

PRODUCTION OF BETA-KERATIN FROM  
CHICKEN FEATHERS

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MASTER OF CHEMICAL ENGINEERING WITH  
ENTREPRENEURSHIP

UNIVERSITI MALAYSIA PAHANG

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## EXECUTIVE SUMMARY

The concept of the business of K-my Sdn Bhd is a process of turning waste feathers from poultry industry into a high value product for use in the cosmetics and consumer goods industries, particularly hair-care and hair treatment. There are a few problems that become the reason for K-my Sdn Bhd has potential to become one of the most successful companies in Malaysia. It is because the production of keratin protein from sheep wool caused high cost. It is due to the price of sheep wool is quite expensive. Besides, sheep wool availability in Malaysia is limited. So, the researchers need to find other alternative as a new raw material. On the other hand, the demand of product based on keratin protein is increased. Due to availability, chicken feather is easy to find in Malaysia. The production of chicken feather in Malaysia is too high until causing the environmental problem. Based on these problems, K-my Sdn Bhd take this advantage to produce a product that is cheap but has a lot of benefits. The demand of the keratin in Malaysia is increasing every year. It is due to the demand of the cosmetic and toiletries are increasing as well. The market of keratin is contributes 5% in the cosmetic and toiletries industry. The demand of keratin in 2012 is 3465 MT per year. The market size of the keratin also increases by year. The invention relates to a process for extracting keratin from poultry feather, and provides a quicker process thus allowing large-scale productions of the keratin to be carried out untimely, efficient and productive manner. The main processes are dissolving chicken feathers and separation of proteins. Keraplast Technologies is the world's leading innovator of keratin protein technology which was established on 1996 by using the sheep wools as the raw materials. K-My Sdn Bhd has assembled a management team experienced in keratin, research and development, marketing, management and finance. Assoc Prof Dr Arun Gupta, Chief Executive Officer, currently works as a associate professor at Universiti Malaysia Pahang in Faculty of Chemical and Natural Resources Engineering. He is expert in research and development about keratin, and got a lot of award about his project. Moreover, Siti Nur Khairunisa who is appointed to be a production manager is one of researchers that do the research about beta-keratin from chicken feathers. Currently she is a Master student of Universiti Malaysia Pahang. The start up business of K-my Sdn. Bhd needs the capital about RM 2.5 million. The cash is to buy the equipments, land, building, contingency plan, and the other expenses including buying the raw materials and paying the salaries to the employers and employees. The funds will be get from the bank and Malaysia Debt Venture berhad (MDVB).

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**LIST OF ABBREVIATION**

MDVB	Malaysia Debt Venture Berhad
PKNP	Pahang State Development Corporation
CEO	Chief Executive Officer
MT	Metric Tonne
RM	Ringgit Malaysia
USD	United State Dollar
EPF	Employees Provident Fund
CAGR	Cumulative Annual Growth Rate
MIDA	Malaysian Industrial Development Authority
FMM-MCTIG	The Federation of Malaysia Manufactures – Malaysian Cosmetics and Toiletries Industry Group
Sdn	Sendirian
Bhd	Berhad
ROI	Return on Investment
SOP	Standard Operating Procedure
TNB	Tenaga Nasional
SESB	Sabah Electricity Sendirian Berhad
SESCO	Sarawak Electricity Supply Corporation
SAJ	Syarikat Air Johor
YTL	Yeoh Tiong Lay

## **CHAPTER ONE**

### **INTRODUCTION**

#### **1.1 Products Overview**

Beta-keratin is one of nature's most important building blocks at a cellular level, giving the human body structure and order, and is fundamental in the development of healthy tissues, including skin, hair and nails. Beta-keratin products have been proven to produce significant benefits for hair care, skin care and wound healing.

For hair care, beta-keratin will help to repair, rescue and renew hair suffering from chemical or environmental damages. Besides, it will protect hair from sunlight, pollution and chemical damages.

