

**RENDERING, REFINING, EVALUTION AND COSMETIC
APPLICATION OF EMU OIL****Padarathi.Vasubabu*, Aithamreddy.Mounisha, Gangi.Sireesha, Karri.Sri Ganga
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Author****Padarathi.Vasubabu**
Department of
Pharmaceutical Analysis,
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Pharmacy, Rajahmundry.**ABSTRACT**

The present work consists of the rendering of emu wax from the emu bird and refining of emu oil which was carried out by neutralizing the free fatty acids with a weak caustic solution (10-15%) and adding a slight excess to ensure complete neutralization, bleaching is done by using Acid-activated clay and deodorizing is done by injecting pure steam into the heated oil. Moisture content, free fatty acid, peroxide value, saponification value and refractive index of Emu oil have been evaluated as per the AOCS standards. Cosmetic preparation of emu soap is done by using emu oil with butter and sodium laurel sulphate.

KEYWORDS: Emu oil, Emu bird, Extraction of emu oil, Refining of emu oil, Soap preparation from emu oil.

INTRODUCTION

Production of emu meat and oil has been steadily increasing in recent years, and both products are starting to be studied in more depth. Some data has already been published on the properties of the oil; however, there are still some discrepancies on some of its measured characteristics. Some of these discrepancies are due to differences in methods of measurement and the source of the oils. There are no established methods to process the emu oil in particular; however, the technology to recover and refine this oil is readily available. This paper will comment on some of the properties of the oil that have been published in literature and also will include some of the methods commonly practiced in the industry to extract and refine emu oil.

Emu

The “*Dromaius novaehollandiae*” more commonly known as the emu, are found only in the plains of Australia. Emus are the second largest bird in the world.



Figure No: 1 *Dromaius novaehollandiae*

It grows to be about 5-6.5 feet tall and weighs about 130 pounds. Male emus are a little smaller than the female emus. Emus can run up to 50 km/h. Emus make loud booming, drumming, and grunting sounds. Emus usually live for 10 to 20 years. Humans use it for many different reasons. One of those reasons is for food. Humans enjoy eating their meat and eggs.

CLASSIFICATION

The emu belongs to a group of flightless birds known as ratites. The emu got its name because the males sometimes can make a call that sounds like “e-moo”

DOMAIN : Eukarya

KINGDOM: Animalia

PHYLUM : Chordata

CLASS : Aves

ORDER : Struthioniformes

FAMILY : Dromaiidae

GENUS : *Dromaius*

SPECIES : *Dromaius novaehollandiae*.

METHODOLOGY

Rendering and Refining Of Emu Oil

There is not a single method to render emu fat. This industry is relatively young; therefore, manufacturers are using rendering methods that they consider best for their needs. However, some generalizations can be made as to the process of rendering. Some of the operations involved in rendering.

Washing

Once the fatty tissue is removed from the carcass, the washing step can be carried out manually, or in larger operations, with the use of washing sprays and conveyor belts. In conventional operation the water used is 120° - 140° F.

Cooking

In this operation the fat is removed from the fatty tissue by breaking the fat cells through application of heat. This softens the tissue and allows the fat to break free. Here temperature and exposure to air are critical. Two methods are generally used in this operation, namely wet rendering and dry rendering. In wet rendering, the fatty tissue is charged into a closed or open tank and boiling water is added. The hot water helps break the fat cells and the liquid fat comes to the surface where it is separated and then washed with a weak acid solution. In dry rendering, the fatty tissue is heated in a jacketed closed vessel. The fat cells are ruptured by dehydration and fat is released as the moisture evaporates. Cooking operation under vacuum is reported to reduce cooking time and spoilage of the final product. This operation is conducted at 180° - 250° F.

Fat Separation

Fat generated in the cooker is then filtered to further eliminate contaminants and this is done in several ways. A simple way is to allow solids to settle and then separate the fat fraction by decanting.

Fat Washing

This operation is carried out to coagulate and separate proteinaceous components of the recovered fat and can be done by simple water washing, steam coagulation, phosphate (trisodium phosphate) washing, citric acid washing or a combination of these methods.

Fat Drying

Moisture removal is usually done by flash drying. The washed fat is first rapidly heated (up to 240° F) and then pumped into a tank where the water flashes out from the fat. The vapor thus generated is condensed and collected in a different tank. This operation can be done at a lower temperature if vacuum is used.

Refining of Emu Oil

The oil generated in the extraction operation may be high in free fatty acids, peroxides, and other impurities and also may have unpleasant odors.

