APPENDIX A
CHARACTERISTICS OF STUDY HOUSEHOLDS

a. Family structure

Family structure	(person) Average
Family size	5.17
No. of adults	3.31
No. of elders	0.76
No. of children	1.12
Age of household head	47.7

b. Educational level of household head

School level	(percents) Percent of households by farm size		
	Small	Medium	Larger
No education	22.2	16.4	0.0
Through Grade 4	60.3	74.6	80.0
Through Grade 7	17.4	9.0	20.0

c. Proportion of children to adult in household

No. of children per one adult	(percents) Percent of households by farm size		
	Small	Medium	Larger
Less than 0.26	30.2	34.3	60.0
0.26 to 0.5	33.3	35.8	20.0
0.51 to 0.75	20.6	14.9	20.0
0.76 to 1.0	15.9	11.9	0.0
1.1 to 1.5	0.0	3.0	0.0

Source : Formal survey, 1990.

APPENDIX B

CROP PRODUCTION AND PRODUCTIVITY

a. Average labor required to produce one hectare of crop

(hours)

Crop	Labor hours by farm size Small	Medium	Larger
Rice	1201	1256	1418
Soybean	1000	1133	1314
Pepper	1363	1565	1714
Garlic	1323	1177	1716
Garlic-Pepper[1]	2224	2566	2599
Tobacco	1156	1228	1547
Tobacco-Pepper[1]	1955	2050	2328
Vegetable	1241	1318	1960
Mungbean	1428	1617	0

[1]Intercrops

b. Net income derived per crop (Baht)

Crop	Baht/rai	Baht/ha
Rice	632	3952
Soybean	625	3904
Pepper	2318	14489
Garlic	3416	21350
Garlic-Pepper	9812	61325
Tobacco	2297	14357
Tobacco-Pepper	5988	37425
Vegetable	2173	13583
Mungbean	575	3594
Dry garlic	16576	103600

Source: Formal survey,1990.

APPENDIX C
RURAL EMPLOYMENT OUTSIDE THE HOUSEHOLD'S FARM

a. Hours per year devoted to outside activities

(hours)

Type of labor	Average hours per year per household		
	Small	Medium	Larger
Casual farm	799.7 (57.0)	223.3 (21.3)	0.0 (0.0)
Casual non-farm	386.0 (27.5)	207.5 (19.8)	110.0 (23.9)
Trade & business	217.5 (15.5)	617.9 (58.9)	350.0 (76.1)
Total hours	1403.2	1048.7	460.0

Note: Figures in parentheses are percentages of total hours

b. Annual income from outside labor activities

(Baht)

Type of labor	Average annual income per household		
	Small	Medium	Larger
Casual farm	6741 (43.8)	2088 (12.0)	0 (0.0)
Casual non-farm	4542 (29.5)	2712 (15.6)	1580 (12.2)
Trade & business	4120 (26.7)	12573 (72.4)	11320 (87.8)
Total income	5403	17373	12900

Note: Figures in parentheses are percentages of toal income

c. Location of outside labor activities

(percents)

Site	Percent of households w/ work at site		
	Small	Medium	Larger
Near village	38.1	30.5	0.0
In district	49.2	45.8	25.0
Beyond district	12.7	23.7	75.0

Source: Formal survey, 1990.

APPENDIX D

CASUAL LABOR EMPLOYMENT

a. Amount of household members in casual labor

(percents)

No. of individuals	Percent of households by farm size		
	Small	Medium	Larger
0	0.0	11.9	60.0
1	17.5	26.9	10.0
2	77.8	56.7	30.0
3	4.8	4.5	0.0

b. Number of households in casual labor each month

(household)

	Small	Medium	Larger
January	48 (76.2)	35 (52.5)	0 (0.0)
February	30 (47.6)	23 (34.3)	2 (20.0)
March	18 (28.6)	12 (17.9)	3 (30.0)
April	11 (17.5)	11 (16.4)	2 (20.0)
May	11 (17.5)	10 (14.9)	2 (20.0)
June	16 (25.4)	13 (19.4)	2 (20.0)
July	29 (46.0)	12 (17.9)	0 (0.0)
August	31 (49.2)	16 (23.9)	0 (0.0)
September	8 (12.7)	2 (3.0)	0 (0.0)
October	15 (23.8)	4 (6.0)	0 (0.0)
November	49 (77.8)	31 (46.3)	0 (0.0)
December	52 (82.5)	37 (55.2)	0 (0.0)
Total household	63 (100)	66 (100)	10(100)

Note: Figures in parentheses are percentage of households with members working in the given months, determined from the total number of households belonging to that farm size.