On the other hand, in terms of skin care, beta-keratin will speed up recovery from dermatological treatments to the skin. Beta-keratins are also possible to repair wrinkles where they start by helping skin cells make more collagen. Moreover, beta-keratins will boost the body's own antioxidant defense system by helping it make more of the master antioxidant, glutathione. In order to heal the wound, beta-keratins can help effectively by managing the chronic and acute wounds. The researchers found that 10% weight of poultry is the feathers and after extraction of feathers done, the keratin produced only 30% from the chicken feathers.

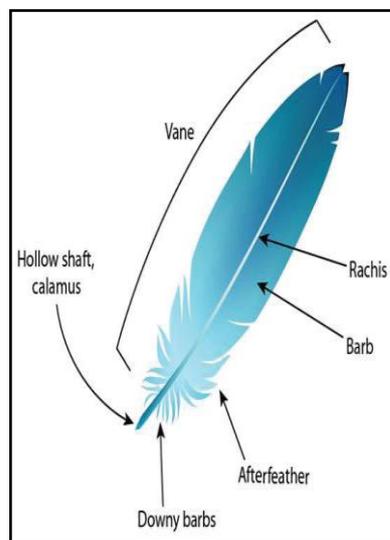
## 1.2 Market Overview

As mentioned earlier, beta-keratins suitable for protection in hair care, skin care and including wound healing as well. Beta-keratin market is not too familiar in Malaysia because of the new development of the products. Due to the growing cosmetic and toiletries industry, beta keratin extraction and production from wool can be found in New Zealand and USA. Manufacturers of cosmetic and toiletries product from Asia generally need to import the keratin from New Zealand. So, it obviously can increase the production cost.

In Malaysia, the annual growth for cosmetic and toiletries industries is 15% annually. The market sales for that product for 2010 are about USD 1.5 billion or RM 5.25 billion. As estimated, the market demand in 2012 is USD 1.98 billion. Beta keratins contribute 5% of the sales. Then, the demand for the beta keratin in 2012 is USD 99 million.

### 1.3 Resources and Raw Materials

The most important raw material that needed in beta-keratin is chicken feathers. The suppliers will be Pahang State Development Corporation (PKNP) poultry farm. The price of the chicken feathers is approximately RM 2 per kg. The transportation cost will be low due to the location of the supplier is near by the company. Chicken feathers have high level of keratin protein content which is 90% and can become a suitable protein source.



**Figure 1.0:** The Important Element of Chicken Feather

K-my Sdn. Bhd decided to use chicken feather as the raw material due to high production cost of production of keratin from sheep wool. Moreover, it is due to non-availability of sheep wool in Malaysia, thus we need to find other alternative as to replace the raw material. The availability of chicken feather is high and it is causing the environmental problem since chicken feather is not easily to be dissolved. In fact, 10% of poultry is feathers.

