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Comparing Characteristics of Various Agro-Ecological Zones of Pig Farming Systems; Case Study of Islands, Coastal and Lowland Pig Farming Systems in Papua and West Papua

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ABSTRACT

The objective of this study was to compare the characteristics of pig farming performances of the three different agro-ecological zones, i.e. at island, coastal and lowland ecological zones. Sites represented island pig farmers were Biak and Yapen. Samples subsequently were taken from Samofa District and South Yapen District comprised of Famboaman, Anotaurei, Mariadei and Mantembu villages. Sites in Manokwari were taken from six districts and 15 villages. Characteristic of farmers and pig keeping systems such as household information, pig population and reproduction, and social technical aspects, were studied. Participatory research using interview and observation was separately done towards 155 pig farmers. Statistical analysis used Duncan multiple comparisons and Chi-square (χ^2) were used to analyse the data. Coastal pig farmers are younger than island and lowland pig farmers. They have middle number of experiences compared to island pig farmers. The majority of farmers is men-pig farmers and has adequate household members. It was found that many are not educated and are elementary graduation. Altough their objectives are directed to commercial production system. Coastal pig farmers have higher number of animal population added to this is herd size per household compared to the two other agro-ecological zones. Feeding systems are practised in proper combination, such as feeding ration of physiological ages every day and feeding processing. Natural mating is practised by the majority of pig farmers. Several of pig farmers know the sign of oestrus, gestating and practising procedures of breed selection. Distance to market and distance to town are experienced by lowland pig farmers compared to coastal and island pig farmers. Perception of pig farmers is satisfy and they have lack of extensionist visiting, lack in middlemen visiting and positive social acceptances.

Key words: pig farming systems, agro-ecological zones, pig production, West Papua

Perbandingkan Karakteristik Berbagai Zona Agroekologi Sistem Peternakan Babi; Studi Kasus Sistem Peternakan Babi di Pulau, Pesisir dan Dataran Rendah di Papua dan Papua Barat

ABSTRAK

Tujuan dari penelitian ini adalah untuk membandingkan karakteristik kinerja peternakan babi dari tiga zona agroekologi yang berbeda, yaitu di pulau, pesisir dan dataran rendah. Zona peternakan babi di pulau direpresentasikan oleh Biak dan Yapen. Sampel diambil dari Distrik Samofa dan Yapen Selatan, meliputi Desa Famboaman, Anotaurei, Mariadei dan Mantembu. Zona di Manokwari diambil dari enam kabupaten dan 15 desa. Karakteristik peternak dan sistem budidaya seperti informasi rumah tangga, populasi babi dan reproduksi serta aspek teknis sosial dipelajari pada penelitian ini. Penelitian partisipatif dengan wawancara dan pengamatan secara terpisah dilakukan terhadap 155 peternak babi. Data dianalisis statistik menggunakan Chi-square ($\chi 2$) dan Duncan's test. Peternak babi di pesisir lebih muda daripada di pulau dan dataran rendah. Mereka memiliki pengalaman yang memadai dibandingkan dengan peternak babi di pulau dan diarahkan ke sistem peternakan komersial. Sebagian besar dari peternak adalah pria dan memiliki anggota keluarga yang tidak berpendidikan atau lulus sekolah dasar. Peternak babi pesisir memiliki populasi ternak yang lebih tinggi dibandingkan dengan dua zona agroekologi lainnya. Sistem pemberian pakan dipraktekkan dalam kombinasi yang tepat, seperti pemberian pakan sesuai umur dan dilakukan pengolahan pakan. Perkawinan secara alamiah dipraktekkan oleh sebagian besar peternak babi. Beberapa peternak babi mengetahui tanda-tanda birahi, kebuntingan dan melakukan seleksi bibit. Jarak ke pasar dan jarak ke kota yang jauh dialami oleh peternak babi dataran rendah dibandingkan dengan peternak pesisir dan pulau. Persepsi peternak adalah puas walaupun jarang dikunjungi penyuluh, pedagang dan kurangnya penerimaan sosial yang positif.

Kata kunci: sistem peternakan babi, zona agroekologi, produksi babi, Papua Barat.

