for low consumption in non-ruminant production. [4, 5]. Recently, emphasis has been placed on cassava programs, curtain potatoes and cocoa cultivation, and many types of high-producing kasava have been developed and released through improvement efforts of the International Institute of Tropical Agriculture (IITA) and other cooperation institutions, indicating that production that exceeds direct human consumption will be available for eating farm animals in Nigeria. This paper examines the potential value and constraints to increase the consumption of these roots and tapioca and their ancillary products as supplements for non-ruminants and fish. In addition, this paper refers to ways that can increase the use of this feed source. potatoes and cocoa are planted as staple food crops. They are competent in producing food energy. More than 228 million tonnes of cassava were produced worldwide in 2007, where Africa accounted for 52%. In 2007, Nigeria produced 46 million tonnes making it the world's largest producer (Table 1). The yield of sweet potatoes is 15-20 tons per hectare and cocoa gives 25-30 tons per hectare of corn depending on the density of planting. Table 1. World cassava production (-000 tons) Roots, tapioca and their products are a source of valuable nutrients (Table 2). They share some nutritional properties that are serious limitations for their practical use in the diet of chickens, pigs and fish, if they are compared to cereals that are food ingredients. The most important of these limitations are as follows:(i) Everything is a succulent substance with low dry material content (25-32 per cent). This makes preservation, transportation and general handling costs more difficult. (ii) All of them have starch to be the main component with low protein (2.7-7.9 per cent) which clearly requires sufficient protein supplements. (iii) Roots and products by-products tubes (peel, leaves and grapes) are high in raw fiber (12.1 – 16.0%). With a high level, the use of exogenous enzymes suitable for lowering fiber is needed for better consumption by non-ruminants[7]. (iv) Some of them contain toxic/anti-nutritional factors (Table 3) such as cyanogenic glycosides (linamarin and lotaustralin) in cassava that cause bitter taste and reduce root reliability. Cocoyam contains irritant/acridity substances that cause burn sensations. Unwanted substances must be eliminated through several types of processing such as fermentation, grating, boiling or drying the sun before being fed to animals to reduce the risk of erroneousness. (v) Microbial pollution is caused by high humidity content. The drying of the sun these substances in a humid environment, especially during bad weather, results in the proliferating proliferating of microbial organisms in food ingredients. It is important to have dryers and silos to reduce changes and deteriorating pollution. (vi) Dry root dustiness and tapioca flour can cause respiratory irritation unless food is added or palm oil added. Food is a complex ingredient that contains many chemical compounds, more than 50 of which are needed to nourish the body. These nutrients include water, protein, lipids, carbohydrates, minerals and vitamins. Most plant foods consist of natural compounds or anti-nutrients that appear to work generally in defence against herbivores and pathogens. Anti-nutrients are potentially dangerous and raise genuine concern for human and animal health because they prevent digestion and absorption of nutrients. They may not be such toxic, but can reduce the nutritional value of plants cause an important nutrient deficiency or prevent complete digestion when eaten[14]. The most common anti-eating factors known and studied in the roots and yams cyanogenic glycosides, saponins, phytate, oxalate, enzyme perencat and alkaloid amounts (Table 3). They must be activated or removed before it is suitable for non-ruminants or fish. [15, 16]. Cyanogenic glycosides or cyanogens are glycosides of 2-hydroxynitriles synthesized and stored in cassava and widely circulated among plants[17, 18]. The peeled component has the highest density of cyanogenic glycosides in cassava (Schedule 3). In yam koko, Abdulrashid and Agwunobi[11], Olajide, et al[13] reported wide variations (2.10 – 17.13mg/100g) in this unincluted level of ingredients. Cyanogenic glycosides hydrolysis secretes hydrogen cyanide (HCN), which prevents some enzyme systems, the growth of moodiness through interference with certain important amino acids and the use of related nutrients[2, 21]. Cytochrome oxidase, is the main site of action for ingested cyanide, effective perencat many metalloenzymes[22]. Oxidase cytochrome enzyme in mitochondria cells inactive by hydrogen cyanide binds to Fe^{2+}/ Fe^{3+} contained in the enzyme. This results in a reduction in the use of oxygen in tissues[23] and the bulation of oxygen at the cellular stage, caused by the effects of cyanide