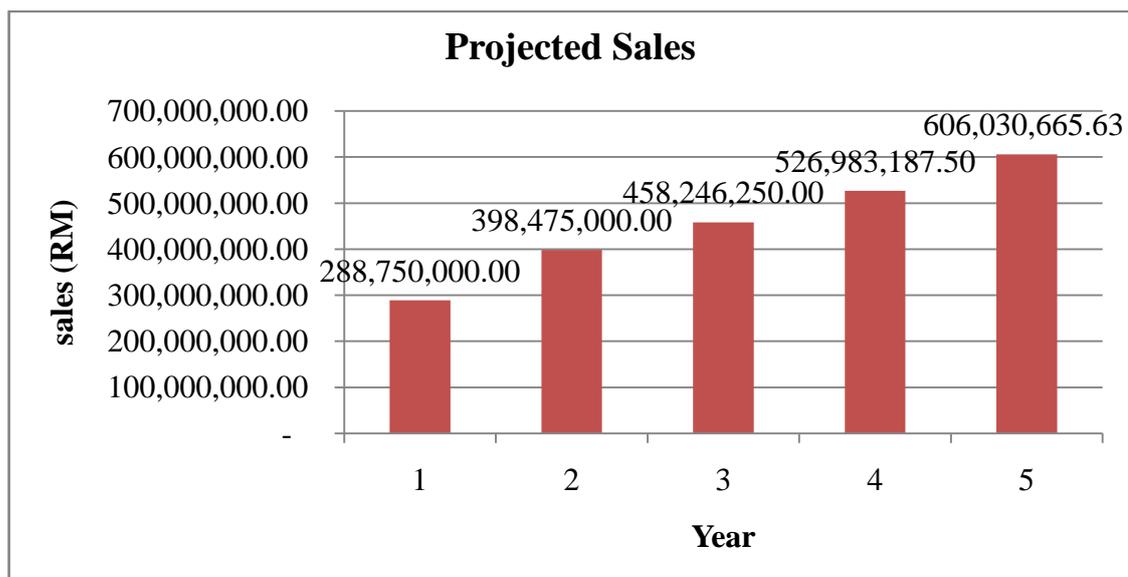
## CHAPTER TWO

### MARKET ANALYSIS

#### 2.1 Market Size

The total market size for beta-keratin is related to the market size for cosmetic and toiletries products. Beta-keratin contributes 5% from the production of the cosmetic and toiletries.

According to the US Consulate General Hong Kong's report, Asia's Cosmetic and Toiletries market size are reported that, in 2008, Malaysia sales is USD 600 million, while Thailand sales is USD 351 million for hair, USD 432 million for skincare, USD 351 million for makeup in 2010; Philippines sales is USD 435 million in 2010 which growing at 10%; Indonesia sales is USD 250 million in 2008 which grow 10% to 15% annually; Hong Kong imports USD 263 million in 2010, China USD 18 billion in 2010 with double digit growth; India imported USD 400 million in 2010; Japan imported USD 16.7 billion in 2009 with an increase of 12.1% in 2010 (export-gov, 2012). The sale projected is shown in **Figure 1.1** below. The sales forecast is estimated to increase every year.



**Figure 1.1:** Projected Sales for 5 Years

The graph shows the projected sales increase every year. It is due to the demand of the keratin in Malaysia increase. Then, it indicates that the market size also expanding.

## 2.2 Market Demand

Demand of cosmetic and toiletries in Malaysia is related to demand of keratin protein. It is because keratin protein is contributing 5% of them in the market of cosmetic and toiletries industry. The demand of the cosmetic and toiletries for 2010 is USD 1.1 billion in Malaysia. The global demand for personal care products was over USD 7.6 billion in 2012 and expected to increase over USD 13 billion in world by 2018. Cumulative Annual Growth Rate (CAGR) is 9.6% from 2012 to 2018. In Asia, including Malaysia, the CAGR is 15% for 2012 to 2015. As estimated, the market demand in 2012 is USD 1.98 billion. So, the demand of the keratin is about USD 99 million or 3465 MT/year.

### **2.3 Target Market**

The target market listed included is hair care manufacturer and skin care manufacturer in Malaysia. It is because in Malaysia, they need to import the keratin to them in order to produce their products. It caused the production cost is high.

According to the Malaysian Industrial Development Authority (MIDA), thirty companies are producing cosmetics and toiletries products in Malaysia. The Federation of Malaysian Manufacturers – Malaysian Cosmetics and Toiletries Industry Group (FMM-MCTIG) reported there are now approximately 50 small and medium sized domestic companies producing cosmetics. Main manufacturers of cosmetics and toiletries are Colgate-Palmolive (M) Sdn Bhd, Follow Me Industries Sdn Bhd, Formapac Sdn Bhd, Henkel (M) Sdn Bhd, Manufacturing Services Sdn Bhd and EngKah Enterprise Sdn Bhd.