INTRODUCTION

Pig production systems on tropical agro-ecosystems of each country reared are varied. These pig production systems depend on resources, in particular feeds such as crops, residues and other potential adible plants and climate elements (Kruska *et al*., 2003). Areas where available with crops can have certain animal production systems. Shapes and alternation of pig production systems tend to be determined by climates and other important relevant factors. Wet and dry seasons tend to shape livestock production systems. Many agro-ecological components have identified contributed in performing livestock production systems in Asia (Devendra, 2006). Several classifications of animal agriculture and definitions can be refered inthe articles of Kruska *et al*. (2003) and Devendra and Thomas (2002).

Other typical agro-ecological elements can beclassified into island, coastal and lowland zones. Region such Indonesia has many agro-ecological zones. They are the recognised as typical agro-ecological components. Many livestock and crops production systems are severely and evidently depended on these components. However, many production systems shaped are rarely studied and lagged behind of information. Its effects on livestock production systems were studied quite often on ruminants. Another livestock commodity which has prospect is pigs (Iyai, 2008ab).

Region where pigs are farmed in Indonesia are scare and limited. North Sumatera, Borneo, Bali, North Sulawesi, Mollucan, Flores and Papua are dependent on this animal agriculture (Liano and Siagian, 2002).

Papua has several recognised agro-ecological zones. Similar to other Indonesian regions, islands and mainland are clearly seperated.Using different agro-ecological zones, it effects have been attached by the knowledge and experience of Papuan farmers. One of their main livelihoods is raising pigs (Peters, 2001). Iyai (2008b) has classified pig keeping systems into four systems. Other important Papuan livelihoods are farming, fishing, hunting and gathering and in few numbers are working as public state officers. Ethnics of Papuan live at coastal, islands (including big and small islands), lowland and highland. They pig farming teathered and benefits the various agro-ecological zones have shaped the production of pigs.However, its typical and features of these zones are lagging behind. Therefore, the aim of this research was to characterise pig farming system performances teathered under different agro-ecological zones in Papua.

MATERIALS AND METHODS

Study Sites and Respondents

Agro-ecological zones of islands were represented by Biak and Yapenislands and coastal and lowland agro-ecological zones were subsequently represented by coastal and lowland of Manokwari. In Biak, samples were taken from Samofa district (Marjen, 2007), while in Yapen samples were taken from Angkaisera district consisted of several villages, i.e. Famboaman, Anotaurei, Mariadei and Mantembu villages (Usior, 2008) and in Manokwari samples were taken from sub district of Gayabaru (Marani, 2004; Iyai, 2008ab). Biak is located at Cenderawasih bay 0°21'-1°31' south latitude 134°47'-136°48' East Meridian with altitude of 0 - 1.000 meter above sea level, Yapen is located at 134°46’ - 137° 54’ East Meridian and 01° 27’ – 02º 50’ South Latitude and Manokwari is located at 132°30’ – 134°45’ East Meridian and 0°20’ – 2°25’ South latitude. The field study was done in Manokwari regency and involved six districts, i.e. Northern Manokwari district, Eastern Manokari District, Western Manokwari district, Warmare district, Prafi district and Masni district. Manokwari regency, which has a total area of 14.445 km^2 and possesses a population of around 161.000 inhabitants with a density of 11.51 inhabitants km^{-1}, is located at 132°30’ – 134°45’ East Meridian and 0°20’ – 2°25’ South latitude. Manokwari has relatively dense population of around 228 inhabitants per km^2. The population in Manokwari is growing in both urban and rural areas, especially in transmigration areas, such as Prafi and Masni districts.

Respondents chosen were guided by local extensionists, originated from 15 villages. In urban areas selected farmers originated from Anggrem, Borobudur, Fanindi, Wosi, Amban and Susweni villages, while in rural areas selected farmers originated at Tanah Merah, Nimbai, Waseki, Aimasi, Mokwan, Mimbowi, SP-8 Masni, Bremi and Warbefor villages. Three urban villages, Anggrem, Fanindi and Wosi, are situated on coastal areas of Manokwari as well as the two rural villages, i.e. Bremi and Warbefor, which are located in the Northern coastal line of Manokwari. Anggrem, Fanindi and Wosi are located at less than 5 m above sea level. Amban and Susweni are located at 110 m above sea level. The rural villages Bremi and Warbefor, are located less than 5 meter above sea level. While most villages in Prafi valley, such as Tanah Merah, Waseki, Nimbai, Aimasi, Mokwan, Mimbowi and SP-8 are located at about 20 to 25 meter above sea level.