Source: Formal survey,1990.

APPENDIX E

HOUSEHOLD INCOME, EXPENSES AND SAVINGS DISTRIBUTIONS

a. Annual income distribution

(percents)

Income range (1000 Baht)	Households by farm size Small	Medium	Larger
0 to 50	79.37	31.34	0.00
51 to 100	19.05	52.24	30.00
101 to 150	1.59	14.93	50.00
151 to 200	0.00	1.49	10.00
201 to 250	0.00	0.00	0.00
251 to 300	0.00	0.00	10.00

b. Distribution of annual expenses

(percents)

Expense range (1000 Baht)	Small	Medium	Larger
0 to 15	3.17	14.93	20.00
16 to 30	50.79	22.39	20.00
31 to 45	39.68	38.81	40.00
46 to 60	4.76	17.91	0.00
61 to 75	1.59	5.97	0.00
76 to 100	0.00	0.00	0.00
over 100	0.00	0.00	20.00

c. Distribution of annual savings

(percents)

Savings range (1000 Baht)	Small	Medium	Larger
Less than 1	12.70	1.49	0.0
1 to 25	74.60	47.76	0.0
26 to 50	11.11	32.84	20.0
51 to 75	1.59	11.94	20.0
76 to 100	0.00	2.99	30.0
101 to 125	0.00	2.99	20.0
126 to 150	0.00	0.00	0.0
151 to 175	0.00	0.00	10.0

Source: Formal survey,1990.

APPENDIX F

TEST STATEMENTS USED IN ATTITUDE MEASUREMENT

Statement	Direction of scoring
1. My pig-production is not orientedtowards making profits.	(Agree: 5)
2. Pig-raising helps me to save (collect) a sum of money.	(Agree: 5)
3. I have many ways of collecting money, and pig-raising is not the best way for me.	(Agree: 1)
4. Pig-raising is the easiest way for me to save money.	(Agree: 5)
5. I need to keep cash to buy pig feed, so sometimes I cannot spend money as easily as I would otherwise.	(Agree: 5)
6. Because I need cash to buy pig feed, pig-raising is a good strategy to help me save money from unnecessary expenses.	(Agree: 5)
7. I think pig-raising takes more time then raising other animals does.	(Agree: 1)
8. Sometimes I cannot do other activities because I have to spend time properly managing my pigs.	(Agree: 1)
9. The time I spend with pigs everyday does not interrupt my other activities.	(Agree: 5)
10. The main reason I raise pigs is that pigs are easy to buy, inexpensive to raise, and easy to sell.	(Agree: 5)
11. The main reason I raise pigs is to make use of available excess time.	(Agree: 5)
12. Pig-raising gives me a non-regular (occasional) minor supportive income.	(Agree: 5)
13. Pig-raising gives me a regular (steady) major supportive income.	(Agree: 1)
14. Quite often I do not sell my pigs at the time I planned (because I wait for a better market price or buyer).	(Agree: 1)
15. Even though compound feed is better quality, I decided to use my own mixed feed because it costs less.	(Agree: 5)
16. My use of bran and broken rice does not help to lower production expenses much (I still pay for it).	(Agree: 5)
17. I call the veterinarian whenever my pigs are sick.	(Agree: 1)
18. I would be willing to take a loan for pig-production investment.	(Agree: 1)
19. If I did not get any profit from selling pigs, I would stop raising them temporarily.	(Agree: 5)
20. If I get good profits from selling pigs, I will raise them continuously (despite constraints such as labor demand in crop season, increase in feed price, etc).	(Agree: 1)
21. Profit-making is not my primary motivation in raising pigs.	(Agree: 5)

