

PALM-BASED *TRANS* FREE VANASPATI

by: NOR AINI IDRIS, MOHD SURIA AFFANDI YUSOFF AND
MOHD ARIF SIMEH



PORIM TT NO. 46

PORIM INFORMATION SERIES

ISSN 0128-5726

INTRODUCTION

Vanaspati is an all purpose cooking fat originally developed as an alternative to the traditional butter fat ghee. It is now widely used in the Indo-Pakistan sub-continent, Middle East and South East Asia. It is required to have a coarse granular structure at ambient temperature, with crystals of 1-2 mm in size. Though it has a rather solid texture at ambient temperature, it is usually required to melt at 37°C-39°C.



Trans Free Vanaspati

Originally it was made from hydrogenated vegetable oils, hydrogenation being a necessary part of the process. This is a fairly costly process and at the same time, produces the undesirable *trans* fatty acids. Palm oil and its products, which have similar physical characteristics such as melting point, melting profile and semi-solid consistency at ambient temperature to vanaspati, do not require hydrogenation. Though naturally it does not develop the desired granular appearance, this can be improved by using the technique of interesterification, to give vanaspati of satisfactory consistency. In addition, interesterification increases the amount of palm oil and its products

(especially palm stearin) in the vanaspati preparation, leading to a *trans* fatty acid free formulation.

TRANS FREE VANASPATI

The formulations for *trans* free vanaspati prepared by either direct blending or interesterification are shown in *Tables 1* and *2*. Results indicated that vanaspati based on direct blending of 60% palm stearin and 40% other liquid oils such as soyabean, rapeseed and sunflower oils were of good characteristics and superior to products containing 80% or 40% palm stearin (*Table 1*).

ISSN 0128-5726



9 770128 572000

Palm Oil Research Institute of Malaysia, Ministry of Primary Industries, Malaysia

P. O. Box 10620, 50720 Kuala Lumpur, Malaysia. Tel: 03-8259155, 8259775, Telex: MA31609, Telefax: 03-8259446



Table 1. Formulation and Observation on Physical Properties of Vanaspati Based on Direct Blending

Sample Composition	Appearance	Consistency	Oil Separation
POs:SBO			
40:60	Oily, Granular	Too soft	Yes
60:40	Granular	Soft	No
80:20	Dry, Granular	Slightly firm	No
POs:RSO			
40:60	Oily, Granular	Too soft	Yes
60:40	Granular	Soft	No
80:20	Slightly dry, Granular	Slightly soft	No
POs:SFO			
40:60	Oily, Granular	Too soft	Yes
60:40	Granular	Too soft	No
80:20	Oily, Granular	Slightly soft	No

Note: POs = Palm stearin; SBO = Soyabean oil;
RSO = Rapeseed oil; SFO = Sunflower oil.

Table 2. Formulation and Observation on Physical Properties of Interesterified Vanaspati

Sample Composition	Appearance	Consistency	Oil Separation
IE (POs:SBO)			
40:60	Oily, Slightly granular	Too soft	Yes
60:40	Granular	Too soft	No
80:20	Slightly dry, Granular	Soft	No
IE (POs:RSO)			
40:60	Oily, Granular	Too soft	Yes
60:40	Oily, Slightly granular	Too soft	Yes
80:20	Slightly granular	Too soft	Slightly
IE (POs:SFO)			
40:60	Oily, Slightly granular	Too soft	Yes
60:40	Granular	Too soft	No
80:20	Oily, Granular	Soft	No

Note: IE = interesterified; POs = Palm stearin;
SBO = Soyabean oil; RSO = Rapeseed oil;
SFO = Sunflower oil.

Vanaspati formulation based on interesterified blends of palm products with other liquid oils are shown in Table 2. Some of the tested samples were similar to conventional hydrogenated vanaspati with respect to appearance and consistency. It was noted that interesterified vanaspati were of softer consistency than direct blends of palm stearin with other oils. With interesterification, the level of palm stearin in the formulation could be increased up to 80%.

RAW MATERIALS

The raw materials used in the preparation of *trans* free vanaspati are :-

- Palm stearin and other liquid oils, e.g. soyabean, rapeseed and sunflower oils.
- Flavour and natural colouring.

TRANS FREE VANASPATI PREPARATION

The preparation of *trans* free vanaspati can be carried out in two different ways. The formulations could be prepared by direct blending and allowing the product to crystallise in air conditioned temperature in the warehouse. The cooling temperature and time will depend on packaging materials and size. This method is a little bit slow but is cheaper.

