

## 付 属 資 料

- 1．ミニッツ( 中間評価報告書 )
- 2．合同調整委員会コメント



**MINUTES OF DISCUSSIONS  
BETWEEN THE JAPANESE ADVISORY STUDY TEAM AND  
THE AUTHORITIES CONCERNED OF THE GOVERNMENT OF MALAYSIA  
ON JAPANESE TECHNICAL COOPERATION  
FOR THE PROJECT OF TECHNOLOGY RELATED TO  
THE PROCESSING OF FEED BASED ON  
AGRO-INDUSTRIAL BY-PRODUCTS OF OIL PALMS  
IN MALAYSIA**

Japan International Cooperation Agency (hereinafter referred to as "JICA") organized the Advisory Study-Team (hereinafter referred to as "the Team") headed by Mr. Nobuyuki Samejima, Managing Director of Agricultural Development Cooperation Department, and assigned to Malaysia from the 2nd July to 12th July, 2000.

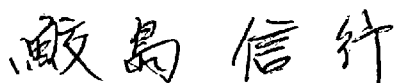
A Joint Evaluation Committee was organized for the purpose to conduct mid-term evaluation of the Project of Technology related to the processing of feed based on agro-industrial by-products of oil palms in Malaysia (hereinafter referred to as "the Project").

The Joint Evaluation Committee conducted evaluation through interviews, field visits and analysis of these results, and prepared an Evaluation Report (hereinafter referred to as "the Report") as attached. The Report was presented to and discussed in the Joint Coordination Committee of the Project.

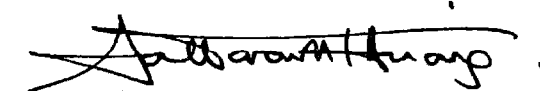
The Joint Coordination Committee (hereinafter referred to as "JCC") agreed to conveying to their respective Governments the matters in the Report attached hereto with the suggestions made by JCC. The suggestions in the written form will be transmitted separately to the respective Governments at the earliest possible time.

11 July, 2000

Kuala Lumpur, Malaysia



Mr. Nobuyuki Samejima  
Leader,  
Advisory Study Team,  
Japan International Cooperation Agency  
JICA



Dr. Saharan bin Hj. Anang  
Director General,  
Malaysian Agricultural Research  
and Development Institute

MID-TERM EVALUATION REPORT  
ON  
THE PROJECT OF TECHNOLOGY RELATED TO  
THE PROCESSING OF FEED BASED ON AGRO-  
INDUSTRIAL BY-PRODUCTS OF OIL PALMS  
IN MALAYSIA

Kuala Lumpur, 7th July, 2000

Japan-Malaysia

Joint Evaluation Committee

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## **1. OUTLINE OF THE PROJECT**

### **1-1. Overall Goal**

The livestock industry in Malaysia is developed through the stable supply of feed based on agro-industrial by-products of oil palms.

### **1-2. Project Purpose**

Effective, practical and viable method and system for converting by-products of oil palms into processed feed are developed.

### **1-3. Activities and Outputs of the Project**

#### **1-3-1. Activities**

- 1) The methodology for processing oil palm fronds and other by-products of oil palms into processed feed is developed.
  - A. An appropriate and economical system of material supply is investigated through the following activities:
    - a. To improve the techniques of harvesting and collection of oil palm fronds.
    - b. To improve the pre-treatment methods of oil palm fronds.
    - c. To improve the methods of handling and transportation of the raw materials from oil palm farm to processing plant.
  - B. An experimental feed processing plant with specialized machines for the drying, grinding (size reduction), mixing, pelleting, cubing and other secondary processing of oil palm fronds and other by-products of oil palms is operated through the following activities:
    - a. To plan/establish the experimental feed processing plant.
    - b. To improve the efficiency of the processing system.
    - c. To evaluate the overall plant management.
- 2) The chemical and nutritional properties of the feed and the feeding values of the feed are assessed through the following activities:
  - a. To conduct chemical and nutritional analyses of the raw materials from oil palm fronds and other by-products of oil palms.
  - b. To conduct chemical and nutritional analyses of the products.
  - c. To improve nutritional value of the products.
  - d. To evaluate the products by multi-dimensional aspects (chemical and nutritional).

3) Feeding management is investigated through the following activities:

- a. To plan feeding experiments in dairy/beef cattle.
- b. To conduct feeding experiments on institutional and on farm level.
- c. To improve feeding technology for high quality beef and milk.
- d. To evaluate the total system of feeding management.

4) Economic evaluation of the feed is conducted through the following activities:

- a. To analyze production costs of the pre-processing and the experimental plants.
- b. To evaluate economic value of the feed in comparison with the other commercial feeds.

#### 1-3-2. Outputs

- 1) The methodology for processing oil palm fronds and other by-products of oil palms into processed feed is developed.
- 2) An appropriate method of animal feeding management on the feed is developed.
- 3) The viability of the feed for practical use is verified.

## 2. OBJECTIVE AND METHOD OF THE EVALUATION

### 2-1. Purpose of the Evaluation

#### 2-1-1. Aims of the Evaluation

The evaluation activities were performed with the following purposes:

- 1) To evaluate the progress of the project on the Detailed Implementation Plan (DIP) during the first three years of the Project.
- 2) To identify problems on any aspects of the Project implementation and propose necessary solution.
- 3) To assess the appropriateness of DIP and PDM for the remaining Project period.

#### 2-1-2. Items of the Evaluation

The following items were evaluated.

- 1) Relevancy of the Project purpose
- 2) Efficiency of inputs
- 3) Degree of achievement (Effectiveness)
- 4) Impact
- 5) Prospects for the sustainability

## 2-2. Composition of the Joint Evaluation Committee

The evaluation was jointly conducted by both the Japanese and Malaysian members.

### 1) Japanese members

1. Mr. Nobuyuki SAMEJIMA (Leader)

Managing Director, Agricultural Development Cooperation Department,  
Japan International Cooperation Agency (JICA)

2. Dr. Jun-ichi SATO (Agricultural Machinery)

Department Director, Department of Forage Production and Utilization, Agricultural  
Production Bureau, National Grassland Research Institute, Ministry of Agriculture,  
Forestry and Fisheries (MAFF)

3. Dr. Toshiaki TANIGUCHI (Feed evaluation)

Director, Animal Production and Grassland Division, Japan International Research  
Center for Agricultural Sciences (JIRCAS), MAFF

4. Dr. Yukita SATO (Project Management)

Staff, Livestock and Horticulture Division, Agricultural Development Cooperation  
Department, JICA

### 2) Malaysian members

1. Dr. Mohd. Ariff Omar

Director, Livestock Research Centre, Malaysia Agricultural Research and  
Development Institute (MARDI)

2. Dr. Ibni Hajar Hj. Rukunuddin

Assistant Director, Mechanization and Automation Program, Strategic  
Environmental and Natural Research Centre, MARDI