Research Approach and Parameters

Participatory situation analysis (PSA) was employed to approach pig

farmers (Conroy, 2005). Interviews using questionnaire was done to collect relevant information from all pig farmers. Variable measured and observed were age of farmers (y), experience of farmer in rearing pigs (y), animal number is indicating amount of pigs reared by pig farmers (individual per households), litter size is indicating amount of borne piglets per sow/gilt of each farmer, pig species is indicating breeds species raised by pig farmers, number of feeding on offer is indicating amount of feed offered to the pig herd per day (kg), feeding sources are indicating places where feeds are collecting. Types of feeding are indicating kinds of feeding offered to pigs, feeding processing is indicating the ways feeds are provided to feeds, and infectious disease information is indicating infectious diseases experienced by pig farmers. Mating systems are the ways sows and gilts are mated, oestrous sow is indicating how farmers experiencing the signs of oestrous sows, gestating sow is indicating the sign pigs are entering the period of gestation, selection procedures are indicating how farmers selecting the high breed pigs. Qualitative measured data were wealth status, gender, education level, objective, feeding sources, feeding processing, mating systems, oestrus sows, gestating sows, selection procedures, perception of pig farming, seeing extensionist, seeing middlemen, desire to improve and social acceptances.

Data Collection and Statistical Analysis

Qualitative and quantitative data collected were entered in Excel database (2003). Analysis of data using SPPS version 18.0., was used. Due to 3×2 table, crosstab statistic using Gamma chi-square (χ^2) was used to test and measure of association. In comparing different agro-ecological zone of pig farming systems, a one-way analysis of variances (Anova) test (Ottand Longnecker, 2001) was used. Mathematical formula applied was $Yij = \mu + \alpha i + \varepsilon ij$, where Yij is variable responses (Snedecor and Cochran, 1989), consisted of ages, experience, household members, amount of animal (piglet, grower and adults), herd size, amount of feeding on offer, distances to market and distances to town; μ is overall mean, αi is effect of agro-ecological zones, i=1 is island pig farmers,2 is coastal pig farmers and 3is lowland pig farmers and εij is errors with normal distribution, N (0, I).

RESULTS AND DISCUSSION

Pig Farmers Characteristic

Ages of pig farmers at the three agro-ecological zones were significantly different ($p<0.05$). The larger age wasfound at lowland pig farmers (48.64±10.74 years old), followed by island (42.02±10.07 years old) and coastal pig farmers (41.72±9.82 years old), respectively.Ages of farmers are above average ages of productive workers in Indonesia, i.e. 17-50 years old. Contrary with finding in Columbia reported by Ocompo *et al.*(2005) that ages were varying from 12 to 45 years old. Example was informed indeed by Iyai (2008ab).

Wealth status was tested and had no association with agro-ecological zones ($p>0.05$). Many farmers had well-off livelihood of farming pigs (75 households in total). In detail 35 coastal pig farmers had well-off status in running their pig farming. While 25 island pig farmers and 15 lowland pig farmers were sharing small part. Several pig farmers as well detected were poorly performed in their livelihood resource (80 households in total). Higher number pig farmers of poorer category were found at island pig farmers (52 households) and followed subsequently by island and lowland pig farmers. Experienced pig farmers based on agro-ecological zones in terms of the starting time (amount of years) in rearing pigs were significantly different ($p<0.01$). The larger number of years in rearing pigs wasin lowland pig farmers(22.43±17.75 years), then followed

Table 1. Characteristics of pig farmers' performances at three different agro-ecological zones

Characteristic	Agro-ecological Zone						Total (n=155)		Prob.
	Islands (n=77)		Coastal (n=49)		Lowland (n=29)				
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	
Age (y)	45.02[ac]	10.07	41.72[ab]	9.82	48.64[bc]	10.74	44.61	10.33	0.015
Wealth status									
Well-off	25		35		15		75		n.s
Poor	52		15		13		80		n.s
Experiences (y)	8.79[a]	7.71	15.34[b]	12.75	22.43[c]	17.75	13.36	12.76	0.000
Gender									
Man	60		35		19		114		n.s
Women	17		14		10		41		n.s
Hh. Member	5.48	2.22	7.16	6.87	5.82	2.48	6.08	4.37	0.10
Education level									
No education	2		18		0		20		n.s
Basic	10		16		13		39		n.s
Junior	23		6		3		32		n.s
Senior	33		5		2		40		n.s
University	9		5		6		21		n.s
Objective									
Semi-Commercial	45		24		17		86		n.s
Commercial	32		25		12		69		n.s