The second method is by fast cooling using scrape surface heat exchanger. Production by this method is fast but will incur higher cost.

The preparation of *trans* free vanaspati by both methods are shown in Figure 1.

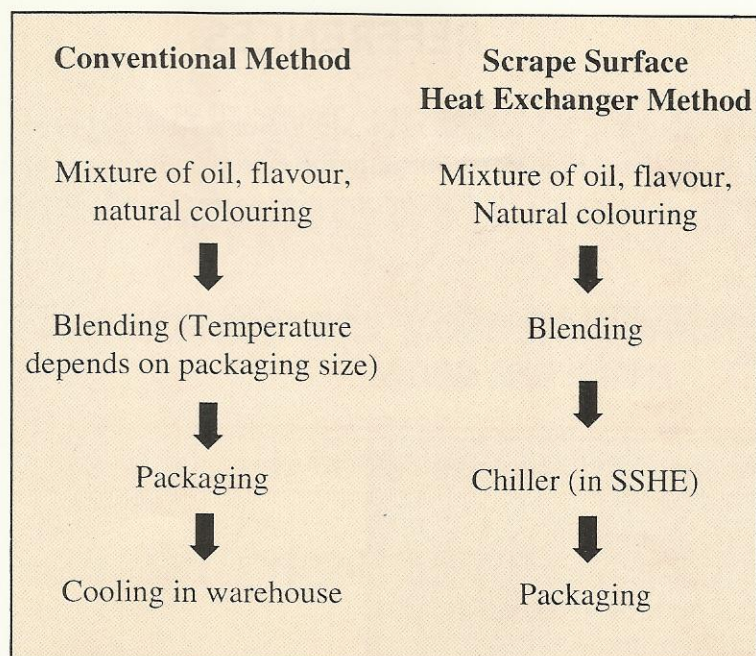


Figure 1. The Preparation of Trans Free Vanaspati by Conventional Method and by Scrape Surface Heat Exchanger (SSHE)

PRODUCTION ECONOMICS

The cost of investments in *trans* free vanaspati production is estimated at RM 1.19 million with almost two-thirds of it (RM 659,370) are attributable to acquisition of plant and machinery whilst about RM 495,000 on land purchase, building construction and other civil works. The cost could be further lowered as some of the machines can be fabricated locally. Under full operation at a production level of 3 000 tonnes per year and at a long term price of RM 2, 000 per tonne, *trans* free vanaspati production is expected to generate pre-tax annual income of RM 1,641,622. This is equivalent to a monthly income of about RM 136,800. The unit cost of production is expected to be about RM 1,849.60 per tonne of output (Table 3).

Table 3. Gross Margin Estimation

Production Cost	4,126,800
Raw Materials	3,901,800
Packing Cost	75,000
Labour Cost	150,000
Processing Cost	162,253
Electricity	32,400
Water	816
Depreciation	119,037
Maintenance	10,000
Miscellaneous Cost	16,225.3
Administration	23,100
EPF	16,500
Insurance	2,000
Diesel	1,000
Vehicle maintenance	3,600
Marketing	30,000
Total	4,358,378
Sales	6,000,000
Gross revenue per year	1,641,622
Gross revenue per month	136,801.8
Unit cost of production	
Fixed cost	396.79
Variable cost	1,452.79
Total cost	1,849.58

Using a discount factor of 10%, a benefit cost analysis of *trans* free vanaspati production indicates that the enterprise is expected to generate a B:C of 1.3502, NPV of RM 5.3677 million and IRR of 21%. As the B:C is more than unity, NPV is positive and the IRR is greater than the opportunity cost of capital, *trans* free vanaspati production is a feasible proposition.

CONCLUSION

Trans free vanaspati can be produced using palm stearin and other liquid oils either by direct blending or by employing interesterification. Results indicated that vanaspati based on these formulations were of good characteristics and comparable to the commercial product. Since no hydrogenated products were added in the formulation, vanaspati is free from *trans* acid.

REFERENCES

Noor Lida Habi, MD and Mohd Suria Affandi (1995). "Trans Free Food Formulation Based on Palm Oil and its Products" *PORIM Information Series No. 47*, August 1995.

PORIM Annual Research Report 1996, February 1997.

For more information kindly contact:

Director-General
PORIM
P. O. Box 10620
50720 Kuala Lumpur, Malaysia.