3. Mr. Tengku Mohd. Ariff Tengku Ahmad

Assistant Director, Agricultural Business Management and Industrial Economic  
Program, Economic and Technology Management Research Centre, MARDI

4. Dr. Yusof Hamali Ahmad

Assistant Director, Novel Feed Program, Livestock Research Centre, MARDI



## 2-3. Schedule of the Evaluation

Date & Time	Activities
7/4(Tue.)	Explanation of Joint Evaluation Method, Visit to the plant Evaluation Meeting (Presentation by C/P) at MARDI-LRC
7/5(Wed.)	Evaluation Meeting (Presentation by C/P) at MARDI-LRC
7/6(Thu.)	Evaluation Meeting (Discussion and preparation of Evaluation Report) Discussion on project management
7/7(Fri.)	Discussion on Evaluation Report and PDM Preparation of M/D
7/8(Sat.)- 7/9(Sun.)	Preparation of M/D Meeting in Evaluation Team
7/10(Mon.)	Evaluation Meeting (Discussion of M/D)
7/11(Tue.)	Evaluation Meeting (Final Discussion of M/D) Joint Coordinating Committee Meeting (Presentation of Evaluation Report, Signing on Minutes of Discussion)

## 2-4. Method of the Evaluation

The Joint Evaluation Committee spent approximately seven days of time carrying out the following activities:

- 1) Brief review of the Project activities undertaken so far through technical presentations by the Malaysian Counterpart personnel (hereinafter referred to as 'C/P');
- 2) Interviews through individual sessions both with the Malaysian C/Ps and JICA Experts;
- 3) Field study of the Project site;
- 4) Analysis of observations and findings at meeting of the Joint Evaluation Committee.

### 3. RESULTS OF THE EVALUATION

#### 3-1. Relevancy of the Project Purpose

In 1998, the Malaysian Government had revised The Second National Agricultural Policy (NAP2, 1992-2010) with facing the economic slow down, and established new dimensions in the Third NAP3 (1998-2010). The new strategy is to enhance food security and combat inflation by reinforcing the agro-based agro-industrial development as identified in the Second Industrial Master Plan (1996-2005). In this regards the Project purpose is highly appreciated by the Malaysian Government and the Project's relevancy to those development must be redressed in the Project overall goal.

#### 3-2. Efficiency of Inputs

Inputs made by Japanese and Malaysian sides are shown in Annex 1. Adequate financial and human resources have been provided and there exists excellent cooperation among the Project members. However, there are considerable delays on installation and test-run of the plant machineries particularly on the cuber line. These delays have affected those activities related to the technology development for cost-effective OPF feed processing and feeding management as targeted in the Project.

#### 3-3. Degree of achievement (Effectiveness)

##### 3-3-1. Improvement of feed processing system

###### A. Material supply

##### 1) Technology development of harvesting/collection and Improvement of material handling and transportation

Direct use of small trucks combined with mobile chipping machines has been found most cost effective in comparison to conventional material handling. The cost for the improved method is estimated RM 27 / fresh ton, 57 % cost saving to the conventional handling. Alternative handling methods have also been studied where terrain or ground condition is not accessible by trucks.

##### 2) Improvement in pre-treatment of materials

A solar house pre-drying was tested with raw material thickness of 20 cm. It took about 5 days to reduce the moisture content of raw material below 30 % which is prerequisite for the secondary drying. Fungi growth on the material was observed even one day after when the moisture content was over 40 %. Desirable cost effectiveness for the pre-drying stage has not been verified yet. There are still many factors to be examined for cost reduction on the pre-drying stage.

## B. Processing plant

### 1) Planning and setting

Construction of the plant building was completed. Although there has been considerable delay on machinery installation, the processing plant is almost completed.

### 2) Improvement of processing system

Operating efficiencies of processing components in the peletizer line are not uniform. The hopper which stores the raw material for the secondary dryer does not function as expected due possibly to design fault of the feeder. The bucket-type elevator which connects the foresaid hopper to the secondary dryer is not able to handle as much materials as indicated by its capacity. Considerable heat loss occurs at the secondary dryer due to poor insulation. With these constraints, total efficiency of the processing plant has not been maximized.

### 3) Evaluation of plant management

Operation manuals are under preparation.

## 3-3-2. Improvement of feed quality

Activities on improvement of feed quality have progressed satisfactorily. OPF pellets give higher voluntary intake value than other OPF products. The highest digestibility and live weight gain were obtained with 30 % or less OPF inclusion pellets.

## 3-3-3. Improvement of feeding management

OPF feeding experiments on beef cattle at MARDI institutional farm have satisfactorily progressed. Highest live weight gain was achieved with 30 % OPF inclusion pellets. Feeding experiments on beef cattles at the private farm and on dairy cattles both at DVS institutional farm and private farms have been planned. However, there is uncertainty in OPF product supply due to the delay in processing machinery setting, particularly on the cuber line.

## 3-3-4. Economic evaluation of OPF production

Preliminary economic analysis on the pilot plant was made. At later stages, more detailed economic evaluation on the pilot plant will be conducted. The target cost for 100% OPF pellet product was estimated 451 RM / ton by the study presuming product export to Japan.

#### 3-4. Impact of the Project

Intensity of visitors and inquiries to the Project has been increasing. Majority of those having interests in the Project activities are traders and potential entrepreneurs, followed by farmer associations and extension agents. Scientific articles published related to the Project activities also attract attentions from foreign scientists in neighboring Southeast Asian countries as well as local scientists.

#### 3-5. Prospects for Sustainability

One C/P who received training in Japan resigned from MARDI and left the Project. The Committee recognized that trained C/Ps should remain with the Project as long as possible.

Necessary budget has been secured by Malaysian side. In addition, analytical services provided by MARDI have strongly supported the Project activities. The Committee sees no immediate difficulties in sustainability of the Project. Full operation of the plant and catching up in subsequent activities are definitely needed for disbursement of the fund MARDI secured in 1999 as running cost for the Project.

## **4. CONCLUSION AND RECOMMENDATION**

### **4-1. Conclusion**

The team carried out evaluation of the Project following the PCM five categories. It acknowledged the relevancy of the Project to the Malaysia agricultural policy remains high and foresaw it would be even higher. As to the impact of the Project, while recognizing it is too early to expect any tangible effect, the team appreciated that the Project has been greatly contributing to the capacity building of MARDI. In addition, the team favorably took note of the fact that the Project has received frequent visitors and inquires from private sectors. The team saw no difficulty on sustainability of the Project. However, it is noted that the financial resources secured by MARDI for the Project have been under disbursed because some of the activities have not started due to the delay of the plant machinery installation. Nevertheless it welcome MARDI's effort to secure necessary fund for the activities envisaged in 2001 and 2002. The team was very much concerned about the efficiency of the Project. Installation and test-run of the plant machineries have delayed more than one year. The delay has seriously affected subsequent activities. The team felt it is imperative to expedite the installation and test-run so that the plant becomes fully operational as soon as possible. It urged the concerning parties to take appropriate actions to this end. The team took note of the request voiced by MARDI the Project needs to be extended beyond 2002.