poisoning, resulting in death. Respiratory failure is therefore the cause of death since the central nerve cells of the respiratory system are highly sensitive to hypoxia. Other diseases related to the taking of edified cyanide include (i) konzo (Cliff et al 1997), a paralytic disease; (ii) tropical ataxic neuropathy (TAN)[25], a nerve disorder that damages nerves that causes a person to be unstable and not aligned; (iii) goiter and cretinism. Sheeba and Padmaja[21] note that the proximity and life span of cassava products may extend with processing. Cyanogenic glycosides and hydrogen cyanide are also reduced to a more safe limit by processing (peeling, peeling, boiling, exploring) prior to use[27, 28]. Schedule 2. Composition of their roots, yams, products and seeds (% dry matter) Schedule 3. Symptoms and ways of removing toxic components of the Root, Yams and Physical acids of their products, i.i. hexaphosphate myo-inositol, are very common in the loji kingdom. Physical acid is the primary storage of phosphorus in plants, accounting for up to 80 percent of the amount of phosphorus[30, 31]. Physical acid has been found in cassava root[32] and yam koko[13] to stages 62.4 and 1.75g/100g. Josefsen et al.,[33] reported that the phosphates negatively charged in phytic acids strongly bind to metal kasi (e.g. Ca, Fe, K, Mg, Mn and Zn) and form a mixed salt called phytin or phytate. Phytates form complexes that are not resolved because they are negatively charged under physiological conditions. These complexes cannot be suppressed or absorbed in the gastrousus tract of monogastric plants due to the absence of intestinal phytoase enzymes. Lack an important mineral in monogatric animals can be a result of cations tied to physics acid salts and low phosphorus bioavailability[35, 36]Oxalis plants, commonly known as wood sorry, provoking oxalic acid, powerful organic acid that has been found to be widely distributed in plants]. Up to 45.30g/100g was found in cocoa tapioca[13]. Strong bonds are formed between oxalic acids and various other minerals, such as calcium, magnesium, sodium and thorny[38, 39]. Oxalis plants, commonly known as wood sorry, provoke oxalic acid, a powerful organic acid found to be widely distributed in plants[37]. Up to 45.30g/100g was found in cocoa tapioca[13]. Strong bonds are formed between oxalic acids and various other minerals, such as calcium, magnesium, sodium and thorny[38, 39]. This combination of chemicals results in the formation of oxalate salt. Salt formed from oxalic acid is known as oxalate: for example, calcium oxalate. Some oxalate salts, such as sodium and potassium, dissolve, while calcium oxylate salt is essentially not soluble. Non-soluble calcium oxalate has a tendency to preciate (or strengthen) in the kidneys or in the urinary tract, thus forming sharp calcium crystals when the level is high enough[40]. These crystals played a part in the formation of kidney stones[39]. When oxalic acid is consumed, it irritates the intestinal lining and can prove fatal in large doses. Most taro cultivars have astringent flavors and can cause swelling of the lips, mouth and throat if consumed are not processed. This is due to crowded oxalate crystals, such as needles, oxalate calcium crystals, which can penetrate soft skin[40]. Both tapioca and leaves can give this reaction[41] but this effect is reduced by cooking[40]. Chicken feeds constitute more than 90 percent of all commercial livestock feeds produced. The use of cassava as a corn substitute therefore will have the biggest impact if it can be put into commercial chicken feed. Certain precautions should be taken to achieve satisfactory stock performance on a cassava-based diet. These include the removal of cyanides, higher protein supplements with fish foods, sobu nuts, groundnut cake or methionine in pure form and the prevention of microbial activity during sun drying as well as overcoming dustiness. Most studies now show that satisfactory growth response has been obtained for chickens growing at 10% of the establishment of cassava flour (lafun) or peel cassava into the diet; 40% entry of cassava flour or 20% entry of cassava skin in the diet of layers is satisfactory for the production of eggs[2]. A combination of cassava roots and leaves in a ratio of 4:1 can replace corn in chicken diets and reduce food costs without decrease weight gain or egg production[42]. Feeding cassava chips coupled with moringa oleifera leaf dishes at level 5 and 10% indicates that cassava chips replace corn at 55.56 and 83.33% in diet diets has no negative effect on productivity and hematology when 5% Moringa oleifera leaf dish is added. Cassava can be fed to pigs as well as fresh or parboiled (as is commonly practiced in small and simple pig fields), or put on a diet as a dry dish. Due to the high humidity level, fresh cassava is not insioned to feed suckling and weaning pigs. Also, in