n.s. not significant difference (p>0.05)

subsequently bycoastal and island pig farmers, i.e. 15.34±12.75 years and 8.79±7.71 years.It seems that lowland pig farmers have been commencing their pig farming prior to the other two agro-ecological zones. Experiences in Colombia (Ocompo *et al.*, 2005) shown that family nucleus was 8 persons per household. This is rather high as found in Manokwari.

Gender in line with the persons who have been responsible for raising pigs was higher at the man and was no association with agro-ecological zones (p>0.05). Higher number of gender raising pigs was in island pig farmers (17women), followed by coastal (14 women) and lowland pig farmers (10 women).Involvement of gender, particularly the ratio of man-woman, has shown responsibility. Similar finding was revealed by Nakai (2008) in hillside Thailand.

Household members amongst agro-ecological zones were not different (p>0.05). Higher number of household members was found at coastal pig farmers (7.16±6.87 persons) and followed by lowland pig farmers (5.82±2.48 persons) and island pig farmers (5.48±2.22 persons). Similar finding of household members at humid tropical agro-climate in Vietnam was also reported by Tra (2003), i.e. in range of 5-7 persons/hh. Tra also reported that mature ages of 16-55 years old was the majority of his finding. This similar finding was also experienced b Iyai (2008b).

Education levels were no associated with agro-ecological-zones (p>0.05). It could be seen that farmers with no education level were detected at coastal pig farmers (18 households) and followed by island pig farmers (2 households). Farmers with basic education (SD) were found at coastal and followed subsequently by lowland (13 households) and island (10 households). In one hand farmers with identity of junior high school (SMP) were found dominantly at island pig farmers (23 households). Senior high school farmers were found in larger number on island and in few number followed by coastal and lowland pig farmers, i.e. 5 and 2 households, respectively. University farmers were found sharing the three agro-ecological zones of

pig farming systems. It tells us that the lower education level was found at lowland pig farming system compared to the rest, i.e. island and coastal pig farmers. The fact on Table 2 tells that number of education levels of pig farmers were recently dominant at basic to university levels (32, 39 and 40 households). Similar finding of education level in affecting pig productivity in Kenya was also reported by Kagira *et al*. (2010).

Objectives of pig farmers could be grouped into semi-commercial and commercial, i.e. farmers who have objective raising their pigs for economical benefits and contrary with semi-commecial, i.e. farmers who have their pig farming for social activities compared to economical aim.No association was found in agro-ecological zone ($p>0.05$). Semi-commercial aim still dominate local pig farmers ranging from island, coastal and lowlands, respectively.