Caustic neutralization

This is usually done by neutralizing the free fatty acids with a weak caustic solution (10-15%) and adding a slight excess to ensure complete neutralization. The neutralized free fatty acids are then easily removed by centrifugation as saponified matter.

Bleaching

Acid-activated clay is usually used for the removal of these colored compounds. However, bleaching also serves as a "cleaning" step of other contaminants. The acid-activated clay, in conjunction with other adsorbents normally used for bleaching, also serves as a catalyst to decompose or remove peroxides and metals that may still be present.

Deodorizing

Deodorizing is usually done by injecting pure steam into the heated oil (350 - 450° F) under high vacuum (2-4).

Evaluation of Emu Oil as Per The AOCS (or) ISO Standards Procedure**Moisture content**

Weigh the empty beaker then add 15ml of oil and again reweigh then subtract the weight of (oil +beaker – empty beaker) that is the weight of oil. Place the beaker on a hot plate and heat it for 20mins at 100 °c till the bubbles are appeared and evaporation of fumes will see then cool the beaker for some time and then weighed.

Free Fatty Acid (FFA)

Weigh the 5gm of sample (emu oil) was taken in to the conical flask then add 50-100 ml of spirit and add two drops of indicator (phenolphthalein) then titrate the solution with 0.1N

NaOH (preparation of 0.1 N NaOH 4gm of NaOH in 1000ml of water) until the pale pink color appeared and record the readings.

Soap determination

Weigh accurately 50ml of acetone then add Bromophenol blue indicator appearance of yellow colour then add oil sample 5-10ml and light heat the conical flask and titrate against 0.02N NaOH until the blue colour will appear. Repeat the titration to get the average value.

Peroxide value

Weigh accurately 5g of substance in 250ml glass stopper conical flask then add 30ml of mixture of 3 volumes of glacial acetic acid and 2 volumes of chloroform, and swirl until dissolved then add 0.5ml of saturated potassium iodide and allow it to stand for 1 minute in dark. Now, with shaking add 30ml of water and titrate gradually then add 0.5ml of starch solution and continue the titration by shaking vigorously until the blue colour just disappears. Then with continuous 2 vigorous shaking titrate with 0.01M sodiumthiosulphate until the yellow colour almost disappears. Now carry out the blank titration omitting the substance under examination. The volume of 0.01M sodiumthiosulphate in the blank determination must not exceed 0.1ml.

Saponification value

Saponification value represents the number of milligrams of potassium hydroxide required to saponify 1g of fat under the conditions specified. Weigh accurately about 2g of substance under examination in to 200ml round bottomed flask fitted with reflux condenser. Now add 25ml of 0.5M ethanolic potassium hydroxide and a little pumice powder and boil under reflux on a water bath for 30 minutes. Then add 1ml of phenolphthalein solution and titrate immediately with 0.5M hydrochloric acid. Now carry out the blank titration omitting the substance under examination.

Iodine value

Iodine numbers are often used to determine the amount of unsaturation in fatty acids. This unsaturation is in the form of double bonds, which react with iodine compounds. The higher the iodine number, the more C=C bonds are present in the fat. Arrange all the reagent solutions prepared and the requirements on the table. Pipette out 10ml of fat sample dissolved in chloroform to an iodination flask labeled as "test". Add 20ml of Iodine Mono chloride reagent in to the flask. Mix the contents in the flask thoroughly. Then the flask is allowed to

stand for half hour incubation in dark. Set up a blank in another iodination flask by adding 10ml Chloroform to the flask. Add to the blank, 20ml of Iodine Monochloride reagent and mix the contents in the flask thoroughly. Incubate the blank in dark for 30 minutes. Mean while, Take out the TEST from incubation after 30 minutes and add 10 ml of potassium iodide solution into the flask. Rinse the stopper and the sides of the flask using 50 ml distilled water. Titrate the “TEST” against standardized sodium thiosulphate solution until a pale straw colour is observed. Add about 1ml starch indicator into the contents in the flask, a purple colour is observed. Continue the titration until the color of the solution in the flask turns colourless. The disappearance of the blue colour is recorded as the end point of the titration. Similarly, the procedure is repeated for the flask labeled ‘Blank’. Record the endpoint values of the blank.

Volume of Sodium thiosulphate used = [Blank- Test] ml.