The team closely examined the achievements and perspectives of the project and exchanged views with the Project experts and counterparts on the problems and constraints they encountered in the Project implementation. In needs of more efficient and effective progress of the Project in the remaining period of time, the team made the following recommendations.

#### 4-2. Recommendation

- 1) For further cost saving for raw material handling, possibility of cost sharing should be sought in integrated oil palm farm operations and management.
- 2) Improvement of pre-drying method should be further examined. Such examinations include; a) modification of turning/mixing time interval for the raw material, b) trials with different material thickness with the view to raising drying efficiency and preventing microorganism propagation, c) trials with the improved roofing materials permitting higher transmission of solar radiation, d) studies on methods to improve the uniformity of raw material size and its effect on drying efficiency, e) feasibility studies on provision of supplementary heating systems to the solar house, f) comparative studies on alternative drying systems.
- 3) Further improvements are needed in order to make the plant fully operational. Those improvements include; a) improvement of conveying performance between the raw material hopper and the secondary dryer, b) provision of proper insulation to the secondary dryer, c) Dust and vibration control under desirable level, d) Further automation of controlling devices in the processing line and labeling on sequencing devices for easier operation and maintenance.
- 4) The number of beef cattle in the private farm experiment should be carefully determined under the constraint of OPF feed products supply.
- 5) Feeding experiments with OPF cubes may be conducted at later stage if there is further delay in cuber line setting.
- 6) Private farm experiment on dairy cattle should start after the institutional farm experiment is completed.
- 7) Improvement of milk quality by feeding management with OPF products is not feasible in the remaining period of the Project. Therefore, activities on improvement of feeding management on dairy cattle should limit themselves to experiments and evaluation.
- 8) Rapid analysis method on quality control of final products should be developed.
- 9) Further basic studies on the effect of fiber length at rumen level are necessary for the product evaluation.
- 10) Reflecting the evaluation and above recommendations, the team proposed the revision of DSI and PDM as attached in ANNEX 3. and 4.

## ANNEX 1

### JICA Budget Allocated to the Project

¥1,000

Jap Fiscal Year	1996	1997	1998	1999	2000 plan	Total
General Local Budget	300	3,200	3,800	4,405	4,000	15,705
Enlightenment and Spread Activity Budget	0	0	0	822	920	1,742
LLDC Support Budget	0	0	0	1,500	0	1,500
Total(¥1,000)	300	3,200	3,800	6,734	4,920	18,947
Total equivalent in RM	7,470	79,760	116,900	232,360	171,790	608,280

¥1,000

Jap Fiscal Year	1996	1997	1998	1999	2000 plan	Total
Budget for equipment (A4 request)	0	64,000	134,560	70,300	22,000	290,860
Budget for accompanied equipment	2,768	783	4,772	3,689	-	12,012
Total(¥1,000)	2,768	64,783	139,332	73,989	22,000	302,872
Total equivalent in RM	68,990	1,614,730	4,287,140	2,553,100	768,000	9,291,960

RM

Jap Fiscal Year	1996	1997	1998	1999	2000 plan	Total
Emergency Asian Economy Support Budget for workshop roof	0	0	75,000	0	0	75,000
Extra General Local Budget for the Plant front fence & gate	0	0	25,400	0	0	25,400
Extra General Local Budget for the solar house pit cover	0	0	18,600	0	0	18,600
Extra General Local Budget for the plant fence extension	0	0	14,000	0	0	14,000
Extra General Local Budget for the plant water purification pond	0	0	23,000	0	0	23,000
Extra General Local Budget for the plant power upgrade	0	0	64,800	0	0	64,800
Total(RM)	0	0	220,800	0	0	220,800

\*Japanese Fiscal Year=April~March

### Cost Contribution By MARDI To The Project

1. Development Expenditure	RM
• Construction of building for OPF processing plant	1,797,272.92
• Additional electrical supply	260,063.17
• Concrete floor for storage of raw material	24,501.60
• Maintenance expenditure	87,775.45
• Unutilized allocation due to delay of commissioning of plant equipment and machinery in 1999	651,194.80
Total	2,820,807.94
2. Operating Expenditure (exclude emolument of member staff)	
• Operating expenses 1997	57,450.00
• Operating expenses 1998	70,520.97
• Operating expenses 1999 (until 31st March 2000)	72,030.45
Total	200,001.42
3. Research & Development Expenditure	80,383.73
Grand Total	RM 3,101,193.09

Input By Malaysian Side

1997	1998	1999	2000	2001(plan)
-Main site (Serdang) -Sub site (Kluang)	-Main site (Serdang) -Sub site (Kluang) -Chemical -Feed Material -Experimental animals -Labor -Utilities	-Main site (Serdang) -Sub site (Kluang) -OPF Plant Building -Additional electricity supply -Chemical -Feed Material -Experimental animals -Labor -Utilities	-Main site (Serdang) -Sub site (Kluang) -Maintenance of plant -Maintenance of solar dryer -Chemical -Feed Material -Experimental animals -Labor -Utilities	-Main site (Serdang) -Sub site (Kluang) -Maintenance of plant -Maintenance of solar dryer -Chemical -Feed Material -Experimental animals -Labor -Utilities

Machinery & Equipment provided by JICA

1997	1998	1999	2000	2001(plan)
-Lorry x 2 -4WD Vehicle x2 -Tractor x 2 -Chopper x2 -Solar dryer -Incubator -Liquid Crystal Projector etc.	-Pelletazer Line Machinery -Fibertec etc.	-Cuber Line Machinery -Chopper -Conveyor belt -Forklift etc.	-Various Measurement Devices -Supplemental Machinery for the plant -Equipment for feeding experiment etc. (under planning)	(under planning)



# Assignment of JICA Long Term Experts

Expert Name	From	Until	Year	1997年	1998年	1999年	2000年	2001年	2002年
Dr.H. HAYAKAWA	97.4.10	1.4.9							Team Leader / Feeding management
Mr.K. TANAKA	97.3.15	1.3.14							Agro. Machinery
Dr.S. OSHIO	97.3.22	99.3.21							Feed Evaluation
Mr.S. NISHIKAWA	97.4.10	99.4.9							Coordinator
Dr.A. OSHIBE	99.3.15	1.3.14							Feed Evaluation
Mr.A. NISHIKORI	99.3.1	1.2.28							Coordinator