APPENDIX G

TOTAL ATTITUDE SCORES AND VALUES FOR ECONOMIC PARAMETERS USED IN SPEARMAN'S RANK CORRELATION

Farm number	Attitude score	Cash costs per pig	Cash revenues per pig	Cash costs by herd	Cash revenue by herd	Net benefit by herd	Net cash benefit by herd
1	47	1398.37	1633	4195.11	4900	729.49	704.88
2	49	1280.58	1550	2561.17	3100	544.71	538.83
3	47	1519.16	1450	3038.33	2900	-127.56	-138.33
4	48	1645.29	1600	1645.29	1600	-50.73	-45.29
5	44	1488.36	1550	2976.71	3100	135.86	123.29
6	36	1317.96	1500	2635.92	3000	368.19	364.08
7	45	1482.91	1550	5931.63	6200	294.01	268.37
8	88	1997.65	2200	15,981.20	17600	1255.04	1618.80
9	42	995.11	1400	1990.22	2800	828.67	809.78
10	41	1480.64	1500	1480.64	1500	17.57	19.36
11	41	914.90	1300	1829.80	2600	792.64	770.20
12	31	1012.56	1400	2025.13	2800	760.84	774.87
13	43	1389.65	1550	1389.65	1550	168.73	160.35
14	46	1174.45	1600	1174.45	1600	438.89	425.55
15	49	1575.18	1750	3150.36	3500	358.02	349.64
16	47	1896.58	1780	3793.17	3560	-239.68	-233.17
17	35	1469.32	1550	1469.32	1550	87.31	80.68
18	47	1782.08	1650	3564.17	3300	-265.17	-264.17
19	52	1325.02	1500	2650.03	3000	369.71	349.97
20	82	1802.23	2000	14,417.81	16000	1445.21	1582.19
21	58	982.10	1300	6874.68	9100	2181.48	2225.32
22	40	1133.18	1200	2266.36	2400	146.16	133.64
23	58	1677.46	1600	3354.92	3200	-151.56	-154.92
24	50	1444.29	1575	2888.59	3150	275.50	261.41
25	66	1690.13	1633	5070.39	4900	-166.16	-170.40
26	84	1769.31	1800	8846.55	9000	71.65	153.45
27	90	1774.03	1940	8870.13	9700	747.11	829.87
28	88	1206.52	1300	6032.60	6500	490.40	467.40
29	94	1072.84	1348	24,675.38	31000	6362.00	6324.48
30	95	1509.29	1600	21,130.05	22400	1236.58	1269.95
31	57	1861.29	1800	5583.88	5400	-191.32	-183.88
32	86	1451.53	1950	11,612.26	15600	3723.42	3987.74
33	39	996.61	1250	3986.44	5000	987.15	1013.56

APPENDIX H

MANAGEMENT PRACTICES: RANGE OF HERD SIZES AND PIGSTY AREAS

a. Size of pig herds per household

	(percent of households)		
No. of pigs	Small	Medium	Larger farms
0 to 2	73.0	68.7	40.0
3 to 5	20.6	13.4	0.0
6 to 8	1.6	4.5	20.0
9 to 14	4.8	9.0	0.0
over 14	0.0	4.5	40.0

b. Size of pigsty

	(percent of households)		
Sty area (m2)	Small	Medium	Larger farms
0 to 4	41.3	34.3	40.0
5 to 8	52.4	53.7	40.0
9 to 12	3.2	4.5	20.0
13 to 16	3.2	3.0	0.0
17 to 20	0.0	4.5	0.0

c. Sty area available per head of pig (m2)

	(percent of households)		
Area per head (m2)	Small	Medium	Larger farms
0 to 1	9.5	20.9	60.0
1.1 to 2	41.3	35.8	40.0
2.1 to 3	25.4	26.9	0.0
3.1 to 4	22.2	16.4	0.0
over 4	1.6	0.0	0.0

APPENDIX I

ANALYSES OF FEED CONVERSION RATIOS BY DIET

A. 5 diets included (133 pigs)

1. One-way ANOVA for FCR (1st month) = Diet

a. Bartlett's test of equal variances

	Chi Sq	DF	P
Test on raw data	19.03	4	0.0008
Test on transformed data	15.87	4	0.0032

Group variances unequal; Kruskall-Wallis required.

b. Kruskal-Wallis one-way analysis of ranks

Kruskall-Wallis statistic	58.19
P-value (Chi-Square)	0.000

c. Diet has significant effect on FCR in first month.