Pig Farming Characteristics

Animal number depicts the numbers of animal heads reared by pig farmers. Total animal number was significantly differerent ($p<0.01$) at agro-ecological zones. Higher number of animal heads was reared by coastal pig farmers (19.85±21.85) and subsequently followed by lowland (11.39±4.99 heads) and island pig farmers (6.75±5.51 heads). This finding was slightly larger from the finding of Tra (2003) at Vietnam, where number of population was ranged of 5-10 heads/hh and in Northen Thailand, i.e. 4 heads/hh (Kunavongkrit and Heard, 2000; Nakai, 2008). Average piglets yielded under agro-ecological zones were significantly different ($p<0.01$). Coastal pig farmers produced higher number of piglets from sows, i.e. 10.54±13.71 heads, followed by lowland pig farmers (5.53±2.38 heads) and island pig farmers (2.17±3.33 heads). This finding was in similar range of Tra (2003) in Vietnam, where piglets reared were in range of 6-11 heads/hh and in Northen Thailand (Nakai, 2008) was in average of 7 piglets/hh. This finding was slightly lower than the finding of Iyai (2008b) at Manokwari pig farming systems, i.e. in average of 6 heads. Similar report was also found by Wabacha *et al.* (2004) at Kenya pig farming system, i.e. 4 heads of born piglets/hh and number of farrowing/y was 2 times. The average grower reared was also significantly different ($p<0.01$). Average number of grower was higher at coastal pig farmer (4.56±6.23 heads/hh), followed by lowland (3.71±3.23 heads/hh) and island pig farmers (2.10±2.57 heads/hh). This number was lower than the finding of Tra (2003) at Vietnam where fatteners were found in range of 4-6 heads/hh and slightly similar to the report of Peters *et al*. (2005). Comparing sows were not significantly different ($p>0.05$). Average number of sows was higher at coastal pig farmers (3.34±5.69 heads), followed by island pig farmers (1.63±1.34 heads) and lowland (1.57±1.59 heads). The sow number found at this agro-ecological zone was higher than that of Tra (2003). Average boars raised by agro-ecological pig farmers were different ($p<0.05$). Coastal pig farmers had reared higher number of boars (1.4±2.91 heads), compared to the other two, i.e. islands (0.84±0.94 heads) and lowland (0.57±0.95 heads). In one hand, Kagira *et al*. (2010) has defined animal number based on the physiological objectives such as raising pigs for wenaners to finisher, farrow to finisher, farrow to weaner etc..Local pigs are mainly kept by farmers in developing countries (Lekule and Kyvsgaar, 2003; Chiduwa *et al*., 2008; Phookan *et al*., 2006; Lemke *et al.*, 2006). Local pigs are suitable for smallholder farmers. In Asia, many different native pigs and local breeds can be found (Oliver *et al*., 1993; Anil *et al*., 2006). Other important traits that can be economically and socially adapted are needed to be selected (Kanis *et al.*, 2008). Herd size of pigs was tested significantly different ($p<0.05$) at three agro-ecological zones. Average higher number of herd size was reared by coastal pig farmers (2.32±2.23 groups on every household). Island pig farmers had reared 1.79±1.15 groups and followed by lowland

Table 2. Characteristics of pig farming performances at three different agro-ecological zones

Characteristic	Agro-ecological Zone						Total		Prob.
	Islands (n=77)		Coastal (n=49)		Lowland (n=29)				
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	
Animal Number	6.75[a]	5.51	19.84[b]	21.85	11.39[a]	4.99	11.81	14.32	0.000
Piglets	2.17[a]	3.33	10.54[b]	13.71	5.53[a]	2.38	5.47	8.95	0.000
Grower	2.10[a]	2.57	4.56[b]	6.23	3.71[ab]	3.23	3.18	4.32	0.005
Sows	1.63[a]	1.34	3.34[b]	5.69	1.57[a]	1.59	2.17	3.51	0.016
Boars	0.84	0.94	1.4	2.91	0.57	0.95	0.97	1.84	0.111
Herd size	1.79[a]	1.15	2.32[b]	2.23	1.46[ab]	0.88	1.90	1.56	0.046
Amount of feeding ration (kg)									
Piglet (kg)	0.39[a]	0.55	1.33[b]	0.93	0.58[a]	0.71	0.73	0.83	0.000
Grower (kg)	1.25[a]	1.03	3.01[b]	1.33	1.95[c]	1.14	1.95	1.39	0.000
Adult (kg)	2.22[a]	1.32	4.42[b]	1.62	2.83[a]	1.69	3.04	1.77	0.000
Feeding sources (%)									
Paid	39		14		21		74		n.s
Swill	14		26		16		56		n.s
Cropland	21		14		18		53		n.s
Feeding processing (%)									
Cooked	41		36		15		92		n.s
Rape	36		13		14		63		n.s
Combination	15		21		10		46		n.s

pig farmers (1.46±0.88 groups each household). In contrary Tra (2003) did not measure the herd sizes of Vietnamese condition.

Amount of feeding ration offered to each animal physiological groups, i.e. piglets, grower and adult, was significant different ($p<0.01$). Appropriate amount of feeding ration was given by coastal pig farmers (1.33±0.93 kg/day) compared to the other two agro-ecological zones, i.e. lowland pig farmers (0.58±0.71 kg/day) and island pig farmers (0.39±0.55 kg/day). Similar proper feeding ration each day also was given by coastal pig farmers on grower, i.e. 3.01±1.33 kg/day, compared to the other two agro-ecological, i.e. 1.95±1.14 kg/day and 1.25±1.03 kg/day at lowland pig farmers and island pig farmers, respectively. Adult pigs given proper feeding ration was offered by coastal pig farmers, followed by lowland pig farmers, i.e. 4.42±1.62 kg/day, 2.83±1.69 kg/day and 2.22±1.32 kg/day, respectively.