the initial pig diet, cassava dishes should be limited due to potential problems with their legating and powdery properties that can affect the respiratory organs. This can be dealt with with pellets. The use of peeled cassava as a side substitute for corn in the diet of young pigs is effective and up to 57% entry rate has no lasting effect on pigs. Reports of increasing endfish are fed a diet coupled with groundnut cake, fish food and dried beer seeds in which cassava or cassava peeled foods replace 60% or 100% corn, each showing no adverse effect on performance and the economy replacing corn with cassava or byproducts depending on the additional price of protein that can provide sufficient profit margins. The authors conclude that 40% of cassava entry into the growing pork diet can be implemented in terms of economics. Ospina et al[46] found that pigs feed cassava root food advertising libitum, combined with 200g/day of raw protein over an increasing period of endmatation providing acceptable growth performance and carcass quality. Kanji in cassava are highly filled when compared to corn due to their high amylopectin content. Therefore, Cassava may be used as a source of energy in fish food, but attention should be paid to the low protein, metabolizable energy and hydrogen cyanide (HCN) content in cassava products. Studies of cassava food use in fish foods[48 - 50] show that cassava can replace conventional energy food ingredients such as corn, broken rice and sorghum, which are commonly used in the diet of captives in most africans. Cassava has been successfully used to replace corn in Clarias gariepinus fingers – 50% replacement[3]; C. advanced fried garieipinus[52] and hybrid keli fish (Hetero X Clarias) – 66% replacement.[53] The overall inclusion of cassava root dishes in the fish diet promotes growth and survival. Therefore, fish farmers can use this material as a substitute for more expensive corn when formulating food for fish in aquaculture. Peel Cassava can be used to reduce expenses and lead to active development and mampan in livestock production. Some workers[55 -57] recommend the inclusion of peeled cassava up to 15% in broiler diets without any effect For reasonable performance of animals fed a kasava-based diet, rations must be balanced nutrition and with protein sources containing sufficient sulfur-containing sulfur.[58]. In a study on the influence of protein sources on performance and Meat chicken on a cassava peel-based diet using fish cakes and peanuts, Egbunike et al[59] reports that meat chicken can be raised on a cassava-based diet using ground cake as a source of protein without any adverse effects on performance indicators. Also, Sogunle et al[60] examines the rejection of entry cash nuts and cassava peel dishes in a growing pullet diet and concludes that a combination of 10% cassava peel dishes and 30% cash beans push food is ideal for increased pullet performance. Cassava, one of the world's top calorie producers for human consumption, is generally grown without fertilization on the ground with poor fertility and can survive a prolonged water deficit[61], it tolerates acid soil, but the result is limited by a weak supply of phosphorus (P) Cassava is grown mostly for its tubed roots, leaving leaves leaves to sail after harvesting the roots. However, it is possible to get out of cassava leaving more than 6 tons of ha^{-1} $year^{-1}$ raw proteins with the right agronomical practices directed towards foliage uves[5]. Cassava leaves contain high levels of raw protein, vitamins and nutritional minerals[63, 64]. The nutritional limitations of cassava holidays include HCN content, low digestible energy, humidity and possible high tannin content[65]. Inherent sianogenetic glycosides can limit their use as a non-ruminant feed. Cyanogenetic glycosides, influenced by the nutritional status and age of the plant[66], and higher levels of HCN are found in leaves from bitter than sweeter varieties[67]. However, the concentration of HCN and the market associated with high cyanogenetic glycosite content in leaves[68] decreases with the maturity of the leaves. The two most widely used processing methods are sun drying and enciling. In humid tropes, especially in wet seasons, sun drying is difficult and can result in the production of low-quality products with severe Aspergillus and aflatoxin pollution. Involving leaves requires chopping into small pieces (2-3cm), then mix with extras and add regular salt at 0.5% and store in a two-month tight-sealed plastic bag of air can reduce HCN content by up to 80% of the original concentration. In chickens it was reported that chickens could tolerate a diet containing 141 mg of kg^{-1} volume without any negative impact on growth performance[65]. According to Fasuyi and Aletor[69] con concentrated cassava leaf proteins can replace up to 60% of fish dishes without any negative effects on the