# Assignment of JICA Short Term Experts

Expert Name	From	Until	Year	1997年	1998年	1999年	2000年	2001年	2002年
Mr.S.TAKAI	97.7.7	97.8.10			Consultants on Agricultural processing machinery and processing plant design				
Mr.N. NOBORU	97.7.7	97.8.10			Consultants on Agricultural processing machinery and processing plant design				
Dr.H.UKAWA	97.9.4	97.10.2			Economic Analysis				
Mr.K.NONAKA	98.2.10	98.3.23			Feed Analysis				
Mr.K.TAMAKI	98.2.10	98.3.23			Agriculture Processing Machinery				
Mr.S.TAKAI	98.5.16	98.5.27			Plant and Machinery Installation				
Mr.S.MASAKI	98.6.17	98.7.16			Evaluation of the Deterioration in the Chemical Components of OPF				
Mr.S.TAKAI	98.7.27	98.8.16			Plant and Machinery Installation				
Mr.H.KAWAMOTO	98.10.19	98.12.13			Presumption Method of Voluntary Intake for OPF				
Mr.K.ICHITO	99.3.20	99.4.19			Improvement of Harvest/Collection Technology Based on OPF				
Mr.S.HASHIMOTO	99.3.28	0.2.27			Feed Processing Machinery and Feed Processing Technique				
Mr.T.KOJIMA	99.5.9	99.5.14			Preparation of Specification & Tender Document for Cobic Machine				
Mr.T.KOJIMA	99.7.27	99.8.16			Assistance of Tender				
Dr.A.WATANABE	99.8.28	99.9.6			Checking methods of meat quality and blood characteristic for beef cattle				
Mr.N.UMEDA	99.11.5	99.12.3			Improvement of Pre-treatment Technology Based on OPF				
Mr.Y.SHIBUYA	0.2.11	0.3.9			Mechanization technology of harvesting - collection				
Dr.H.UKAWA	0.3.22	0.4.18			Economic evaluation and cost analysis				
Mr.S. HASHIMOTO	0.4.17	0.10.15			Plant Production Control Technology				

# MARDI Counterpart Allocation

		Japanese Fiscal Year				1996				1997				1998				1999				2000				2001				Position		
Field/Post in the project	C/P's Name	Month	4	7	10	1	4	7	10	1	4	7	10	1	4	7	10	1	4	7	10	1	4	7	10	1	4	7	10	1		
Administration	Project Director	Dato' Dr. Md. Sharif Ahmad																												Retired Dec. 1999	Director General, MARDI	
	Project Director	Dr. Saharan Hj. Anang																												successor to Dato' Dr. Md. Sharif	Director General, MARDI	
	Project Manager	Dr. Mohd Ariff Omar																													Director, LRC, MARDI	
	Asst. Project Manager	Dr. Wan Zahari Mohamed																													LRC, MARDI	
	Coordinator	Mr. Mat Daham Mohd Daud																													LRC, MARDI	
Improvement of feed processing system (Material supply)	C/P	Mr. Hamdan Manaf																													SENRC, MARDI	
	Assistant C/P	Mr. Ab. Rahman Abdullah																													SENRC, MARDI	
Improvement of feed processing system (Processing plant)	C/P	Mr. Mat Daham Mohd Daud																													LRC, MARDI	
	Assistant C/P	Mr. Yunus Ismail																													LRC, MARDI	
	Assistant C/P	Mr. Rabuan Said																													LRC, MARDI	
	Assistant C/P	Mr. Wan Ghani Mohamed																													LRC, MARDI	
	Assistant C/P	Mr. Zainal Zulkifly																													LRC, MARDI	
Improvement of feeding management	C/P	Dr. Wan Zahari Mohamed																													LRC, MARDI	
	Co worker	Dr. Abu Bakar Chik																													LRC, MARDI	
	Co worker	Mr. Shamsuddin Abu Bakar																													LRC, MARDI	
	Co worker	Mr. Yusoff Sudin																													DVS, Kluang	
	Co worker	Dr. Ahmad Shukri Abdullah																													DVS, Kluang	
	Co worker	Dr. Basery Mohamed																													LRC, MARDI	
	Co worker	Mr. Mohd. Sukri Idris																													MARDI, Kluang	
	Assistant C/P	Mr. Nor Ismail Mat Shukor																													LRC, MARDI	
	Assistant C/P	Mr. Shaharuddin Mohd Ali																													LRC, MARDI	
	Assistant C/P	Mr. Wan Razari Omar																													LRC, MARDI	
	Assistant C/P	Mr. S. Subramaniam																													LRC, MARDI	
	Assistant C/P	Ms. Rashidah Ahmad																													LRC, MARDI	
Improvement of feed quality	C/P	Dr. Mohd Jaafar Daud																													LRC, MARDI	
	Co worker	Ms. Marini Ahmad Marzuki																													LRC, MARDI	
	Co worker	Mr. Suparjo Nordin Mokhtar																													LRC, MARDI	
	Assistant C/P	Ms. Sarah Rasol																													LRC, MARDI	
	Assistant C/P	Mr. Zainal Abidin Ahmad																													LRC, MARDI	
Economic evaluation	C/P	Ms. Siti Badriah Saful Nathan																													31/10/99 resigned	EC, MARDI
	C/P	Mr. Sarmin Sukir																													successor to Ms. Siti	EC, MARDI
	Assistant C/P	Mr. Arbain A. Rahman																													EC, MARDI	

# Counterpart Personnel Training in Japan

JIRCAS: Japan International Research Center for Agricultural Sciences  
 NAES: National Agricultural Experiment Station  
 NGRI: National Grassland Research Institute  
 NIAI: National Institute of Animal Industry

Name of C/P	Subject	Date from	Date until	Main Training	Year	1997年	1998年	1999年	2000年	2001年	2002年
Ms.Siti Badariah Bt Saiful Nathan	Economy Evaluation	97.10.6	97.12.13	JIRCAS, Hokkaido NAES		▼▲					
Ms.Rosnizah Bt Ismail	Feed	97.10.6	97.12.13	NIAI		▼▲					
Mr.Mat Daham Mohd Daud	Plant	97.10.12	97.11.14	Private companies		▼▲					
Mr.Hamdan Bin Ab Manap	Material	97.10.12	97.11.14	Private companies		▼▲					
Ms.Sarah Bte Rasol	Sugars	98.2.23	98.4.24	NIAI			▼▲				
Dr.M.Ariff Omar	Project	98.3.30	98.4.10	Tokyo International Centre			▼				
Dr.Wan Zahari bin Mohamed	Feeding Management	98.5.11	98.7.11	NIAI, Univ. of Kyoto			▼▲				
Mr.Idris b. Mohamed	Safety & environment management of plant	98.8.31	98.9.30	Private companies			▼▲				
Mr.Mohd. Yunus b. Ismail	Plant Management	98.8.31	98.10.30	NGRI			▼▲				
Mr.Rubuan Said	Plant Machinery	98.10.26	98.12.25	Kyushu, NAES			▼▲				
Mr.Ramuli bin Hj. Mohd Noor	Study in Japan	99.4.5	1.3.31	Kagoshima Univ.				▼	▲		
Mr.Wan Abdul Ghani Mohamed	Material drying of OPF	99.8.1	99.10.2	NGRI				▼▲			
Mr.Abdul Rahman Abdullah	Material supply and handling	99.8.1	99.10.2	NGRI				▼▲			
Dr.Abu Bakar Chik	Nutrition management of dairy cattle	99.6.2	99.8.3	NGRI				▼▲			
Mr.Mohd. Sukri Hj. Idris	Nutrition management of beef cattle	99.6.2	99.8.3	Tohoku, NAES				▼▲			
Dr.Mohd. Jaffar Daud	Simple estimation of indigestible components	99.10.3	99.11.30	NIAI				▼▲			