2. One-way ANOVA for FCR (2nd month) = Diet

a. Bartlett's test of equal variances

	Chi Sq	DF	P
Test on transformed data	4.96	4	0.291

Group variances concluded equivalent.

b. ANOVA on square root transformed data

Source	DF	SS	MS	F	P
Between	4	11.71	2.927	24.95	0.0000
Within	128	15.02	0.117		
Total	132	26.73			

c. Diet has significant effect on FCR in second month.

3. One-way AOV for FCR (3rd month) = Diet

a. Bartlett's test of equal variances

	Chi Sq	DF	P
Test on raw data	6.88	4	0.1423

Group variances concluded equivalent.

b. ANOVA on raw data

Source	DF	SS	MS	F	P
Between	4	329.1	82.28	29.27	0.0000
Within	128	359.8	2.811		
Total	132	688.9			

c. Diet has significant effect on FCR in third month.

4. One-way AOV for FCR (avg of 3 months) = Diet

a. Bartlett's test of equal variances

	Chi Sq	DF	P
Test on raw data	20.90	4	0.0003
Test of transformed data	11.42	4	0.0216

Group variances unequal; Kruskal-Wallis required.

b. Kruskal-Wallis one-way analysis on ranks

Kruskal-Wallis statistic	57.619
P-value (Chi Sq)	0.0000

c. Diet has significant effect on FCR averaged over three months.

B. 4 diet treatments included (99 pigs)

1. One-way ANOVA for FCR (first month) = Diet

a. Bartlett's test of equal variances

	Chi Sq	DF	P
Test of raw data	1.12	3	0.7719

Group variances considered equivalent.

b. ANOVA on raw data

Source	DF	SS	MS	F	P
Between	3	54.72	18.24	5.87	0.0011
Within	95	295.2	3.107		
Total	98	349.9			

c. Diet has significant effect on FCR in first month.

2. One-way ANOVA for FCR (2nd month) = Diet

a. Bartlett's test of equal variances

	Chi Sq	DF	P
Test of raw data	5.19	3	0.1585

Group variances considered equivalent.

b. ANOVA on raw data

Source	DF	SS	MS	F	P
Between	3	135.8	45.26	13.91	0.0000
Within	95	309.2	3.254		
Total	98	444.9			

c. Diet has significant effect on FCR in second month.

3. One-way ANOVA for FCR (3rd month) = Diet

a. Bartlett's test of equal variances

	Chi Sq	DF	P
Test of raw data	4.05	3	0.2564

Group variances concluded equivalent.

b. ANOVA on raw data

Source	DF	SS	MS	F	P
Between	3	205.0	68.34	21.82	0.0000
Within	95	297.5	3.132		
Total	98	502.6			

c. Diet has significant effect on FCR in third month.

4. One-way AOV for FCR (avg of 3 months) = Diet

a. Bartlett's test of equal variances

	Chi Sq	DF	P
Test of raw data	15.79	3	0.0013
Test of transformed data	11.51	3	0.0093

Group variances unequal; Kruskal-Wallis required.

b. Kruskal-Wallis one-way analysis by ranks

Kruskal-Wallis statistic	32.727
P-value (Chi Sq)	0.0000

c. Diet has significant effect on FCR averaged over three months.

APPENDIX J

ANALYSES OF FEED CONVERSION RATIOS BY INITIAL WEIGHT

A. 5 diet groups included in analysis (133 pigs)

1. One-way AOV for FCR (1st month) = Initial weight (using square root transformed data)

   a. Bartlett's test of equal variances

	Chi Sq	DF	P
Test of transformed data	4.89	2	0.0867

   Group variances considered equivalent.

   b. ANOVA on transformed data

Source	DF	SS	MS	F	P
Between	2	0.984	0.4918	2.95	0.0543
Within	130	21.65	0.1665		
Total	132	22.63			

   c. Initial weight does not have significant effect on FCR in first month.