### **2.4 Market Share**

Throughout 2010 skincare was the most significant segment, with its 23% of the market share and its growth driven primarily by the Asian Market (Lennard, 2010). The global haircare market, comprises of shampoos, conditioners, styling agents and hair colorants, has only shown moderate growth. It shares in the Global beauty Market went from almost 21% to 17.3%. In Malaysia, the market share for hair care and skincare product is about 35%. K-my decided to penetrate into the market about 5% of them because keratin contribution in the market.

## 2.5 Market Segment

There are a few segmentations that are related to this business. There are:

- a) Human health and nutrition (dietary supplement and food ingredients)
- b) Animal health and nutrition (poultry, swine, aquacultures, ruminants, pets and others)
- c) Personal care (the skin care, hair care, oral care and others)

The focus market segment is personal care part which is skin care, hair care, oral care and the other cosmetics and toiletries product.

## 2.6 Competitor Evaluation

**Table 1.0:** Competitor Evaluation

<b>Name of Company</b>	<b>Established</b>	<b>Location</b>	<b>Customers</b>
Keraplast Technology	1996	New Zealand	Hair care & Skin care manufacturer

Keraplast Technology is a well-known company. It was established on 1996 in New Zealand. However, they are producing keratin protein from sheep wool. The price of the sheep wool is quite expensive compared to chicken feathers. It is RM17.50/kg. It is due to the limited availability of sheep wool in Malaysia.

## **CHAPTER THREE**

### **COMPANY DESCRIPTION**

#### **3.1 Nature of Business**

Name of the company is decided to be K-my. Sdn. Bhd. The concept of the business of K-my Sdn Bhd is a process of turning waste feathers from poultry industry into a high value product for use in the cosmetics and consumer goods industries. Aims for K-my Sdn. Bhd is to reduce the problem of waste management that involving feathers. The plant capacity is 3465 MT/year.

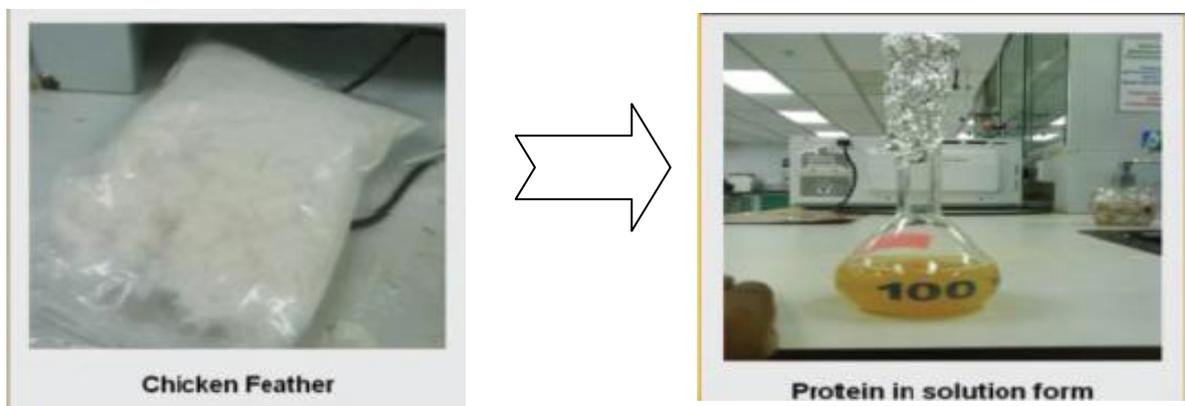
The nature of business for this company is divided into two types. They are comprised of manufacturing and marketing. This company is manufacture the intermediate product, which is beta-keratin, and end up it will be sold to the manufacturer of cosmetics and toiletries products.

## 3.2 Marketing Strategies

### 3.2.1 Product

Our environmental-friendly product is produced by high technology equipments. The availability of raw material is high and do not need to import. The raw materials will be sterilized before start to produce keratin protein. It is to avoid any bacteria to affect the product's quality and cause the infection. The process of the production will be monitored by the experts and at the end quality and the safety of the product will be certified by Ministry of Health Malaysia and Good Manufacturing Practice (GMP). Other than that, the product is patented.