## ANNEX 2. Itemized Evaluation of DIP activities

### I. IMPROVEMENT OF FEED PROCESSING SYSTEM

#### 1.1. Material Supply

Item	Activity	Goal	Progress (1997 – 1Q 2000)	Future Perspective (2Q 2000 – 1Q 2002)
1. Technology development of harvesting/collection				
1.1. Review of present status of industry (1997)	Conceptual design of machinery system	Identification of researchable areas with respect to material supply	From the investigation, a conceptual design of machinery system for collection and processing of OPF for feed production were determined. (Technical Report, Hamdan, al. 1997)	Completed  The mechanization system is designed around the mobile chipper as the main machine component
1.2. Field performance evaluation of machine (1997-1998)	Time study of machine operating in farm condition	Development of machinery system for collection of OPF	Actual performance in farm of machines consisted of tractor-trailer with OPF grabber and tractor with mobile chipper was investigated. Aspects of required improvements in tractor-trailer-grabber system were identified. (Draft of Project Publication No.10 , K. Ichito, et.al. 1999)	On going  Study the incorporation of feeding box with OPF grabbing arm to replace present manual feeding of OPF into chipper
1.3. Improvement of mechanization system (1998-1999)	Adaptation & modification of machines	Development of machine components for economical machinery system of OPF collection	The modification of tractor-trailer-grabber system to improve the hydraulic oil pressure induction speed, the lift and the directional control is under investigation.	On going.  Conduct improvement of grabber as collection robot arm

Item	Activity	Goal	Progress (1997 – 1Q 2000)	Future Perspective (2Q 2000 – 1Q 2002)
2. Improvement of material handling & transportation				
2.1. Analysis of present status (1997)	Conceptual design of appropriate transportation system	Identification of areas for Improvement In handling and transportation of OPF	The system consisted of tractor-trailer in farm with truck at roadside and the system using truck directly in farm were studied. Direct use of truck in farm to serve mobile chipper whenever possible was found to be more efficient.	Completed.
2.2. Field performance evaluation of transporters (1997-1998)	Time study of transporter operating in farm situation	Development of areas for Improvement In handling and transportation of OPF from farm to processing plant	<p>Actual performance of the machines in farm was investigated. Chipping of OPF in farm reduced bulk density of material four-fold compared to whole OPF so that transporters could be loaded to its full capacity (Technical Report, Hamdan, al. 1997).</p> <p>Aspects for improvements were identified (Draft of Project Publication No.10, K. Ichito, et.al. 1999 )</p> <p>Soil penetration resistance in relation to machinery traffic in farm was investigated.</p> <p>(Draft of Project Publication No. 16, Y. Shibuya, et. al. 2000)</p>	<p>On going.</p> <p>Study factors such as soil hardness and topography of field in relation to machine performance</p>

2.3. Improvement of transportation system: (1998-1999).	Adaptation & modification	Development of machinery system for economical handling and transportation system of OPF from farm to processing plant	Modification of the truck's container and tipping mechanism to improve loading and unloading operations was under investigation.	On going. Study 'Roll-on Roll-off' container.
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3. Improvement of pre-treatment methods				
3.1 On-farm chipping of OPF (1997-1998)	Evaluation of commercial chippers	Identification of economical chipping of OPF	The selected chipper could chip whole OPF at about 4 tons per hr (Draft of Project Publication No.10, K. Ichito, et. al. 1999)	Completed
3.2. Pre-drying of OPF (1998- 2000)	Evaluation of solar drying system	Development of economical method for pre-drying of OPF	Modification of Okada drying machine was carried out to improve drying efficiency and material handling in the solar house. The replacement of roof material is under investigation to improve solar radiation reception. Solar drying was capable of reducing moisture content of chipped OPF from 61% to 29% (wet basis) after 24 hrs and 11% after 48 hrs. (Project Publication No.5, K. Tamaki, et. al. 1998)	On going. Study automated material handling from solar house to processing plant to save labor
3.3. Field evaluation of improved chipping method	Evaluation of improved chipper	Development of economical chipping system	The incorporation of feeding box with OPF grabbing arm to replace present manual feeding of OPF into chipper is under investigation.	On going Study of autofeeding system for mobile chipper.

## 1.2. Processing Plant

Item	Activity	Goal	Progress (1997 – 1Q 2000)	Future Perspective (2Q 2000 – 1Q 2002)
1. Planning and setting				
1.1 Conceptual design of plant and machinery (1997 – 1998)	Planning for plant and machinery  (Actual installation, and commissioning )	To set up a 2 ton /hr OPF processing plant	The design, tender process and construction of the plant were completed. (Consultant report, Intem, et. al. 1997)  Pelleting machinery with 2 ton/hr has been installed. Cubing machinery is under installation.	Completed  Improvement in term of machinery layout.
2. Improvement of processing system				
2.1 Artificial drying of OPF (1997 – 1998)	Evaluation of heated drying machine	Identification of economical drying system	Performance of drying machine will be evaluated upon completion of machinery installation.	i. Conduct test and evaluation of the drying machine ii. Study the economics of the installed drying machine. iii. Conduct modification and improvement of drying system

2.2 Size reduction  (1997 – 1999)	Evaluation of grinder	Identification of suitable grinder for size reduction of OPF to meet requirement	Performance of grinder will be evaluated upon completion of machinery installation	i. Determine the relationship between size reduction and moulding efficiency of the OPF. ii. Determine the length of the fibre and quality of feed produced.
2.3 Pelleting and cubing  (1998 – 2000)	Evaluation of pelleting and cubing machine	Determination of the most economical machine for processing system	Performance of pelleting and cubing machine will be evaluated upon completion of machinery installation	Evaluate performance of pelleting and cubing machine
3. Evaluation of plant management.				
3.1 Evaluation of plant machinery layout  (2000 – 2001)	Work study of process flow and control	To determine the most optimum layout and efficient process control	Preliminary study was carried out during the installation	Study layout and process control for further improvement.