Feeding sources were tested and no association between agro-ecological zones. Several farmers had to pay for obtaining food materials. In total of 74 households of pig farmers, 34 coastal pig farmers had to pay for feeds, 21 lowland pig farmers and 14 coastal pig farmers. In one hand, 26 pig farmers had to collect swill-food from kitchen and restorants. In few number of island pig farmers (14 households) and lowland pig farmers (16 households) had to collect and gather feeds from kitchen and might be from small restaurant. Island pig farmers and lowland pig farmers had dependent on farming land while 14 coastal pig farmers had farming land to obtain crops for pig feeds. Similar practises were reported by Kagira *et al*. (2010) where left over or kitchen and restaurant wastes mostly practised and followed by vegetables from farmland, swill, fruit and cassava. Commercial feeding was also practised (Kagira *et al*., 2010). Other crops products were also offered to pigs such as palm kernel (Amaufule *et al*., 2006).

Cooked feeds were mostly practised by island (41 households) and coastal pig

farmers (36 households) and 15 lowland pig farmers cooked their pig feeding. Uncooked feeding were mostly practised by island pig farmers, followed by loland and coastal pig farmers. Combination of feeding processing were mostly practised by coastal pig farmers (21 households) and followed by island pig farmers (15 households) and lowland pig farmers (10 households). Feed processing for preservation using technique of silage was done by Cargill and Mahalaya (2007) at highland pig farmer in Wamena. Vine and leaves of sweetpotato were ensilged and producing high production.

Pig Reproduction Characteristics

Mating systems practised by pig farmers consisted of two means. Natural mating system was mostly done by island pig farmers, followed by coastal pig farmers and lowland pig farmers. Unknown mating system was recorded when farmers did not know where and when pigs were doing copulation. Few farmers who were releasing their pigs would not know where and when their pigs were copulated and entering gestating period. Similar finding was also reported by Nakai (2008) at Northen Thailand, where the sows were unknown mated. Few island (17 households) and lowland (14 households) pig farmers had unknown mating system. No one did artificial insemination. Am-in *et al*. (2010) reported increasing quality of litter size on each sow where there is artificial insemination was applied.

Several pig farmers at island pig farmers (57 households) were recognised if their sows or gilts were oestrus. While 30 households coastal and 10 lowland pig farmers were recognised how their pigs were entering oestrus stage. Data on farrowing rate/y was not reported. Although Iyai (2008b) reported that farrowing rate was in average of 2 time/y. This reproduction cycle was also repoted by Nakai (2008) at Northen Thailand, i.e. 2-3 times/y.Number of farrowing was slightly similar found under this pig keeping systems, i.e. 2 times/y. Similar findings were reported in India by Kumaresan*et al.*, (2007) and in Vietnam by Lemke and Zarate(2008) and Lemke *et al.*(2008) and Roessler*et al*. (2008).

The majority of coastal pig farmers (62 hoseholds) were recognised how pigs were entering gestating period. Similar counting were found at coastal pig farmers (35 households) and lowland pig farmers (21 households).

Selection procedures were known by several island pig farmers (41 households),followed by 15 coastal and lowland pig farmers (3 housholds). The quantity of not knowing selection procedures was higher in island pig farmers (36 households) and slightly different in coastal pig farmers (34 households).The proportion of lowland pig farmers (26 households) was higher than the other two agro-ecological pig farmers.

Social Characteristics

Distance to markets is one indicator of farming productivities when farmers could have an access selling their pigs. Distance to markets were vary significantly amongst agro-ecological zones ($p<0.01$). Lowland pig farmers had lenght distances from markets. Short distances had of island (1.75±0.93 km) and coastal pig farmers (4.89±6.23 km). Distance to town was vary significantly ($p<0.01$). Distances to town were experienced by lowland pig farmers (28.21±12.33 km) and followed by coastal (3.91±7.08 km) and island pig farmers (2.01±0.90 km). Distances to markets will have positive effects on pig farming productivity when farmers have direct access in selling their pigs. Shorten distances will reduce farmers in transportation expenditure. This variable cost is frequently reported by several researcher in Manokwari, West Papua (Ropa, 2001; Warastuti, 2001; and Awom, 2010). Small-scale pig production systems vary in production intensity (use of external inputs) due to location and market access (Deka *et al.*, 2007).