performance of growth, haematology and metabolite serum starting broiler. In pigs, the inclusion of 15% of fresh cassava leaves in the diet has no adverse effects on growing finishing pig[70]. Dry or ensiled cassava leaves were used at 16.5% and 20% respectively in the diet without significant impact on the growing performance and characteristics of pig carcasses[71]. However, Ravindran[72] reports depression in weight gain and food efficiency when Leaf feed is inserted up to 30% in the diet for growing finishing pigs. Khieu Borin et al[73] reported a significant increase in daily weight gain of crossbred pigs fed a mixture of kasava leaves and water spinach compared to only the fed kasava leaves, due to increased intake and possibly a better balance of amino acids mixed. Sweet potatoes, (Ipomoea bounds) belong to the family of Convolvuceace morning glory. It is planted mainly in tropical areas and ranked fifth among the most important food crops in the tropics[74]. The cost of potato production is much lower than the grain crops[75]. Potato carbohydrates are highly available and can be utilized by non-ruminant animals[76]. Also, patatin that accounts for 30-40% of protein in potatoes is very balanced, which is similar to that of casein[77]. Holiday meals have a high protein content of between 26 to 33%, with high amino acid scores. It has a good mineral profile and is rich in vitamins such as A, B2, C and E. In addition to its nutritional values, the sweet potato leaves can be uvested many times throughout the year[78] making many leaf dishes. The main factor that limits its use in monogastric animals is the presence of anti-nutritional factors[79]. The antinutritional substances found in potato leaves, according to Oyenuga[10], are protease and invertase inhibitors. These substances can be activated by various processing methods such as oven or drying the sun, boiling or steaming and grinding before putting in animal feed. With regard to non-ruminant feeding, sweet potato data is limited. However, reports by Yeh and Bouwkamp[80] and Nwokolo[81] show that up to 50% of cereals in soybean corn-nut diets can be replaced with sweet potato chips, without significant depression in growth or production. With a high level of replacement, it may be necessary to add such sweet potatoes - a diet based with 0.2-0.5% of smoothness. Sweet potato dustiness and high content reducing sugar will tend to limit its consumption at high levels in chickens and other non-ruminant ruminant diets.[82]. The inclusion of a serving of sweet potato leaves in the Tilapia zilli diet indicates that levels of up to 15% can be added without any negative effects on the growth, food efficiency and digestion of proteins[83]. In the same vein, Omoregie et al[84] reveals that oreochromis niloticus can tolerate up to 15% of tapioca peel entry. Cocoyam is recognized as a source of cheaper carbohydrates than cereals or other tapioca crops[85]. It has high calorie yields per hectare, low production costs[86] and relatively low suspicions to insect and pest attacks. Similarly, it is reported that cocoa has been easily digestible starch content due to size small[87, 88]. It is almost without competition with men in most places because it is only consumed as a last resort when families can no longer afford it or yam. Therefore, it is more likely to be used at a lower cost. The consumption of cocoa as food for humans and animals has limiting factors such as storage and the presence of antinutrition factors. Taro is closely related to Xanthosoma and Caladium, plants that are usually grown as decorations. Antinutrition factors found in taro cocoa include oxalates, phytates, Tannins and Saponins. [4]. However, some may serve as a defense mechanism against pests and diseases. Thus, oxalates were found to be defense mechanisms and storage reserves for calcium[89]. There is limited reference work on the use and inclusion of taro cocoyam as an alternative source of energy in the production of chickens. However, Anigbogu[90] and Abdulrashid and Agwunobi[11] reported that taro dishes should not exceed 25% of corn replacements in the diet of meat chickens. Tania (Xanthosoma sagittifolium) is a high disease-resistant crop. Its energy content looks simple when compared to corn. However, like most types of cocoa, the problem with Xanthosoma sagittifolium is the content of several antinutritional factors that can be a limitation to its consumption[91]. These limiting factors can be removed by boiling or drying the sun[92]. Esonu[93] reports that startup meat chickens can tolerate up to 20% of wild different cocoa entry levels (hortulanum canadium). On the other hand, Uchegbu et al[94] shows that raw sun dried cocoa dishes can be used in diet broilers finishing up to 15% entry levels without harming their performance. However, the entry level of cocoa 10% is best in terms of daily weight gain, food conversion