## II. Improvement of feed quality

Item	Activity	Goal	Progress (1997 – 1Q 2000)	Future Perspective (2Q 2000 – 1Q 2002)
1. Raw material analysis				
1.1. Assessment of chemical properties of OPF (1997)	Collection of OPF from different areas and aged trees and the analysis	Recognition of the range of variation in quality and quantity of OPF in Malaysia	<p>Chemical analyses on OPF of various ages ( 5 to 29 years) revealed the following results: (1) CP content tended to increase with age. (2) Only small variation existed in ADF and NDF contents. (Project publication No. 06 , K. Nonaka, et. al. 1998 ).</p> <p>There was significant difference in weight of fronds collected from the four different locations in Peninsular Malaysia. NDF content increased with age. (Project publication No. 07, S. Oshio, et.al. 1999).</p>	Completed
1.2. Assessment of nutritional properties of OPF (1997-1998)	Sampling OPF at the lapse of time after pruning and drying process	Determination of optimum harvesting conservation and drying methods	<p>The DM weight of pruned fronds reduced to 50 % after 30 days of pruning. ADF and NDF contents significantly increased with storage. About 0.4 % of TDN was lost per day after pruning. (Project publication No. 07, S. Oshio, et.al. 1999).</p>	Completed
1.3. Assessment of toxicological properties of OPF (1999-2000)	Analysis of other by products of oil palm. Digestibility trials for these raw materials	Confirmation of OPF as safety feed for ruminants	<p>Fungi (<i>Aspergillus</i> and <i>Penicillium</i>) were detected in raw / fresh OPF. The monitoring of moisture content and fungal growth in each processing stage is in progress.</p> <p>Analysis on heavy metals in raw material has been conducted.</p>	Completed

Item	Activity	Goal	Progress (1997 – 1Q 2000)	Future Perspective (2Q 2000 – 1Q 2002)
2. Product analysis				
2.1. Assessment of chemical and nutritional properties of OPF products (1998-1999)	Analysis of chemical composition of OPF products	Determination of suitable combination of ingredients and physical form of OPF products	Animal trial conducted in Serdang revealed that digestibility of OPF-based pellet decreased with increasing OPF ration. Reduction of the particle size by grinding increased the passage rate of OPF pellet in the rumen (Project publication No.07, S. Oshio, et. al. 1999) ( Project publication No. 8, H. Kawamoto, et. al. 1999) Analyses on heavy metals in OPF pellets and cubes are in progress.	On going.  Evaluate toxicological properties of the product
2.2. Assessment of physical properties of OPF products (1998-1999)	Palatability and voluntary intake of OPF pellets and cubes		Intake of OPF in the form of pellet was highest as compared to fresh- chopped, silage or NaOH treated OPF (Project publication No.07, S. Oshio, et. al. 1999.)	Completed

Item	Activity	Goal	Progress (1997 – 1Q 2000)	Future Perspective (2Q 2000 – 1Q 2002)
3 Improvement of nutritive values				
3.1. Improvement of the nutritive values of raw materials (1999)	Improve the quality of raw materials by chemical treatment	Choice of suitable method to improve the raw quality	Digestibility trials carried out on KK cattle revealed that digestibility of NaOH treated OPF silage was higher than that of OPF pellet or OPF silage. (Project publication No.07, S. Oshio, et. al. 1999.)	Completed

3.2. Improvement of the nutritive values of OPF products (1999-2000)	Improve the quality of OPF products by mixing other feed by-products	Choice of optimum combination of OPF and other by-products	Chemical compositions (Organic cell content and organic cell wall) of feed ingredients (PKC, POME, brewer's grain and Napier grass) were analyzed by the enzyme analysis. (Project publication No. 06 , K. Nonaka, et. al. 1998 ). Feeding value of diets comprising various levels of OPF was determined (Proc. of 97 <sup>th</sup> Annual conf. of JSAS, Wan Zahari, et. al. 2000)	Completed  Data collected during feeding trials on beef and dairy cattle to be utilised
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Item	Activity	Goal	Progress (1997 – 1Q 2000)	Future Perspective (2Q 2000 – 1Q 2002)
4. Product evaluation				
4.1 Improvement of the uniformity of the products in chemical composition (1999-2001)	Sampling of the products and analysis of the chemical composition (It is proposed that the activity be concentrated on "Improvement of the keeping quality of OPF products through packing and storage methods".)	Correction of feed processing method for making uniform feeds	Preliminary data on suitable packaging materials have been collected.	On going  Determine the optimum condition to improve keeping quality of the products
4.2 Development of simple evaluation system of chemical composition and nutritive values (1999-2001)	Making calibration equations for OPF feeds with NIR, in vitro or in situ method	Establishment of simple method for presuming composition and nutrition value of OPF products	Chemical analysis has been conducted on some samples of the compound feed.	Establishment of calibration curves for NIR analysis will be conducted when the NIR analyzer is available.

### III. Improvement of feeding management

Item	Activity	Goal	Progress (1997 – 1Q 2000)	Future Perspective (2Q 2000 – 1Q 2002)
1. Planning of experiment				
1.1. Preparation for feeding trials (1997)	Calculation of chemical composition for OPF based feeds Survey of dairy and beef farm	Planning of suitable combination of OPF and other ingredients for ruminant	Planning of beef cattle trial has been completed  The survey on suitable location for the subsequent trial at a private farm is in progress.	Completed  On going.
2. Feeding experiment				
2.1. Feeding experiment on beef cattle at institutional farm (1999-2000)	Feeding trial of beef cattle on institutional level	Establishment of efficient feeding technology for beef cattle	Feeding trial on beef cattle at MARDI Kluang was terminated due to limitation in dietary intake of high N diet.  Another trial conducted at MARDI Serdang to determine optimum inclusion level of OPF pellets for growing beef cattle revealed that optimum inclusion level of OPF in the pellet was about 30 % when commonly available local feeds were used as other ingredients. (Proc. of 97 <sup>th</sup> Annual conf. of JSAS, Wan Zahari, et. al. 2000)	Completed  A trial on the utilization protein as supplement in the OPF-pellet based diets is on going.
2.2. Feeding experiment on dairy cattle at institutional farm (1998-1999)	Feeding trial of dairy cattle on institutional level	Establishment of efficient feeding technology for dairy cattle	A dairy cattle trial has been planned to be conducted with DVS at Institute Haiwan Kluang.	The trial to be carried out from 3Q 2000 to 2001.
2.3. Feeding experiment on beef cattle at private farm (2000)	Feeding trial of beef cattle on practical condition	Collecting the feed back from the user.	The location of the trial has been identified.	The LRC has agreed to bear the cost of OPF production and the delivery to the experimental sites.____ The trials to be carried out 2001.
2.4. Feeding experiment on dairy cattle at private farm (2000)	Feeding trial of dairy cattle on practical condition			

3. Improvement of feeding technology				
3.1. Improvement of milk quality (2000-2001)	Analysis of milk composition of dairy cows feed on OPF based rations	Improvement of milk quality suitable for local market	Nil	The activity is proposed to be withdrawn because improvement of milk quality by upgrading feed quality only has certain limitation
3.2. Improvement of beef quality (2000-2001)	Checking the beef quality of the beef cattle reared on OPF based rations	Improvement of beef quality suitable for local market	A study to evaluate meat quality of local cattle using ultrasonic device has been conducted (Draft of project publication No.11, A. Watanabe, et. al. 1999)	Evaluation of meat quality of beef cattle fed OPF diet will be conducted in the feeding experiment on beef cattle at private farm.