Table 3. Characteristics of pig reproduction performances at three different agro-ecological zones

Characteristic	Agro-ecological Zone						Total (n=155)		Prob.
	Islands (n=77)		Coastal (n=49)		Lowland (n=29)				
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	
Mating system									
Natural	60		40		15		115		n.s
Unknown	17		9		14		40		n.s
Oestrus sow									
Yes	57		30		10		97		n.s
No	20		19		19		58		n.s
Gestating sow									
Yes	62		35		21		118		n.s
No	15		14		8		37		n.s
Selection procedures									
Yes	41		15		3		59		n.s
No	36		34		26		96		n.s

Table 4. Characteristics of social performances at three different agro-ecological zones

Social performances	Agro-ecology zones						Total (n=155)		Prob.
	Islands (n=77)		Coastal (n=49)		Lowland (n=29)				
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	
Distance to market	1.75[a]	0.93	4.89[b]	6.23	6.31[b]	3.59	3.58	4.32	0.000
Distance to town	2.01[a]	0.90	3.91[a]	7.08	28.21[b]	12.33	7.35	11.84	0.000
Perception of pig farming									
Positive	25		40		20		85		n.s
Negative	26		9		9		44		n.s
No opinion	26		0		0		26		n.s
Seeing extensionist									
Yes	18		10		16		34		n.s
No	59		39		13		112		n.s
Seeing middleman									
Yes	25		38		19		82		n.s
No	52		11		10		73		n.s
Desire to improve									
Yes	50		45		24		119		n.s
No	22		4		5		31		n.s
Social acceptance									
Accepted	47		35		20		102		n.s
Neglected	30		14		9		53		n.s

Perception of pig farming was recorded to obtain the feeling of pig farmers towards what pig farmers had. The majority of coastal pig farmers had positive experience towards their pig farming system. Island (25 households) and lowland pig farmers (20 households) had positive perception. Negative perception was higher at island pig farmers (26 households) and followed by coastal (9 households) and lowland pig farmers (9 households). Only several island pig farmers had no opinion of their pig farming.

Agro-ecological pig farmers who had contacted with extensionists were done by island pig farmers (18 households), followed by lowland (16 households) and coastal pig farmers (10 households). Many pig farmers found had no contacts with extensionists. In selling their products, middle men played prominent roles. Contacts of middlemen were frequently done by coastal pig farmers and followed by island (25 households) and lowland pig farmers (19 households). Visiting and seeing middlemen extensionist was also reported by Kagira *et al*. (2010) as the major of constraints.

In seeking their perception in order to improve their current pig farming, question of desire to improve was asked. It seemed that, in majority, changes in improving their pig farming were desired by 50 island pig farmers, 45 coastal pig farmers and 24 lowland pig farmers. In few respondents, no desire answers were not given, i.e. 22 island pig farmers, 4 coastal pig farmers and 5 lowland pig farmers.

Social acceptances were asked to obtain their experiences of neighbour perception. It seemed that several island pig farmers had positive social acceptances. Similar finding was found at coastal pig farmers (35 households) and 20 pig farmers were experienced by lowland pig farmers.Some pig farmers had expereinces for neglection. Island pig farmers (35 households) had neglected and followed by coastal (14 households) and lowland pig farmers (9 households). Similar finding was also reported by Kagira e*t al*. (2010) at Kenyan pig farming systems, where conflict with neighbour was exist.

CONCLUSIONS

Coastal pig farmers are younger than island and lowland pig farmers. They have middle number of experiences compared to island pig farmers. The majority of farmers is men-pig farmers and has adequate household members. Found that many are not educated and are elemntary graduation. Altought their objectives are directed to commercial production system. Coastal pig farmers have higher number of animal population added to this is herd size per household compared to the two other agro-ecological zones. Feeding systems are practised in proper combination, such as feeding ration of physiological ages every day and feeding processing. Sources of feeding can be in terms of paid, swill and crops. Cooked and rape feeding are practised. Natural mating is practised by the majority of pig farmers. Several of pig farmers know the sign of oestrus, gestating and practising procedures of breed selection. Distance to market and distance to town are experienced by lowland pig farmers compared to coastal and island pig farmers. Perception of pig farmers is satisfy and they have lack of extensionist visiting, lack in middlemen visiting and positive social acceptances.

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