ratio, and cost effectiveness. Wild cocoa is the root of a high humidity tube. Currently, it is not consumed directly by humans and equally no industrial consumption. The literature available on the diet of wild cocoa food to the finishing broiler indicates that it is a satisfactory energy substance of up to 20% of the total ration[95, 96]. However, its liberal consumption in the diet of monogatric animals can be frozen in the presence of several anti-nutritional factors (tannins and trypsin inhibitors), affecting protein and energy consumption in chickens[96, 97]. The use of heat to activate these anti-nutritional factors can increase the consumption of wild cocoa as a component of feed in the diet of chickens. Cocoa corms intended for use as pig feed should be cooked before drying and nutrition to ensure the removal of toxic substances (oxalic acid) found in corpses, leaves and plant crates. There are some real experiments conducted on cocoa consumption. However, it is recommended that cooked dry cocoa be fed pigs in pregnancy and lactation pass but do not start pigs or them in the early growing phase. Silaj koko can be fed to pigs at increasing and fatening rates, as well as gilts in pregnancy and lactation. At stage 20 - 40% of dry matter, silaj koko supports sufficient growth rate in pigs[93]. Ohaemenyi[98] reports that the Sagittifolium Xanthosoma corm can be cooked and used slightly in the growing diet of pigs. Given the chemical and nutritional properties of alternative energy supplements available (roots, tapioca and their ancillary products), they have the potential to increase consumption as an alternative energy supplement for non-ruminant production. Furthermore, these substances have energy that is easily digestible. The growth performance of pigs and chickens comparable to various levels of roots, tapioca and products for the sake of their products with feeding corn indicates that they can be used as substitute in non-ruminant diets at a certain level without harming their performance. However, for better performance of animals, rations containing roots, tapioca or products for the sake of their products must be formulated to contain good protein sources and amino acids containing adequate sulfur. In addition, various processing methods (e.g. drying, boiling, shelling, fermentation and destruction) can be used to eliminate or reduce the anti-nutritional factors available; this will improve the quality and safety of these food ingredients. If these findings diffuse and are adopted by farmers and feed producers, the amount of roots and tapioca used in non-ruminant food production in Nigeria will increase with a reduction in pressure on grain demand.

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Kadam , Institute of Engineering and Post-Harvest Technology (CIPHET), Ludhiana, Punjab, India.Email: Abstract mango is widely preferred because of its excellent taste and quality of eating. Mango pulp from various Dussehri is a dry foam mat using 0, 3, 5, 7, and 9% egg whites as frothy agents and then dry at air drying temperatures of 65, 75 and 85°C. Weight loss is used to estimate changes in movement ratio with regard to timelessness and effectiveness. Seven thin layer drying models are installed to obtain the most suitable model, selected based on various statistical parameters. Wang and Singh's models were found to be the best in almost all the case. The status of the eater in terms of the amount of carotene is budgeted and it is noted that there is a significant effect of the drying temperature and density of the egg whites. Based on the parameters above, it is completed that the drying froth mat uses 3% egg whites at 65°C air temperature is the best combination.
Keywords: Mango, Foam Mat Drying, Egg White, Kinetic Drying, Effective Moisture Diffusivity, Karotena Mango (Mangifera indica L.) commonly known as fruit kings are the main fruits in Asia and around the world. The importance of mango nutrition is mainly due to carotene and other bioactive compounds[1]. India as the largest producer of mangoes accounted for 37% of the total 30.5 million tonnes of global production[2]. Mango imposes a bigger problem in storage and transportation, since it is very easy to perish than tropical fruits and other sub-tropicals. The vast gap between production volume and consumption due to poor transportation and storage facilities leads to losses after harvest[3]. To avoid losses after harvest and increase the mango life of the shelves should be processed into a stable product of shelves. The conventional type of mango products has been developed to a relatively long extent but the mango industry is eager to develop new processed products[4]. In India, several studies have been reported on the development of mango powder. The drying spray of mango pulp produces good coloured powder but no pleasant flavours[5]. Frozen dried mango pulp with added