Item	Activity	Goal	Progress (1997 – 1Q 2000)	Future Perspective (2Q 2000 – 1Q 2002)
4. Evaluation of feeding management system				
4.1. Evaluation of OPF feeding management system for beef cattle (2001)	Investigation of the requirement of manpower and facilities of the work in beef cattle feeding system	Establishment of labor-saving management system for beef and dairy cattle	The activity to be carried out as scheduled.	On going.
4.2. Evaluation of OPF feeding management system for dairy cattle (2001)	Investigation of the requirement of manpower and facilities of the work in dairy cattle feeding system		The activity to be carried out as scheduled.	On going.
4.3. Preparation of OPF feeding management manual for beef and dairy cattle (2001)	Preparation of OPF feeding management manual for beef and dairy cattle		The activity to be carried out as scheduled.	On going.

#### IV. Economic evaluation of OPF production

Item	Activity	Goal	Progress (1997 – 1Q 2000)	Future Perspective (2Q 2000 – 1Q 2002)
1. Cost analysis				
1.1. Analysis of production cost structure (1997)	Analysis of cost at pre-processing stage, experimental plant	Identifying reducible cost items	The analysis on cost structure revealed that the production cost of OPF pellet by the present mini plant was RM 342.5 per ton. Labor cost accounted 33.8% of the total cost. Main cause is due to non-continuous processing procedure. (Project publication No. 09 , S. N. Siti Badariah et. al. 1999 ).	Completed
1.2. Feasibility of OPF pilot plant (1998-2001)	Projected cash flow of OPF plant	Profitability of OPF pilot plant	Preliminary cost analysis of pre-drying stage by the solar drying system and pelleting at test run stage has been carried out. The analysis on cost structure revealed that production cost of OPF pellet by the pilot plant was RM 1,252 per ton. The depreciation of the machine and facility accounted 42% of total cost. (Draft of project publication No. 17, H. Ukawa, et. al. 2000)	On going  Determine economics of the pilot plant at full scale operation
1.3. Viability of OPF plant (1999-2001)	Forecasting of business viability	Calculations of viability indicators	Nil	The viability indicators will be determined.

Item	Activity	Goal	Progress (1997 – 1Q 2000)	Future Perspective (2Q 2000 – 1Q 2002)
2. Market Study (Comparative evaluation of feed)				
2.1. Demand analysis (1997-1998)	Analysis of substitute feed price Survey of farm	Suggest target price of OPF	The range of target price for the Japanese market has been suggested to be comparable / within the price of sugar beet and rice straw. The cost of roughage to be used for local horses were obtained. The surveys on dairy, beef and goat farms have been conducted to estimate feed cost.	On going The data to be updated until the completion of the project.
2.2. Supply analysis (1998-1999)	OPF supply outlook	Status of OPF available for feed	Data on oil palm acreage and production has been compiled based on PORIM statistics.	On going The data to be updated until the completion of the project.

## ANNEX 3.

## DETAILED SCHEDULE OF IMPLEMENTATION

## Annual Work Plan

Item \ Year	1997	1998	1999	2000	2001
<b>I. Improvement of feed processing system</b> <b>1. Material supply</b> (1) Technology of development of harvesting/ collection 1) Review of present status of industry 2) Field performance evaluation of machines 3) Improvement of mechanization system (2) Improvement of material handling and transportation 1) Analysis of present situation 2) Field performance evaluation of transporters 3) Improvement of transportation system (3) Improvement of pre-treatment methods 1) On-farm chipping of OPF 2) Pre-drying of OPF 3) Field evaluation of improved chipping methods <b>2. Processing plant</b> (1) Planning and setting 1) Conceptual design of plant and machinery (2) Improvement of processing system 1) Artificial drying of OPF 2) Size reduction 3) Pelletizing and cubing (3) Evaluation of plant management 1) Evaluation of machinery layout					
<b>II. Improvement of feed quality</b> (1) Raw material analysis 1) Assessment of chemical properties of OPF 2) Assessment of nutritional properties of OPF (2) Product analysis 1) Assessment of chemical and nutritional properties of OPF products 2) Assessment of physical properties of OPF products 3) Assessment of toxicological properties of OPF products					



<p>(3) Improvement of nutritive values</p> <p>1) Improvement of the nutritive values of raw materials</p> <p>2) Improvement of the nutritive values of OPF products</p> <p>(4) Product evaluation</p> <p>1) Improvement of the uniformity of the products in chemical composition</p> <p>2) Development of simple evaluation system of chemical composition and nutritive values</p>					
<p>III. Improvement of feeding management</p> <p>(1) Planning of experiments</p> <p>1) Preparation for feeding trials</p> <p>(2) Feeding experiments</p> <p>1) Feeding experiments of beef cattle at institutional farm</p> <p>2) Feeding experiments on dairy cattle at institutional farm</p> <p>3) Feeding experiments on beef and dairy cattle at private farms</p> <p>(3) Improvement of feeding technology</p> <p>1) Improvement of beef quality</p> <p>(4) Evaluation of feeding management system</p> <p>1) Evaluation of OPF feeding management system for beef cattle</p> <p>2) Evaluation of OPF feeding management system for dairy cattle</p> <p>3) Preparation of OPF feeding management manual for beef and dairy cattle</p>					
<p>IV. Economic evaluation of OPF Production</p> <p>(1) Cost analysis</p> <p>1) Analysis of production cost structure</p> <p>2) Feasibility of OPF pilot plant</p> <p>3) Viability of OPF plant</p> <p>(2) Comparative evaluation of feed</p> <p>1) Demand analysis</p> <p>2) Supply analysis</p>					

# ANNEX 4.

## REVISED PROJECT DESIGN MATRIX

### Project for Development of Technology Related to Processing of Feed Based on Agro-industrial By-Products of Oil palms in Malaysia