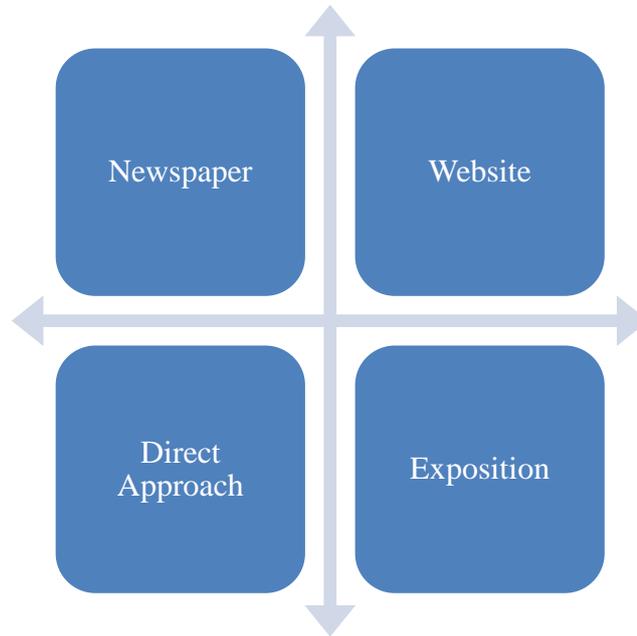
### 3.2.2 Price



**Figure 1.2:** The Image of Chicken Feather and the Solution

The raw material price is RM2/kg. After calculating the labor cost, production cost, and delivery cost, the price of the product is summed up to become RM100/kg. The raw material will be supplied by PKNP.