sugar produces powder with good shelf life but the cost is prohibitive[6]. Sweet mango powder produced by drying, which involves mixing pulp with the same quantity of sucrose and dry in vacuum drier at 65°C and 27°Hg vacuum for 8 h, maintaining 57% β-carotene at 38°C and 65% RH[7]. Liquid and semi-liquid foam has long been recognized as one of the efficient methods for shortening drying time. Over the past decade, this relatively long technology, known as foam mat drying, has gained renewed attention because of its ability added to process hard-to-dry materials to produce desired real estate products, maintaining down shoots that would otherwise disappear during drying out non-frothing materials[8,9]. Drying foam mats involves the establishment of foaming agents into liquid food with subsequent lashes to form stiff foam[10,11]. In general, the drying rate of foam materials is faster than non-filthy and highly accelerated ingredients during the final stages of drying. Many researchers have reported that increasing the area of the foamy material interface is a factor responsible for enhanced drying rates. The investigation now aims to study the drying characteristics of mango pulp mats to improve shelf life and find optimal conditions to apply this technique for the development of mango powder with the retention of nutritional qualities. Fully cooked mango (Dushehri variety) has been hammered from ludhiana local market (Punjab). Mango with water to remove dirt and foreign things, if any. After manual gridding for uniform size and shape, only sound, blemish-free fruit is taken to extract the pulp. Pulp has homogenized using a domestic mixer after peeling the skin and rock removal. The sample size of 300g in triplika has been intensified using a hand grinner Ajanta Limited, India.) at 18000rpm. Egg whites (EW) @ 0, 3, 5, 7 and 9% have been added to develop foam that increases the surface area due to air incorporation. Foaming pulp has spread inside a food grade stainless steel tray and dry in a tray dryer (MSW-210, Macro Scientific Work, India) at three different drying air temperatures of 65, 75 and 85°C. Weight loss is measured after every half an hour to determine drying rates and other drying parameters. Semi-dry foam mats are plugged in around 15-19% moisture content for faster drying and better quality retention. The foregoed mat has been reversed and dried for another half an hour to reduce the moisture content of the mat below 3%. Dry mats have been fulfilled and packaging to further their studies. The current humidity ratio of the sample is determined using the following equations: (1)Given that My value is very small compared to mo and M values, my value can be ignored and the humidity ratio has been simplified and it can be expressed as[9, 12]. (2) Fick diffuser equations for particles with geometry slabs are used for effective moisture diffuser calculations. Thinly foaming mango pulp in the tray is considered a geometry of slabs[13]. The equation is expressed as [14]:(3)Equation (3) may be rewritten as:(4)The slope (Ko) is calculated by plotting Ln (MR) vs. time by equation (6) to determine the effective differences for different temperatures. (5) To choose the appropriate model to describe the drying process of mango foam mats, the drying curve is fitted with seven drying equations of the thin layer. The model of the assessed humidity ratio is presented in Table 1. Non-linear regression analysis is carried out using STATISTICS 6.0 (Soft statistics). Determination coeftract, R2 is one of the main criteria for choosing the best model. Besides R2, fit benefits are determined by various statistical parameters such as reduced chi-square (χ2), Root means square errors (RMSE) and Mean bias errors (MBE). For vibrant quality, R2 value should be higher χ2 value, MBE and RMSE should be lower[9, 12, 15]. Table 1. Thin layer dryer models and their SimilaritiesModelEquationNewton [22]MR = Exp(-kt)Henderson and Pabis[23,24]MR = Exp(kt)Logarithmic[25]MR = Exp(-kt) + term cTwo[26, 27]MR = Exp(-kt) + b Exp(-nt)Two term exponents[28]MR =a Exp(-kt) + (1-a) Exp(-kat)Wang and Singh[29]MR = 1 + (at) + (bt2)Diffus approach[30]MR = Nutritional Quality Exp(-kt) + (1-a) Exp(-kbt)In terms of total kaotena content is estimated to be using the Rangana method[16]. The moisture content of fresh mango was found to be 79.25 ± 1.77% (wet base). The average drying time for foam mat drying is 390, 330 and 300 minutes respectively at 65, 75 and 85°C (Figure1). The final moisture content of powder samples is within range Air temperature drying has a significant effect on drying time, which is evident from the fact that the drying time, reduced by the increase in drying air temperature. An hour's humidity reduction is higher than in stage and then begin to decrease with a growing drying time. The results were in line with initial observations for drying out tomato foam