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumptions
<p>Overall Goal:</p> <p>The livestock industry in Malaysia is developed through the stable supply of feed based on agro-industrial by-products of oil palms.</p>	Demand for processed OPF feed	Monitoring of the demand for processed OPF feed by the concerned traders.	<p>a. There will be no change in Malaysian Government policy in agro-production</p> <p>National Agricultural Policy 3 (NAP3) aims at maximizing income of producers through the optimal utilization at resources, thus maximizing agriculture's contribution to national income and export earnings.</p>
<p>Project Purpose:</p> <p>Effective, practical and viable method and system for converting by-products of oil palms into processed feed are developed.</p>	User's confidence	Inquiry results from the users ( feed manufactures and traders and cattle feeders)	<p>a. Neither natural disasters nor new type pests affecting oil-palm production will occur.</p> <p>b. There will be smooth growth of consumption in livestock products in Malaysia.</p>
<p>Outputs:</p> <p>1. The methodology for processing oil palm fronds and other by-products of oil palms into processed feed is developed.</p> <p>2. An appropriate method of animal feeding management on the processed feed is developed.</p> <p>3. The viability of the processed feed for practical use is verified</p>	<p>1.1 2,000 ton of OPF feed is processed yearly by the pilot plant.</p> <p>1.2 Comparable quality to conventional fibrous feed products</p> <p>2.1 OPF feeding standardization for beef and dairy cattle.</p> <p>3.1 Market competitiveness</p>	<p>Project quarterly reports</p> <p>Product evaluation reports</p> <p>Manuals prepared by the Project</p> <p>Economic evaluation reports</p>	<p>a. The developed technology will be accepted for use by the local private enterprises.</p> <p>b. The MARDI organization will not change.</p> <p>c. The MARDI budget will not decrease.</p> <p>d. The cost for OPF materials will not rise unexpectedly</p>

<p>Activities:</p> <p>1.1 Improvement of feed processing system</p> <ol style="list-style-type: none"> <li>1) Material supply               <ol style="list-style-type: none"> <li>(1) Technology development of harvesting/collection</li> <li>(2) Improvement of material handling and transportation</li> <li>(3) Improvement of pre-treatment methods</li> </ol> </li> <li>2) Processing plant               <ol style="list-style-type: none"> <li>(1) Planning and setting</li> <li>(2) Improvement of processing system</li> <li>(3) Evaluation of plant management</li> </ol> </li> </ol> <p>1.2 Improvement of feed quality</p> <ol style="list-style-type: none"> <li>(1) Raw material analysis</li> <li>(2) Product analysis</li> <li>(3) Improvement of nutritive values</li> <li>(4) Product evaluation</li> </ol> <p>2.1 Improvement of feeding management</p> <ol style="list-style-type: none"> <li>(1) Planning of experiments</li> <li>(2) Feeding experiments</li> <li>(3) Improvement of feeding technology</li> <li>(4) Evaluation of feeding management system</li> </ol> <p>3.1 Economic evaluation of OPF production</p> <ol style="list-style-type: none"> <li>(1) Cost analysis</li> <li>(2) Comparative evaluation of feed</li> </ol>	<p>Inputs:</p> <p><u>Japanese side</u></p> <ol style="list-style-type: none"> <li>1. Despatch of experts           <p>Long-term experts;</p> <ol style="list-style-type: none"> <li>a. Team leader</li> <li>b. Coordinator</li> <li>c. Agro-machinery</li> <li>d. Feed evaluation</li> </ol> <p>(Team leader may serve concurrently as expert for other field)</p> <p>Short-term experts; when need arises.</p> </li> <li>2. Equipment, machinery, instruments, tools, materials and vehicles will be provided within the Japanese budget limitations</li> <li>3. C/P training in Japan</li> </ol> <p><u>Malaysian side</u></p> <ol style="list-style-type: none"> <li>1. Director General of MARDI as Project Director</li> <li>2. Director of LRC of MARDI as Project Manager</li> <li>3. C/P for Japanese experts;           <ol style="list-style-type: none"> <li>a. C/P in agro-machinery both in material supply &amp; processing plant</li> <li>b. C/P in feed evaluation</li> <li>c. C/P in feeding management</li> <li>d. C/P in economic evaluation</li> <li>e. Other necessary fields mutually agreed on</li> </ol> </li> <li>4. Research assistants and administrative personnel</li> <li>5. Land, offices, laboratories and other necessary facilities</li> </ol>	<ol style="list-style-type: none"> <li>a. There will be no change in affirmative allocation of MARDI C/Ps.</li> </ol> <p>Pre-conditions:</p> <ol style="list-style-type: none"> <li>a. The project will be accepted by the Malaysian Government and the relevant organization.</li> <li>b. Oil palm fronds will be uninterruptedly supplied as feed material.</li> </ol>
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2. 合同調整委員会コメント



**INSTITUT PENYELIDIKAN DAN KEMAJUAN PERTANIAN MALAYSIA**  
Malaysian Agricultural Research and Development Institute

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PEJABAT KETUA PENGARAH (*Director General's Office*)

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July 25<sup>th</sup>. 2000

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Dear Sir,

Re: **Mid-Term Evaluation Report For MARDI-JICA Project**  
- **Suggestions Of Joint Coordination Committee**

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The Joint Coordination Committee for the MARDI-JICA project at its meeting on July 11<sup>th</sup>. 2000 at MARDI Head Office, Serdang, Selangor has been briefed on the Mid-term Evaluation Report by the Review Panel. The committee has made a number of comments and suggestions on the report as attached.

2. The committee would like JICA to favorably consider these suggestions.

" LEADER IN AGRO - TECHNOLOGY "

Yours faithfully,

**DR. SAHARAN B. HJ. ANANG**  
Director General MARDI

c.c. Dr. Mohd. Ariff b. Omar  
Director Livestock Research Centre

Dr. H. Hayakawa  
JICA Team Leader

**Comments and suggestions of Joint Coordination Committee at its meeting on July 11<sup>th</sup>. 2000**

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1. MARDI is planning to invite the Hon. Prime Minister of Malaysia or Hon. Deputy Prime Minister of Malaysia to the official opening ceremony of the processing plant in early October 2000.

The Minister of Agriculture has been informed about MARDI intention. Although there is a considerable delay in the installation and commissioning of the cuber line, all necessary actions must be taken to ensure that the plant will be fully operational in September 2000. A detailed action plan and targets for completion must be formulated by the Project Team. Tomen as the cuber machinery contractor of JICA shall be urged to speed up the completion in the commissioning of the remaining cuber line.

2. With the delay in the completion of the processing plant as well as there remains less than 2 years of the project period, the Project Team has to prioritize the recommendations suggested by the Review Team for implementation. Necessary inputs (finance, personnel and equipment) have to be provided to conduct the prioritized recommendations. A critical evaluation of all stages of the process flow need to be carried out to identify the necessary rectification.
3. All efforts must be addressed to make the OPF products to be highly competitive. Critical factors which could further reduce the cost of production must be examined. Collaboration with replanting contractors in supplying the raw materials is one area which needs consideration.
4. Target selling price of OPF based on imported barley straw price of Japan was 451RM/t. However, market competitiveness of OPF feed should be like products in comparison with other comparable fibrous feed in terms of price.
5. In order to produce high quality OPF feed, harvested OPF materials should be in good quality. Inspection and selection must be done at the time of collection.
6. Importance of use of OPF is strengthening not only in Malaysia but also world wide. The model of this Project becomes very influential. In view of this, the success of this Project must be ensured.