REFRACTIVE INDEX

The temperature of the refractometer and/or sample must be controlled to within $\pm 0.1^{\circ}\text{C}$. The crosshairs and compensate the color by adjusting the position of the dial located below the eyepiece. The borderline should be faintly blue on one side and faintly red at the other. Observe the crosshairs, sharply focusing eyepiece if necessary, and bring the dividing line upon their intersection by means of the coarse or fine controls.

PREPARATION OF SOAP

Initially heat the butter and then poured into a dish then add sodium lauryl sulphate to this butter add steric acid then add flavoring agent then the formed mass poured into an oval shaped dish then the oval shaped dish kept in a refrigerator for 2-3 hours. After 2-3 hours they may get harder then packed in a suitable one then labeled if necessary.



Figure.no. 2 Emu oil soap

RESULTS AND DISCUSSION

Moisture content

Water content or moisture content is the quantity of water contained in a material, such as oil (called oil moisture), rock, ceramics, fruit, or wood. Water content is used in a wide

range of scientific and technical areas, and is expressed as a ratio, which can range from 0 (completely dry) to the value of the materials' porosity at saturation. It can be given on a volumetric or mass (gravimetric) basis.

$$\% \text{ of loss of moisture} = \frac{b}{a} \times 100$$

$$\text{empty beaker weight} = 26.5720$$

$$\text{empty beaker + oil} = 44.9013$$

$$\text{beaker weight after heating} = 44.8154$$

$$W_2 - W_1 = 44.9013 - 26.5720 = 18.3293 \quad (\text{A})$$

$$W_2 - W_3 = 44.9013 - 44.8154 = 0.0859 \quad (\text{B})$$

$$\% \text{ of loss of moisture} = \frac{b}{a} \times 100$$

$$\% \text{ of loss of moisture} = \frac{0.0859}{18.329} \times 100$$

$$\% \text{ of loss of moisture} = 0.4686$$

Free Fatty Acid (FFA)

A non-esterified fatty acid, released by the hydrolysis of triglycerides within adipose tissue free fatty acids can be used as an immediate source of energy by many organs and can be converted by the liver into ketone bodies.

$$\text{free fatty acid} = \frac{\text{volume consumed} \times \text{normality} \times 282}{10 \times \text{weight of the sample taken}}$$

$$\text{free fatty acid} = \frac{1.4 \times 0.1 \times 282}{10 \times 14}$$

$$\text{free fatty acid} = 0.282$$

Soap determination

soap is a salt of a fatty acid. Soaps are mainly used as surfactants for washing, bathing, and cleaning, but they are also used in textile spinning and are important components of lubricants. Soaps for cleansing are obtained by treating vegetable or animal oils and fats with a strongly alkaline solution.

$$\text{soap determination} = \frac{\text{volume consumed} \times \text{normality} \times 304}{\text{weight of the sample taken}}$$

$$\text{soap determination} = \frac{0.19 \times 0.02 \times 304}{6}$$

soap determination = 0.192

Peroxide value

The peroxide value is defined as the amount of peroxide oxygen per 1 kilogram of fat or oil. Traditionally this was expressed in units of mill equivalents, although if we are using SI units then the appropriate option would be in mill moles per kilogram

$$\text{peroxide value} = \frac{\text{volume} \times \text{normality} \times 1000}{\text{weight taken in gm}}$$

$$\text{peroxide value} = \frac{8.3 \times 0.01 \times 1000}{5}$$

peroxide value = 16.6

Saponification value

Saponification value represents the number of milligrams of potassium hydroxide required to saponify 1g of fat under the conditions specified

$$\text{saponification value} = \frac{28.05 \times (b - a)}{\text{weight taken in gm}}$$

$$\text{saponification value} = \frac{28.05 \times (19.8 - 6.2)}{2}$$

saponification value = 190.74

Refractive index

The refractive index of emu oil is **1.459**.

Standards of emu oil as per AOCS method are as follows

S.NO	TEST	SPECIFICATION AS PER AOCS METHOD	RESULTS
1	Moisture content	<0.05%	0.4686%
2	Free fatty acids	<1.5%	0.282%
3	Peroxide value	<25	16.6
4	Saponification value	190-200	190.74
5	Refractive index	1.456-1.467	1.459

CONCLUSION

Evaluation tests such as moisture content, free fatty acids, soap determination, peroxide value, saponification value and refractive index were conducted for emu oil which is collected from the emu wax by rendering and refining process. All the test values are within

the limit as per AOCS standards. Soap is prepared by using emu oil which is having the cosmetic property and other pharmaceutical applications.

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