mats[9]. It is observed that drying occurs mainly during the period of the fall rate and no continuous rate period is observed at all drying temperatures. It can be lowered from Figure1 that the concentration of foaming agents has a significant impact on drying rates. At 65°C drying, samples with 3% of egg whites have a minimum humidity ratio with respect to time, however in case of drying at 75 and 85°C, the minimum humidity ratio is noticed with 3 and 5% and 3 and 7% of egg whites. From above, it can be concluded that the concentration of 3% egg whites is good due to the effective drying rate. Although samples with 5 and 7% of egg whites have the same drying rate, but being a higher concentration, this can be avoided to prevent excessive consumption of foaming agents. Figure 1. Egg white effect (%) at the drying rate of the dried mango pulp mat at (A) 65°C, (B) 75°C and (C) 85°C drying air temperatureThe the effectiveness of moisture differences between 1.53×10-8 and 2.63×10-8 m2/s for temperature ranges between 65 to 85°C (Table 2). The humidity of the imbalance of mango foam mat increases with increased drying air temperature. Diffuse moisture is maximum for 3% egg whites at 65°C and 7% at 75°C along with the highest R2 value. Data of moisture ratio of drying foam mats of mango pulp at different temperatures using different concentrations of egg whites is attached into a thin layering drying model (Table1). The correlational circali and statistical analysis results are listed in Table 3. Four criteria for model adequacy are suitable, i.e. determination (R2), Chi square is reduced (χ2), meaning bias errors (MBE) and roots mean square errors (RMSE) are used. The best models that describe the thin drying features of the mango foam mat are selected as the one with the highest R2 and χ2, MBE and RMSE. All models installed gave R2 more than 0.9, however out of this model, Wang and Singh are the most suitable for R2 more than 0.99 to 65 and 85°C, while, logarithmic and diffusion approach models are found to be suitable for 75°C. Table 2. Effective moisture diffusivity and its linear equation for foam mat drying of mango pulpTemp (℃)EW%Equationk0 valuesDeffR2650y = -0.0042x-0.1599-0.00421.53E-080.9064 3y = -0.0046x-0.0158-0.00461.68E-080.9627 5y = -0.0045x-0.0643-0.00451.64E-080.9533 7y = -0.0045x-0.0358-0.00451.64E-080.9424 9y = -0.0044x-0.1005-0.00441.60E-080.9203750y = -0.0052x-0.1938-0.00521.90E-080.9296 3y = -0.0051x-0.2904-0.00511.86E-080.8679 5y = -0.0050x-0.3003-0.00501.82E-080.8630 7y = -0.0052x-0.1405-0.00521.90E-080.9468 9y = -0.0055x-0.1613-0.00552.01E-080.9309850y = -0.0071x+0.0616-0.00712.59E-080.9601 3y = 5y = -0.0070x+0.0368-0.00702.55E-080.9522 7y = -0.0069x-0.0395-0.0.000692.52E-080.9123 9y = -0.0072x+0.0556-0.00722.63E-080.9551Figure 2. Changes in the amount of kasotena with drying drying froth mats 65, 75, and temperatures of 85oCMango are the main sources of carotene, which has been known to be important for decades for its wide range of health benefits and role in disease prevention. The amount of fresh mango carotene was found to be 21.84 ± 3.88 mg/100g. The amount of carotene powder content of the newly supplied dried mango mat is in 16.59- 4.25 mg/100g. Foam mat drying at different temperatures using different white egg density has a significant effect on the content of carotene (Rajah 2). The decrease in carotene content is noticed by the increase in the density of white eggs and temperature. The loss of the amount of kaherah can be attributed to the photosensitive properties, isomerization and epoxide that make up the kaotenoid properties[17, 18]. The decrease is more significant in the case of 75 and 85°C than 65°C. The deterioration of carotene content with drying and dehydration was reported by Chen, Peng, & Chen[19] in Taiwanese mangoes, Wen-ping, Zhi-jing, He, & Min[20] in the barbarum fruits Lycjum and Lavelli, Zanoni, & Zaniboni[21] in Schedule 3 dehydration. Statistical Quality Analysis of Mathematical Models Drying Thin Layer Into Clothing Mango Pulp Drying Mat Schedule 4. Continued From the current study on drying mango pulp froth mats, it can be concluded that the increase in drying temperature decreases the drying time. Foaming with different egg white density has a significant effect for drying up to a 3% level as is evident from the curvature of moisture ratio and suction data. The subsequent increase in egg white density is that it has the same or negative effect on drying. Data on drying froth mats followed Wang and Singh models for approaches 65 and 85°C and Logarithmic and diffusion to 75°C. The highest amount of kacukan content is in dry sample cases at 65°C. In summary, it is suggested that the drying of mango pulp froth mats can be carried out using 3% egg whites as frothy agents and air drying temperature of 65°C with the quality of the eating quality. 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