2. One-way AOV for FCR (2nd month) = Initial weight (using square root transformed data)

   a. Bartlett's test of equal variances

	Chi Sq	DF	P
Test on transformed data	2.78	2	0.2486

   b. ANOVA on transformed data

Source	DF	SS	MS	F	P
Between	2	1.954	0.977	5.13	0.0073
Within	130	24.77	0.1906		
Total	132	26.73			

   c. Initial weight has significant effect on FCR in second month.

3. One-way AOV for FCR (3rd month) = Initial weight (using square root transformed data)

a. Bartlett's test of equal variances

	Chi Sq	DF	P
Test on transformed data	2.78	2	0.2486

Group variances concluded equivalent.

b. ANOVA on transformed data

Source	DF	SS	MS	F	P
Between	2	1.345	0.673	3.72	0.0262
Within	130	23.48	0.181		
Total	132	24.83			

c. Initial weight has significant effect on FCR in third month.

4. One-way AOV for FCR (avg of 3 months) = Initial weight (using square root transformed data)

a. Bartlett's test of equal variances

	Chi Sq	DF	P
Test of transformed data	5.33	2	0.0695

Group variances concluded equivalent.

b. ANOVA on transformed data

Source	DF	SS	MS	F	P
Between	2	1.187	0.5937	4.65	0.0112
Within	130	16.59	0.1276		
Total	132	17.77			

c. Initial weight has significant effect on FCR averaged over three months.

B. 4 diets included in analysis (99 pigs)

1. One-way AOV for FCR (1st month) = Initial weight

a. Bartlett's test of equal variances

	Chi Sq	DF	P
Test on transformed data	5.47	2	0.065

Group variances concluded equivalent.

b. ANOVA on transformed data

Source	DF	SS	MS	F	P
Between	2	4.029	2.015	0.56	0.579
Within	96	345.9	3.603		
Total	98	349.9			

c. Initial weight has no effect on FCR in first month.

2. One-way AOV for FCR (2nd month) = Initial weight

a. Bartlett's test of equal variances

	Chi Sq	DF	P
Test on transformed data	1.97	2	0.3729

Group variances concluded equivalent.

b. ANOVA on transformed data

Source	DF	SS	MS	F	P
Between	2	23.31	11.66	2.65	0.0737
Within	96	421.6	4.392		
Total	98	444.9			

c. Initial weight does not have significant effect on FCR in second month.

3. One-way AOV for FCR (3rd month) = Initial weight

a. Bartlett's test of equal variances

	Chi Sq	DF	P
Test on transformed data	0.62	2	0.7325

Group variances concluded equivalent.

b. ANOVA on transformed data

Source	DF	SS	MS	F	P
Between	2	29.6	14.8	3.00	0.0529
Within	96	472.9	4.927		
Total	98	502.6			

c. Initial weight has slightly significant effect on FCR in third month.

4. One-way AOV for FCR (avg of 3 months) = Initial weight

a. Bartlett's test of equal variances

	Chi Sq	DF	P
Test on raw data	7.35	2	0.0253
Test of tranformed data	18.07	2	0.0001

Group variances unequal; Krukal-Wallis required.

b. Kruskal-Wallist one-way analysis by ranks

Kruskal-Wallis statistic	6.0572
P-value (Chi-Sq)	0.0484

c. Initial weight has significant effect on FCR averaged over three months.

Curriculum vitae

Name: Nara Kaophong

Date of birth: 14 March 1961

Educational background:

1992 M.S. Agricultural Systems, Chiang Mai University
1982 B.A. Sociology and Anthropology, Kasetsart University

Fellowships and grants:

1989-90 Rockefeller Brothers' Foundation Grant
1988-90 Winrock International Fellowship
1980-81 Mitsui Bank Fellowship

Working experience:

1984-88 Project Evaluation Officer, Thung Luang Highland Development Project, Maejo Institute of Agricultural Technology.

1984-88 Assistant to the Vice-Rector, Maejo Institute of Agricultural Technology.

1984 Social Researcher, Royal Project, Chiang Mai.

1983 News reporter, Matoopoom Newspaper.

1981-82 Volunteer, Thai Development Reconstruction Agency.