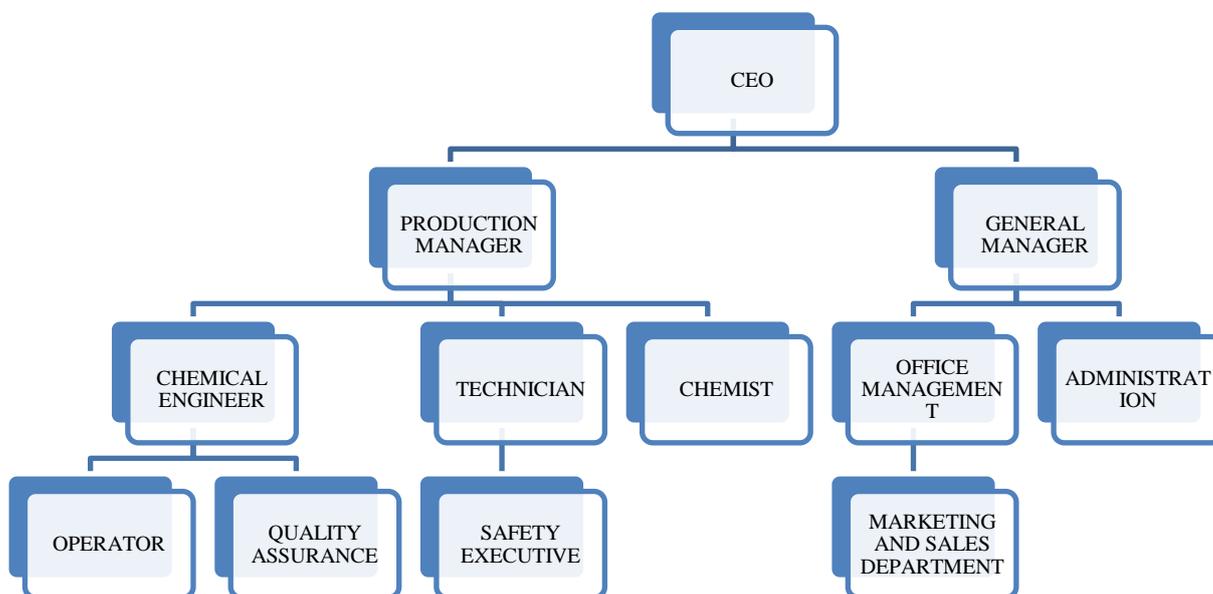
### 3.2.3 Promotion



**Figure 1.3:** Types of Promotion

K-my Sdn Bhd can be promoted through newspaper, website, direct approach and exposition or exhibition. Through all of these, the customers will know us and easy to contact in order to order the keratin. The interesting advertisement can attract the investors to invest into the company as well. Direct approach to the customers can be easier to make a deal with them. It is one way that purposely to explain everything directly by face to face with the customers. Exposition is a way to promote the products too. At that time, the coupon can be given to the customers.

### 3.3 Organization and Management



**Figure 1.4:** Organization Chart

#### 3.3.1 Key Personnel

**Assoc Prof Dr Arun Gupta, Chief Executive Officer**, currently works as an associate professor at Universiti Malaysia Pahang in Faculty of Chemical and Natural Resources Engineering. He is expert in research and development about keratin, and got a lot of award about his project.

**Siti Nur Khairunisa, Production Manager**, one of researchers that research about beta-keratin from chicken feathers. She won a gold medal in Bio Malaysia 2012. Currently, she is a Master Degree student at Universiti Malaysia Pahang under responsibility of Assoc Prof Dr. Arun Gupta.

### **3.4 Location of Operation**

The chosen location is in Gebeng. It is due to the good facilities there. Besides, our company is a biotechnology plant based, thus, the location must be near to Universiti Malaysia Pahang. The research and development can be done at there.

Gebeng has a few facilities that including near by Airport Kuantan, it is located 68.9 km from Kuantan Port, the electric supply is get from Tenaga Nasional Berhad Petronas Centralised Utility Facilities and the water supply is from Semambu water Treatment Plant. The facilities provided can make the operation of the business move smoothly.

## **CHAPTER FOUR**

### **OPERATION DESCRIPTION**

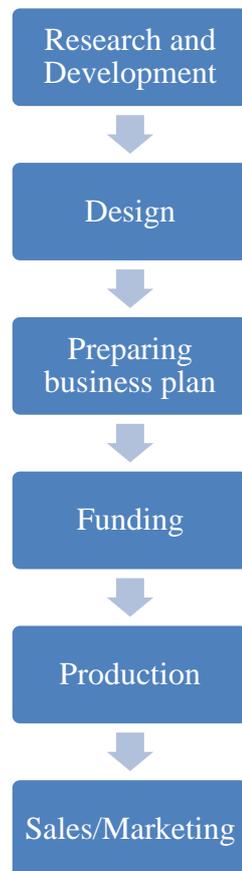
#### **4.1 Product Descriptions**

Beta keratin protein is organic product that is extracted from chicken feathers. It will be applied as one of raw materials of other products especially personal care products like hair care and skin care products. Keratin is formed through formation of different kinds of amino acids.

Keratin is a family of more than 200 normally non-soluble proteins. Keratin is an extremely strong protein which is a major component in skin, hair, nails, hooves, horns and tooth. Mechanical stability and high resistance to proteolytic degradation of keratin are due to their disulfide bonds, hydrogen bonds, salt linkages and cross linking.

Beta-keratin is one of nature's most important building blocks at a cellular level, giving the human body structure and order, and is fundamental in the development of healthy tissues, including skin, hair and nails. Beta-keratin products have been proven to produce significant benefits for hair care, skin care and wound healing.

## 4.2 Process Descriptions



**Figure 1.5:** Process Description for K-my Sdn. Bhd.

There are few processes involved before and after producing the beta keratin. The initial process is started with the idea. Then, the research and development is done including the design of the plant. After that, the business plan is prepared to find the funding from bank and from Malaysia Debt Venture which give the fund for the new company in Malaysia. After settled all of that, then the plant can be build up and then the production can be operated. Lastly, part of sales and marketing involved in order to get the profit.